**Nexus between income inequality and financial development in selected Latin American economies**

**Abstract**

This empirical work is aimed at verifying Kuznet inverted-U curve hypothesis in the context of financial development and income inequality for five major Latin American nations during post debt crisis of 1980s. The recently developed Han and Philips linear dynamic panel model has been employed to examine the nexus between aforementioned two variables in presence of crucial macroeconomic control variables like inflation and industrial sector output. Empirical findings support the fact that financial development at an early stage leads to higher income inequality whereas after a certain threshold level it helps in reducing poverty due to higher penetration of financial services to lower strata of the economy.

Key Words- Kuznet inverted U curve, Han-Philips linear dynamic panel, GMM

JEL Classification: B23, D63, G20

**Introduction:**

Income inequality is a major challenge to inclusive growth of any economy across the globe. Similar truth prevails for emerging economies of Latin American continent. In recent time, specially post 1990, major Latin American (LA) economies like Brazil have emerged as major economic giants in the global platform. Promising economic growth coupled with rapid financial and trade linkages with rest of the world brought a sea change in the economic health of Latin American nations in post debt crisis period of 1980s. But a sustained economic prosperity is an outcome of equitable distribution. Financial inclusion, apart from strong economic fundamentals plays a key role to egalitarian distribution of economic resources. Erstwhile financial repression and dominant position of government in respective country’s financial institutions was a major hindrance to liberalized financial system but in recent time financial market have expanded considerably in Latin American economies (Edward, 1995). Impact of financial development on economic growth is a well-documented research in economic literature. Seminal works of Rajan and Zingales (1996) argued in favour of financial growth which in turn augers economic prosperity. Some researchers thrive on impact of financial improvement on income inequality. Beck, Demirguc-Kunt and Levine (2007) argued that financial development leads to reduction in income inequality. Many an economist argues against this idea since they believe that market imperfection and information asymmetry will lead to disproportionate advantage of financial resources to handful of rich entrepreneur and leave needy businessmen in perpetuating poverty trap. Empirical work of Galor and Zeira (1993) tuned their argument in this line.

Some economists argue that growth in financial sector may not of considerable importance to poor people since they are mostly depending on informal sector which remains under-covered by formal financial sector’s emergence. Hence, financial sector growth only impacts the rich and raise inequality. Along this line of argument, Greenwood and Jovanovic (1990) hypothesized a non-linear nexus between finance and inequality. At early stages of economic development, only the rich people will have access to the limited financial services and this leads to rise in inequality. Once higher level of economic development is achieved, larger segments of society can access the growing financial services, so inequality can be reduced. This idea reflects the concept of financial Kuznet curve. Pioneering works of Banerjee and Newman (1993), Kim and Lin (2011) supported this notion where financial development after a certain threshold level is found to exert significant impact in eradicating inequality. In this context, gauging right measure for financial development becomes a challenging empirical exercise since there is no concise consensus on this notion. Number of research works attempted to quantify financial development through measures like broad money as share of gross domestic product (GDP). Some of the empirical works are based on variables like credit to private sector or market capitalization of stocks as a percentage of GDP etc. Very few research attempts are made to analyze the impact of financial development on income inequality of LA nations. This paper is an empirical investigation to find out the plausible non-linear dynamic relation between financial development and income inequality for major LA economies.

**Data and Methodology:**

Major five economies namely, Argentina, Brazil, Colombia, Mexico and Venezuela are considered for the analysis during the time period of 1990-2014. These five nations constitute more than 70% of total GDP (at purchasing power parity) of the whole Latin American countries and also constitutes majority of populations. Apart from that, according to recent working paper of Heng et. al. of IMF (2016) these nations top the list in terms of financial development among all LA nations. Net income inequality (GINI) data is extracted from World Income Inequality Database (WIID). In this paper financial development has been measured on the basis of a newly constructed index (FINDEX) which is a composite indicator of two different variables namely, broad money as share of GDP and domestic credit to private sector by banks (%GDP). Respective weights for each variable is attached on the basis of factor loadings, attained from PCA1 (Principle Component Analysis).Inclusion of financial variables like market capitalization of listed companies would have been a more rigorous exercise but unavailability of data for few countries in the sample is the main constraint to it. Aforementioned two variables from financial sector are compiled from World Bank. Apart from these, few crucial macroeconomic variables like real GDP, inflation (CPI), share of industry output (% GDP) etc. are incorporated as control variables in the empirical analysis. All these variables are taken from World Bank.

Empirical framework for this paper is structured to examine the non-linear interdependence between income inequality and financial development. Degree of financial development is considered in linear and quadratic form respectively to assess the initial incremental and consecutive detrimental impact on income inequality in presence of some selected control variables in a panel framework. Following mathematical form has been augmented for empirical investigation-

Y = α + β \*FINDEX + γ\* (FINDEX)2 + δ\* X + ε --------------------(1)

Where Y represents income inequality (GINI). α, β, γ and δ are parameters in the model. FINDEX and its square term are considered to analyze the impact of financial progress on income inequality.

As per the financial Kuznet inverted-U curve hypothesis, β is supposed to bear a negative sign whereas γ should exert positive impact on Y. X incorporates all control variables in the model and ε represents idiosyncratic error term. This naïve model can be extended to a panel framework since this empirical work incorporates five major LA nations for the time period- 1990-2014.

In panel framework, linear dynamic panel models have been extensively used to analyze interdependence of variables. Celebrated models of Arllendo and Bond (1991) and Blundell and Bond (1998) made remarkable impact on empirical research. Arllendo and Bond (1991) proposed the seminal work on dynamic model where they derived consistent generalized method of moments (GMM) estimator. But this estimator performs poorly in presence of large autoregressive parameters and if the ratio of the variance of the panel-level effect to the variance of idiosyncratic error is too large. Later on, Blundell and Bond (1998) constructed a system estimator with help of additional moment condition to overcome lacuna of existing model. But this model too suffers from a serious problem regarding identification and imposed restriction regarding initial condition which leads to plausible loss of efficiency of GMM estimators (see Hayakawa, 2007).

An alternative empirical approach has been proposed by Han and Philips (2010) which circumvent major issues of first difference and system GMM estimator. The novelty of this technique is in its differencing method which eliminates individual impact as well as the plausible correlation between regressor and error. This model also overcome the bias in estimators due to presence of unit root or near unit in data. Details of the advantages of this model over other dynamic panel models can be referred to original article of Han and Philips (2010). Following empirical structure, as proposed by Han and Philips has been employed to carry out in this paper-

Yit = αi + εit and ρ(L)uit = εit  ----------------------(2)

Yit =αi + ρ1 Yit-1 +……..+ ρpYit-p + εit --------------------- (3)

Where αi = ai(1- ρ1 – ρ2……… ρp ), i=1(1)N and t=0(1)T. N is the number of individuals and T is the number of years. L is the lag operator and αi , ρi are parameters in the model. εit is idiosyncratic error terms.

Following the X-difference technique of Han and Philips (2010) a forward looking format of the equation (3) can be augmented as-

Yit -Yis = ρ1 (Yit-1- Yis+1)+……..ρp (Yit-p- Yis+p) + εis\* ---------------------(4)

Where εis\*= εis - ∑ ρj (Yis+j- Yis-j)

The model can be further augmented by incorporating some control variables and it assumes the following form-

Yit -Yis = ρ1 (Yit-1- Yis+1)+……..ρp (Yit-p- Yis+p) + δ Xit + εis\* --------------------(5)

Where Xit is a vector of control variables in the model along with respective coefficient from δ coefficient vector.

 In the present analysis Y is the dependent variable, i.e. Gini (income inequality) for all countries over the sample period. FINDEX and its square term is incorporated in the model. Further some control variables like inflation(CPI), share of industrial output (INDUSTRY) and GDP are augmented in the model.

**Empirical Findings:**

Prior to applying the Han and Philips linear dynamic panel model all the variables are tested for stationarity and following table shows the result of Levin-Li-Chu and Im-Pesaran-Sin panel unit root tests.

**Table-1: Empirical Result of Unit Root Tests**

|  |  |  |
| --- | --- | --- |
| Variables | Levin-Li-Chu(LLC) test statistic | Im- Pesaran-Sin (IPS) tset statistic |
| Level (With trend) | First Difference(Without trend) | Level (with trend) | First Difference(without trend) |
| GINI | -1.186 (0.118) | -4.334(0.000) | 0.1348 (0.553) | -3.4126(.000) |
| FINDEX |  -1.771(0.0383) | -3.871(0.000) | -0.274( 0.392) | -4.264(0.000) |
| FINDEX^2 | -0.690(0.245) | -3.071(0.001) |  0.4289( 0.666) | -4.086(0.000) |
| GDP | -0.361(0.358) | -4.584(0.000) | 0.4229(0.663) | -3.777(0.000) |
| CPI | 0.384(0.6498) | -2.910(0.001) | -0.8397(0.200) | -3.734(0.000) |
| INDUSTRY | -0.433(.332)  | -6.555(0.000) | 0.0738(0.529) | -3.333(0.000) |

# Figures in parentheses are corresponding p-value.

From the above table it is evident that LLC and IPS tests confirm non-stationarity of the variables at level (including trend) since respective test statistics are lesser than the critical value at 1% level of significance and values in parentheses, representing corresponding p-values are higher than 0.01. On the other hand, variables at first difference are found to be stationary. In the analysis CPI, being a measure of inflation is also considered at its first difference to gauge the impact of growth in inflation on income inequality since for major LA economies suffer from persistent high level of inflation during the period of analysis. In the next stage, Han and Philips linear dynamic panel model has been employed and the empirical findings are charted in the following table. In this model GDP, CPI and INDUSTRY has been considered as control variables and financial development (FINDEX) and its quadratic form are incorporated as crucial explanatory variables. In the Han-Philips dynamic panel framework lag of the dependent variable, i.e. income inequality measure (GINI) serves as an instrumental variable. Following table briefs the empirical findings of the model. All variables are in first difference form and linear dynamic panel version of Han- Philips model is applied. Logarithmic version of the modeling technique is avoided because of some negative figures of first difference of some variables under consideration.

**Table-2: Empirical Result of Estimated Han-Philips Dynamic Panel Model**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Standard error | t value | p>|t| |
| Lag of GINI | 1.648 | 0.274 | 6.00\* \* | 0.000 |
| GDP | -0.024 | -0.006 | -4.00\*\* | 0.000 |
| FINDEX | 0.1324 | 0.0319 | 4.15\*\* | 0.000 |
| FINDEX^2 | -0.006 | 0.002 | -3.00\*\* | 0.000 |
| CPI | 0.0011 | 0.0006 | 1.79\* | 0.079 |
| INDUSTRY | -0.1472 | 0.0277 | -5.31\*\* | 0.000 |

 \* and \*\* signify statistically significant at 10% and 5% level of significance respectively.

From the above table it is evident that lag value of inequality impacts the current level since p-value of the coefficient is lesser than level of significance. Most importantly, coefficient of FINDEX is found to be positive and statistically significant whereas sign of the coefficient of square term of FINDEX is negative and statistically significant too. It confirms that at initial phase of financial development, income inequality grows but after a certain threshold level it helps in bringing down the income disparity for the economies under consideration. This finding can be further substantiated by the following quadratic fitting of data of inequality and financial development in the form of a scatter plot.

**GRPAH-1: Inverted U Shape Relation Between Income Inequlity and Financial Development**



Inverted U-shape relation between two variables is clearly indicated by the fitted curve from the data and at around the value of 50 for FINDEX2, there is point of inflection in the curve which shows that there is diminishing trend of inequality after a certain threshold for the panel. Prior to the threshold, inequality is found to bear a positive relation with financial development. This graph also indicates that Latin American countries under consideration are trapped in perpetuating viciousness of income inequality since there is lack of major steps in financial inclusion of lower strata of society though there is possibility of freeing the economy from this trap by pushing the financial inclusiveness beyond a threshold level. Countries like Brazil, Mexico and Colombia have exceeded or reached the threshold level of financial development to contain the inequality. But rest of the nations have to frame their policies in accordance to creating a congenial economic environment to auger inclusive financial development.

Apart from these, all control variables also register expected result. Growth in GDP has considerable negative impact on GINI which implies higher economic growth leads to eradication of inequality. Industrial sector growth has also strong negative impact on inequality and this is an important finding since higher level of industrialization will enhance employment opportunity in the economy and improves equity in the society. Inflation, being a major economic evil for LA nations for a long period of time is found to be detrimental to income equality since the coefficient bears a positive sign and statistically significant.

**Concluding Remarks:**

Income inequality, being a major hindrance to wholesome welfare of Latin American economies raises serious concern among policymakers. Mere economic growth and strong fundamentals may not mitigate the widening gap between influential class and the lower strata of the society. There is need for strong and penetrating financial inclusiveness in the economy. This empirical study supports the inverted U-shape Kuznet curve for the selected major LA economies during last two and half decades where financial development is found to have detrimental impact on income equity but beyond a certain threshold level it exerts considerable effect to erase inequality through different services from matured financial market. Growing financial market creates congenial economic environment along with factors like lower inflationary pressure and rapid industrial sector growth to cater the different sects of the economy and reduce inequality from the economy. Emerging economic giants from the LA sub-continent needs to focus on higher level of penetration of financial services to poorer sections and frame inclusive policies along with strong economic fundamentals to have an egalitarian economic environment.

**Endnotes:**

1. From PCA, eigenvector corresponding to first component is considered since it accounts for majority of variation in underlying series for all five countries.
2. This is an indicative and tentative average threshold value for all the countries but individual threshold may differ from country to country in which requires separate time series analysis. A quadratic expression has been fitted for the pooled data of all countries over the sample period.

**References:**

Arellano M. and Bond S (1991) Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. Review of Economic Studies 58: 277–297

Banerjee AV and Newman AF (1993) Occupational Choice and the Process of Development. The Journal of Political Economy 101 (2): 274-298

Beck T, Kunt AD and Ross L (2007) Finance, Inequality and Poor. Journal of Economic Growth 12(1): 27–49

Blundell R., and Bond S (1998) Initial conditions and moment restrictions in dynamic panel-data models. Journal of Econometrics 87: 115–143

Edwards S (1995) Crisis and reform in Latin America: From despair to hope. Oxford University Press.

Galor O, Zeira J. (1993) Income Distribution and Macroeconomics. The Review of Economics Studies 60 (1): 35-52

Greenwood J and Jovanovic B (1990) Financial Development, Growth, and the Distribution of Income. The Journal of Political Economy 98 (5): 1076-1107

Han C and Philips P (2010) GMM Estimators for Dynamic Panels with Fixed Effects and Strong Instruments at Unity. Econometrics Theory, 26: 119-151.

Hayakawa, K. (2007) Small sample bias properties of the system GMM estimator in dynamic panel data models. Economics Letters 95, 32–78.

Heng D, Ivanova A, Mariscal R, Ramakrishnan U and Wong JC (2016) Advancing Financial Development in Latin America and the Caribbean. IMF Working Paper WP/16/81.

Kim D H and Lin S C (2011) Nonlinearity in the financial development-income inequality nexus. Journal of Comparative Economics 39: 310-325.

Rajan, R. and Zigales, L. (1998) Financial Dependence and Growth. The American Economic Review, 88(3): 559-686