

STOCK MARKET AND BANKING SECTOR: ARE THEY COMPLEMENTARY FOR ECONOMIC GROWTH IN LOW HUMAN DEVELOPED ECONOMY?

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Abstract. In this study, the impact of stock market and banking sector development on economic growth is investigated by applying mean and common mean group estimators on the sample from 1989 to 2013 for low human developed countries. The empirical findings represent that among the proxies of banking sector development only credit to private sector leaves positive and significant effect on economic growth in case when it interacts with all the three proxies of stock market development. However, traded stocks and turnover ratio are significantly enhancing economic growth in case when these interact with banking sector development. This study also finds that both stock market and banking sector development are together required to increase economic growth in low human developed countries. This study also confirms the evidence of Lewis (1954) model for the selected countries. Lastly, this study proposes that credit to private sector from banking sector development in the light of stock market development must be given prime importance if economic growth is to be targeted in low human developed countries.

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I. INTRODUCTION

The importance of economic growth cannot be underestimated as it entails many welfare maximizing consequences. But what determines the rate of economic growth remains a debatable point. Variety of factors has been identified by the researchers¹ but the debate is still far away from settlement. The factors identified are very much conspicuous in Harrod – Domar model, Solow model and endogenous growth model. One of such indicators identified is financial development. Although, the relationship between financial development and economic growth has been in the discussion from the past many years and researchers have been contributing in the academic literature by empirically exploring this relationship, yet the debate is unsettled that whether development of financial sector causes economic growth or it is growth process which leads to the development of financial sector.

The importance of well-developed financial system to achieve economic growth can be traced back in the Schumpeter (1911), Gurely and Shaw (1955) and Shaw (1973). The debate of growth-finance is then further divided into bank based and market based. Here enters the debate of complementarity and/or substitutability. As while talking about the financial intermediation one cannot set aside either market based or bank based system. So the researchers started to take into account both the markets. The association between financial market development and economic growth then moved in the arena of causality which demands the delineation that which causes which. Thus, another much debated question emerges that whether finance growth nexus is demand following or supply leading. The literature suggests that if causal relationship runs from economic growth to development of financial sector then this will be named as demand following hypothesis, however, if the causal

¹ Mankiw *et al.* (1992), Sala-I-Martin (1997), Bernanke and Gurkaynak (2001), Hendry and Krolzig (2004).

relationship runs from financial development to economic growth then it will be called as supply leading hypothesis.

Besides this, the relationship between output growth and financial development may also be bidirectional which shows that if financial development accelerates economic growth then resultantly economic growth will also expand financial sector development in any economy. Another important aspect of finance and growth relation is the impact of composite term of stock market development and banking sector development (both together represents financial development) on economic growth. This reveals that whether both sectors are complementary and hence are required together to elevate economic growth or this relationship will show that both sectors are substitutes to each other. This will conclude that at one time only one sector is to be focused to enhance economic growth. In an empirical study, Cheng (2012) instead of using multiplicative interaction term, the author uses debt-to-equity ratio to explore the link between credit and equity markets. The author is of the view that an economy's development accompanied by the increase of debt-to-equity ratio confirms whether two sources of finance are complementary to each other or not? The study concludes that in Taiwan the two sources are substitutes. Therefore, the present study introduces interaction term between stock market and banking sector development to investigate the joint effect of interaction term on economic growth and this will enable us to differentiate whether both sectors are complementary or substitutes to each other for promoting economic growth in low human developed countries classified in Human Development Report of UNDP (2013).

Therefore, the present study aims to investigate the impact of financial development in the form of both banking sector and stock market development on economic growth in low human developed countries using mean and common mean group estimators. This study will also capture the effect of interaction term between stock market and banking sector development on economic growth to see whether both sectors should be taken together to promote economic growth or should they be taken separately?

The remaining study will be carried out by discussing review of the past studies in the part – 2. In part – 3, data sources, models and

estimation procedure will be presented. Afterwards, empirical results and their discussion will be discussed in part – 4. In the last and final part – 5, based on the findings of the study, conclusion and possible policy implications will be presented.

II. REVIEW OF LITERATURE

THE IMPACT OF BANKING SECTOR DEVELOPMENT ON ECONOMIC GROWTH

The effect of banking sector development on economic growth has been empirically tested by many researchers. The studies which capture the effect of banking sector development on economic growth are presented as below:

We start from the study of Moustain (2004) who after employing Johansen multivariate cointegration and Granger causality tests on sample period from 1970 to 2000 for Moroccan economy found absence of long run relationship between financial development and economic growth in Morocco. Moreover, the estimates of causality test for short run suggested that out of three proxies of banking sector development only domestic credit to private sector causes economic growth in Morocco. The study concluded that banking sector development was witnessed to be irrelevant for economic growth in Morocco. Khan *et al.* (2005) after using ARDL bounds testing technique on the sample period from 1971 to 2004, this study found that financial depth, real deposit rate and financial reforms have positive and significant impact on economic growth only in the long run in Pakistan.

Apergis *et al.* (2007) after applying panel causality test on sample period from 1975 to 2000 tested the impact of financial development on economic growth for 15 selected OECD and 50 selected non OECD countries (total 65 countries) and confirmed that proxies of financial development such as liquid liabilities, domestic credit to private sector and domestic credit provided by the banks to private sector have bidirectional causal relationship with economic growth in these selected countries. Afterwards, Perera and Paudel (2009) used Johansen multivariate cointegration and Granger causality tests on sample period from 1955 to 2005 and found unidirectional causality running from economic growth to narrow money, total credit and private sector credit

as share of total credit and from private sector credit as share of per capita nominal GDP to economic growth. The findings also confirmed bidirectional causal relationship between broad money supply and economic growth for Sri Lanka. This study confirmed evidence of demand following phenomenon for Sri Lanka. In another study Hassan *et al.* (2011) considering 168 low and middle income countries investigated the effects of different proxies of financial development like domestic credit to the private sector, domestic credit provided by the banks, liquid liabilities and savings on economic growth using sample period from 1980 to 2007. The empirical results confirmed evidence of bidirectional causal relationship between economic growth and financial development in most of the regions but, in the two poorest regions unidirectional causality was found from economic growth to financial development. This study concluded that financial development may be a necessary condition for accelerating economic growth rather than sufficient condition.

Okwo *et al.* (2012) considering M2 and domestic credit to private sector as proxies of financial sector development used least square regression and Granger causality tests on the sample from 1986 to 2010 and found that both measures of financial development may be important for strengthening financial development but these measures did not promote economic growth in Nigeria. Adu *et al.* (2013) using ARDL bounds testing approach on the sample period from 1961 to 2010 and confirmed long run relationship between financial development and economic growth in Ghana. Adusei (2013) after using GMM dynamic panel technique on the data series from 1981 to 2010 for 24 selected African countries concluded that domestic credit to private sector and liquid liabilities have significant and positive impact on economic growth in the selected African countries. The findings further concluded bidirectional causal relationship between measures of financial development and economic growth in the selected countries.

The study by Malki and Assaf (2014) using ARDL cointegration for the period from 1970 to 2008 and found that financial development in the form of bank deposit liabilities and credit to private sector has positive and significant effect on economic growth in the long run but, only bank deposit liabilities were leaving positive and significant effect on economic growth in the short run in Saudi Arabia. This study also

provided evidence of unidirectional causality running from credit to private sector to economic growth both in short and long run. Petkovski and Kjosevski (2014) applied GMM dynamic panel technique on the sample period from 1991 to 2011 on 16 transition countries from Central and South Eastern Europe. This study considered credit to private sector, interest margin and ratio of quasi money as proxies for banking sector development and found that ratio of quasi money was leaving positive and significant effect on output growth but, credit to private sector left negative and significant effect on economic growth in the selected 16 countries. The findings further showed that inflation is significantly increasing economic growth in one specification out of three specifications for the selected sample.

THE IMPACT OF STOCK MARKET DEVELOPMENT ON ECONOMIC GROWTH

Levine and Zervos (1998) after using regression analysis on the sample period from 1976 to 1993 for the selected 41 countries of the world found that stock market development had strong, significant and positive impact on economic growth and concluded that development of stock market was more effective indicator for accounting economic growth. Alajekwu *et al.* (2013) considered market capitalization, value of traded stocks and turnover ratio as proxies for stock market development and applied causality test on time series data from 1986 to 2011 for Nigerian economy and concluded that stock market development do not have significant impact on economic growth in Nigeria. Omoniyi *et al.* (2014) used market capitalization and turnover ratio to represent stock market development to examine the impact of stock market development on economic growth for Nigerian economy. After using regression analysis, the results concluded that Nigerian stock market is not matured enough to accelerate economic growth. Victor *et al.* (2015) considered four measures such as market capitalization, number of deals, all share index and total value of market transactions for representing stock market development to capture the effect of stock market on economic growth for Nigeria. After employing Johansen cointegration approach on the data from 1993 to 2013, this study found negative and significant effect of market capitalization on economic growth whereas the remaining proxies left positive and significant effect on economic growth. These findings were not robust to various diagnostic tests.

THE IMPACT OF BANKING SECTOR AND STOCK MARKET DEVELOPMENT ON ECONOMIC GROWTH

Rousseau and Wachtel (2000) after applying Difference GMM for the sample from 1980 to 1995 on the 47 selected countries of the world tested the impact of stock market and banking sector development on economic growth. By using market capitalization and value of traded stock as proxies for stock market and M3 as share of GDP and M3 as share of total population as proxies for banking sector development, the results concluded that market capitalization as share of total population and value traded along with real liquid liabilities as share of total population (M3) were significantly stimulating economic growth. However, the effect of value traded on output or economic growth was found to be stronger than that of the effect of market capitalization on output.

Yay and Oktayer (2009) after using difference GMM technique on five years averaged data from 1975 to 2006 for 37 countries (out of which 16 countries were developed and 21 were developing) and concluded that both banking and stock market development were significantly improving economic growth in all the 21 developing countries whereas, only stock market development was found in accelerating economic growth in all the 16 developed countries selected in this study. Khadraoui and Smida (2012) considered private sector credit, M3, market capitalization, financial system assets and credit deposit ratio as proxies for financial development for 70 selected developed and developing economies to capture the effect of financial development on economic growth. After applying fixed effect, difference GMM and system GMM techniques on the five years averaged data from 1970 to 2009, the results estimated using difference and system GMM techniques represent that all the proxies of financial development exerted positive and significant impact on economic growth in all the specifications whereas, the estimates of fixed effect model disclosed that all the measures of financial development were significantly enhancing economic growth except credit to deposit ratio.

Rahimzadeh (2012) took market capitalization, value of traded shares and turnover ratio as proxies for stock market development and domestic credit to private sector as proxy for banking sector development 11 selected countries of Middle East and North Africa to explore the

effects of stock market and banking sector development on economic growth. After applying panel co-integration and random effect models on the data series from 1990 to 2011, this study concluded that stock market did not affect economic growth whereas, only banking sector development was found in accelerating economic growth in selected countries of Middle East and North Africa. Chaudhry *et al.* (2012) used broad money supply, credit to private sector and market capitalization to capture the effect of financial development on economic growth for Pakistan. After using Engle Grange based cointegration method and error correction model on the data series from 1972 to 2006, this study found that both broad money supply and credit to private sector were significantly increasing economic growth in short run. In an equation when market capitalization regressed with broad money supply both were significantly increasing economic growth but in an equation when market capitalization is regressed with credit to private sector then only market capitalization was significantly increasing economic growth in Pakistan.

Awan and Iftekhhar (2015) considered market capitalization, stock traded value and stock turnover ratio as proxies for stock market development and M2 as proxy for banking sector development or financial intermediation. After applying ordinary least square regression and Granger causality test on the sample period from 1988 to 2012, this study found positive and significant effect of traded stock on economic growth and negative and significant effect of M2 on economic growth in Pakistan. The results further provided evidence of unidirectional causal relationship running from market capitalization to economic growth and bidirectional causal relationship between economic growth and M2 for Pakistan.

After discussing literature on the relationship between stock market, banking sector development and economic growth. Now we present data source, model and methodology in the next part – 3 which is given as below:

III. DATA SOURCE, MODEL AND METHODOLOGY

The detail of this part is presented as below:

DATA SOURCE

The data for all the variables such as market capitalization, stock traded, turnover ratio, domestic credit to private sector, money supply, remittances, consumer price index, urban and rural populations has been obtained for the period from 1989 to 2013 from World Development Indicators (2015), World Bank² for the 10 low human developed countries [Bangladesh, Cote d'Ivoire, Kenya, Nigeria, Pakistan, Papua New Guinea, Tanzania, Uganda, Zambia and Zimbabwe]. These countries have been selected on the basis of the value of human development index proposed in Human Development Report of UNDP (2013).

MODEL OF THE STUDY

In this study we have conceptualized six models for each low human developed countries using double logged transformation approach as results through double logged transformation are more efficient and consistent [Ehrlich (1977), Bowers and Pierce (1975), Layson (1983), Cameron (1994) and Ehrlich (1996)]. The conceptualized functional forms of the models are proposed as below:

$$\text{LGDP} = f[\text{LMC}, \text{LBMS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LMC} \times \text{LBMS}] \quad (1)$$

$$\text{LGDP} = f[\text{LMC}, \text{LDCTPS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LMC} \times \text{LDCTPS}] \quad (2)$$

$$\text{LGDP} = f[\text{LST}, \text{LBMS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LST} \times \text{LBMS}] \quad (3)$$

$$\text{LGDP} = f[\text{LST}, \text{LDCTPS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LST} \times \text{LDCTPS}] \quad (4)$$

$$\text{LGDP} = f[\text{LTURNRA}, \text{LBMS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LTURNRA} \times \text{LBMS}] \quad (5)$$

²<http://data.worldbank.org/data-catalog/world-development-indicators>

$$\text{LGDP} = f [\text{LTURNRA}, \text{LDCTPS}, \text{LCPI}, \text{LREM}, \text{LMIG}, \text{LTURNRA} \times \text{LDCTPS}] \quad (6)$$

Whereas;

TABLE 1
Construction and Description of the Variables

Variable Representation	Variable Composition	Name of the Variables	Proxy For	Variable Description
LGDP	$\ln(\text{GDP})$	Gross domestic product	Economic Growth	This variable has been obtained from World Development Indicators (CD – ROM 2015) in constant dollar form.
LMC	$\ln(\text{MC} / \text{GDP})$	Market capitalization as share of gross domestic product	Stock Market Development (SMD)	This variable has been obtained by taking the ratio of market capitalization to gross domestic product.
LST	$\ln(\text{ST} / \text{GDP})$	Stock traded as share of gross domestic product		This variable has been composed by taking the ratio of total traded stocks to gross domestic product.
LTURNRA	$\ln(\text{TURNRA})$	Turnover ratio		This variable has been constructed by taking the ratio of market capitalization to the traded stocks
LBMS	$\ln(\text{BMS} / \text{GDP})$	Broad money supply as share of GDP	Banking Sector Development (BSD)	This variable has been estimated by dividing M2 on gross domestic product.
LDCTPS	$\ln(\text{DCTPS} / \text{GDP})$	Domestic credit provided to private sector as share of GDP		After dividing domestic credit to private sector on gross domestic product, we obtain this variable.
LBSD x LSMD	$\ln(\text{BSD}) \times \ln(\text{SMD})$	Proxy specific interaction term of both banking sector and stock market development		This variable will be obtained by multiplying each proxy of stock market development with the each proxy of banking sector development.
LCPI	$\ln(\text{CPI})$	Consumer Price Index	Control Variable	This variable was directly obtained from world development indicators.
LREM	$\ln(\text{REM} / \text{GDP})$	Net inflows of remittances as share of gross domestic product	Control Variable	This variable has been taken after dividing net inflows of remittances on gross domestic product.
LMIG	$\ln(\text{URBPOP} / \text{RURPOP})$	Internal or domestic migration	Control Variable	This variable has been developed by taking the ratio of urban population to rural population.

As all the proxies of both banking sector development and stock market development are expected to have positive impact on economic growth so the objective of the estimation is to analyze which one of them is more elastic and whether the selected pair of proxies are complement or substitutes to each other in terms of their marginal impact on the GDP. The structure of the model is given as below:

METHODOLOGY FRAMEWORK

As we have obtained a large sample in terms of time and cross sections which will imply that the assumption 2 of OLS “*X values are fixed in repeated sampling*” might be violated [Gujrati (2012)], therefore, we will initiate our analysis from estimating unit root problem by using LLC (2002), IPS (2003), Fisher ADF and Fisher Phillip Perron [extracted from Maddala and Wu (1999) and Choi (2001)] unit root tests which will check whether weak version of assumption 2 is fulfilled. If there will be evidence of unit root then mean and variance of the variables will not be constant i.e. violation of assumption 2³. Afterwards we would also apply Pesaran CIPS (2007) unit root test for checking whether there prevails any cross-sectional dependence. Afterwards, we will employ Kao (1999) and Pedroni (2004) panel cointegration tests from the first generation panel cointegration models and Westerlund (2007) panel cointegration test from second generation panel cointegration model for investigating long run cointegration between economic growth and financial development in the form of banking sector development and stock market development considering inflation, inflow of remittances and internal migration as control variables^{4,5}. In the next step, we will find out marginal impact of each factor on economic growth using mean group [Pesaran and Ron (1995)] and common mean group [Pesaran (2006)]

³ The strong version of the assumption was that the distribution of the series must be constant, since we do not have population data to check this, hence we usually check the weak version which states that if the mean and variance of the series are constant then it will mean that it can be expected that the distribution is same means, it is weak or covariance stationary [Johnston and DiNardo (2000)].

⁴ First generation cointegration tests are based on assumption that the cross sections are independent

⁵ Second generation cointegration tests are applicable even if the cross sections are dependent

estimators. The speed of convergence will be tested by using error correction specification. The results will be filtered using various diagnostic tests such as time series hetroskedasticity developed by Breusch and Pagan (1979) for the efficiency of the model, first order time series autocorrelation for the validity of the model⁶, cross-sectional dependence test developed by Pesaran (2004) for the validity of the model and Pesaran (2007) CIPS unit root test of residuals to check the spuriousness of the estimates.

IV. RESULTS AND DISCUSSION

The descriptive statistics Table – 2 shows some basic statistics for each of the variable used in the estimation process. Other than natural log of traded stocks (lnST), natural log of turnover ratio (lnTURNRA) and natural of remittances (lnREMIT), all other variables have mean larger than their standard deviation which means that all variables are under dispersed (dispersion is smaller than the mean value) while the three mentioned variables are over dispersed (dispersion is larger than the mean value). This shows that for our selected countries these three mentioned variables are highly different from each other while other variables resemble each other because of the fact that these countries are from same group. The mean values of the proxies of stock market development such as (lnMC, lnST, lnTURNRA) and proxies of banking sector development such as (lnBMS, lnDCTPS) will be used later for the interpretation of the composite terms.

The Kurtosis value of the variables like lnTURNRA and lnDCTPS is almost equal to 3 while others show that there are either too many (kurtosis > 3) or too few (kurtosis < 3) outliers in the data as compared to a normal distribution thus indicating cross sectional hetroskedasticity. This means that any theoretical model developed from this data should not be estimated using pooled OLS which assumes that all the cross sections are same in each and every aspect. The results of variance inflation matrix are presented in Table – 4.2, which show that the calculated values of VIF for all independent variables are less than 10

⁶ First order autocorrelation testing using AR(1) model of residuals [Gujrati (2012)].

hence it is concluded that there is no evidence of multicollinearity problem in low human developed countries.

TABLE 2
Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
lnGDP	23.53	23.30	25.90	21.83	1.10	0.51	2.02
lnMC	2.41	2.42	6.19	-0.60	1.34	-0.08	2.61
lnST	-0.79	-1.05	4.86	-5.74	2.12	0.48	2.65
lnTURNRA	1.42	1.23	6.21	-2.17	1.74	0.50	3.22
lnBMS	3.36	3.36	5.02	1.99	0.43	-0.16	3.68
lnDCTPS	2.82	2.85	4.64	0.46	0.64	-0.63	3.26
lnMIG	3.60	3.67	4.69	2.44	0.60	-0.22	1.89
lnREMIT	-0.26	-0.02	2.72	-5.61	1.94	-0.62	2.51
lnCPI	3.55	4.23	5.41	-4.28	1.98	-2.31	8.03

After discussing the estimates of variance inflation factor, the estimates of unit root test are going to be discussed. Five types of panel unit root tests (such as LLC, Breitung, IPS, Fisher ADF and Fisher Phillip – Perron) are applied with intercept configuration on natural log of gross domestic product, natural log of market capitalization, natural log of stock traded, natural log of turnover ratio, natural log of broad money supply, natural log of domestic credit to private sector, natural log of migration, natural log of remittances and natural log of consumer price index both at level and at first difference. The null hypothesis of LLC unit root test suggests that panel series is nonstationary and alternative hypothesis states that panel series is stationary. At level we accept null hypothesis for natural logs of GDP, broad money supply, domestic credit to private sector and remittances and we accept alternative hypothesis for the remaining series. When all these variables are tested for first difference then we accept alternative hypothesis and conclude that all the variables are stationary at first difference according to LLC unit root test. Moreover, Breitung unit root test follows the same null and alternative hypotheses as LLC unit root test follows. According to Breitung unit root

test, all panel series are nonstationary but only natural log of stock traded and natural log of migration are witnessed to be stationary at level but all the selected variables are stationary at first difference.

Afterwards, the null hypothesis of all panel series contain unit root suggested by IPS unit root test is tested against its alternative hypothesis of some panel series are stationary. The results confirm that all the panel series are nonstationary except natural log of stock traded at level whereas at first difference all the panel series are stationary. Besides this two further unit root tests are applied Fisher ADF and Fisher Phillip – Perron. These tests follow the same null and alternative hypotheses and the null hypothesis states that panel series are nonstationary whereas alternative hypothesis states that at least one panel series is stationary. The results confirmed that all the panel series are nonstationary at level except natural logs of turnover ratio and consumer price index according to Fisher ADF unit root test whereas according to Fisher Phillip – Perron unit root test all panel series are nonstationary at level except natural logs of turnover ratio, remittances and consumer price index. However, according to the estimates of Fisher ADF and Fisher Phillip – Perron unit root tests all the panel series become stationary at first difference. On the basis of the results of various unit root test, we may conclude that panel series taken in this study follow mixed order of integration as some variables are stationary at level and some are stationary at first difference. The results are reported in the Table – 3 and Table – 4 as below:

TABLE 3
Variance of Inflation Factor (VIF) Matrix

	lnGDP	lnMC	lnST	lnTURNRA	lnBMS	lnDCTPS	lnMIG	lnREMIT	lnCPI
lnGDP	–								
lnMC	1.00	–							
lnST	1.30	1.40	–						
lnTURNRA	1.68	1.00	2.73	–					
lnBMS	1.13	1.56	1.76	1.20	–				
lnDCTPS	1.12	1.46	1.62	1.15	3.04	–			
lnMIG	1.28	1.04	1.23	1.19	1.02	1.04	–		

	lnGDP	lnMC	lnST	lnTURNRA	lnBMS	lnDCTPS	lnMIG	lnREMIT	lnCPI
lnREMIT	1.31	1.10	1.01	1.09	1.00	1.00	1.00	–	
lnCPI	1.11	1.01	1.00	1.00	1.01	1.01	1.02	1.52	–

TABLE 4
Unit Root Test

Unit Root Test At Level					
Variables	LLC	Breitung	IPS	ADF	PP
lnGDP	6.42 (1.00)	0.48 (0.68)	8.86 (1.00)	2.34 (1.00)	1.79 (1.00)
lnMC	-1.47 (0.07)	-0.18 (0.43)	-0.82 (0.20)	22.56 (0.26)	20.59 (0.42)
lnST	-2.3 (0.01)	-1.5 (0.09)	-1.43 (0.07)	27.68 (0.12)	36.13 (0.11)
lnTURNRA	-3.61 (0.00)	0.46 (0.67)	3.87 (0.10)	2.62 (0.08)	52.61 (0.00)
lnBMS	-0.80 (0.21)	0.30 (0.62)	-0.05 (0.47)	18.83 (0.47)	15.18 (0.76)
lnDCTPS	0.73 (0.76)	1.20 (0.88)	0.29 (0.61)	25.75 (0.17)	23.83 (0.24)
lnMIG	-15.52 (0.00)	-1.33 (0.09)	-0.799 (0.21)	27.87 (0.11)	28.50 (0.10)
lnREMIT	0.24 (0.59)	2.20 (0.98)	0.72 (0.77)	23.73 (0.25)	35.74 (0.02)
lnCPI	-1.56 (0.05)	2.68 (0.99)	-0.37 (0.35)	33.18 (0.03)	58.25 (0.00)
Unit Root Tests At First Difference					
Δ lnGDP	-1.84 (0.03)	-1.29 (0.09)	-2.97 (0.00)	79.76 (0.00)	76.99 (0.00)
Δ lnMC	-2.68 (0.00)	-2.01 (0.02)	-11.79 (0.00)	55.87 (0.00)	288.2 (0.00)
Δ lnST	-13.66 (0.00)	-3.08 (0.00)	-11.99 (0.00)	40.50 (0.00)	341.7 (0.00)
Δ lnTURNRA	-		-11.59 (0.00)	48.95 (0.00)	422.6 (0.00)
Δ lnBMS	-9.47 (0.00)	-1.82 (0.03)	-10.44 (0.00)	38.93 (0.01)	199.4 (0.00)
Δ lnDCTPS	-11.04 (0.00)	-4.77 (0.00)	-10.62 (0.00)	62.66 (0.00)	219.6 (0.00)
Δ lnMIG	-2.33 (0.01)	-1.36 (0.08)	-2.37 (0.01)	189.1 (0.00)	92.20 (0.00)
Δ lnREMIT	-8.26 (0.00)	-1.43 (0.07)	-9.93 (0.00)	86.60 (0.00)	286.6 (0.00)
Δ lnCPI	-4.08 (0.00)	-1.55 (0.06)	-4.56 (0.00)	57.83 (0.00)	85.79 (0.00)

Note: Values reported in () are the probability values.

After discussing the order of integration of the panel series, now the long run relationship between stock market, banking sector development and economic growth along with some other control variables is tested. Three types of panel cointegration tests such as Kao Panel Cointegration Test, Pedroni Panel Cointegration Test and Westerlund Error Corrected

Based Panel Cointegration Test are applied. The results reported in Table – 5 confirm that for the models of market capitalization and broad money supply and stock traded and broad money supply, for each case one indicator from Westerlund test reveal presence of cointegration. The results are presented in the following Table – 5:

TABLE 5
Cointegration Test

Model of Low Human Developed Countries								
Cointegration Test	Models	Dependent Variable: lnGDP			Control Variable: lnCPI, lnMigration			
		lnMC + lnBMS	lnST + lnBMS	lnTURNRA + lnBMS	lnMC + lnDCTPS	lnST + lnDCTPS	lnTURNRA + lnDCTPS	
Alternative Hypothesis: Cointegration is Present								
Kao	t	-0.10 (0.45)	0.07 (0.47)	-0.33 (0.36)	-1.37 (0.08)	-1.58 (0.06)	1.62 (0.05)	
Alternative Hypothesis : Cointegration with Common AR Coefficients								
Pedroni	Pv	0.63 (0.74)	-0.07 (0.53)	0.12 (0.45)	-0.91 (0.92)	-1.25 (0.68)	-0.38 (0.64)	
	Prho	2.57 (0.99)	1.99 (0.98)	1.63 (0.95)	2.73 (0.99)	2.91 (0.98)	1.81 (0.96)	
	Ppp	1.60 (0.94)	0.38 (0.65)	-0.23 (0.41)	1.93 (0.97)	1.94 (0.65)	-0.12 (0.45)	
	Padf	2.35 (0.90)	1.20 (0.82)	1.03 (0.33)	2.52 (0.96)	3.83 (0.58)	1.69(0.27)	
	Alternative Hypothesis: Cointegration with Individual AR Coefficients							
	Grho	3.27 (0.99)	3.21(0.99)	2.87 (0.99)	3.64 (0.99)	3.12 (0.99)	2.92 (0.99)	
	Gpp	1.23 (0.89)	0.53(0.70)	0.07 (0.53)	2.30 (0.99)	0.70 (0.76)	0.25 (0.60)	
	Gadf	2.27 (0.91)	1.54(0.86)	1.43 (0.55)	2.90 (0.99)	2.28 (0.68)	2.20(0.48)	
Alternative Hypothesis: Cointegration is Present								
Westerlund	Gt	-1.54(0.33)	4.07(0.20)	1.04(0.00)	5.96 (1.00)	5.03 (1.00)	2.33 (0.00)	
	Ga	-6.22(0.00)	5.31(1.00)	5.06 (1.00)	5.49 (1.00)	4.97 (1.00)	5.16 (1.00)	
	Pt	-3.13(0.67)	1.09(0.00)	-0.24(0.00)	5.88 (1.00)	5.32 (1.00)	1.69 (0.00)	
	Pa	-4.13(0.67)	3.92(0.80)	3.64(1.00)	4.13 (1.00)	3.92 (1.00)	3.66 (0.60)	

Note: Values reported in () are the probability values.

For the case of turnover ratio and broad money supply two indicators from the Westerlund provide evidence of cointegration. Afterwards, one indicator of Kao test provides evidence of cointegration for the case of market capitalization and domestic credit to private sector and for the case of stock traded and domestic credit to private sector. Lastly for the case of turnover ratio and domestic credit to private sector, one indicator from Kao test and two indicators from Westerlund cointegration test

confirm presence of cointegration. Therefore, on the basis of the results reported in the Table – 5, we may conclude that economic growth, stock market and banking sector development along with other controls have long run relationship in low human developed countries.

After discussing the estimates of cointegration test for the low human developed countries, now may present the results and discussion of the long run coefficients in the Table – 6. The results presented in the Table – 6 show six sub models for the case of low human development countries. In these six sub models three proxies of stock market development and two proxies of banking sector development are alternatively used as pairs with each other. Since this study has used the cross product of these proxies hence the individual coefficients will only provide the marginal impact of that proxy only. In order to see the overall effect of that proxy the new coefficient will be calculated from the cross product. The below given formula will provide the adjusted coefficients. This study will apply joint significance test in order to test the significance of adjusted coefficients and the coefficients of cross product terms.

Overall Effect of Stock Market Proxy = Coefficient of Stock Market Proxy + [(Coefficient of
Corss Product) X (Mean Vlaue of Banking Sector Proxy)]

Similarly

Overall Effect of Banking Sector Proxy = Coefficient of Banking Sector Proxy + [(Coefficient of
Corss Product) X (Mean Vlaue of Stock Market Proxy)]

In case of low human developed countries in the first three models the individual coefficients of the proxies of stock market development are insignificant and they are significant in the last three models but with negative sign. Almost similar situation is with the money supply. Money supply is either insignificant or has negative sign. In case of stock market development, the reason could be the low depth of stock market. In case of money supply, the possible reason could be deficit financing. Deficit financing in the long run may not be pro-growth. Besides, one should be cautious while interpreting these coefficients as the regression also includes interaction term and interaction term may render coefficients insignificant. The main effects are either insignificant or significant with negative sign. However, it is noticeable that domestic credit to private sector is performing better relative to money supply. This reinforces our

conjecture that excess money supply might be going into deficit financing. Domestic credit to private sector is positive and significant in one case. As the credit to private sector is private investment so positive impact is understandable also for the reason that increase in money supply may not be necessarily equal to investment. The higher efficiency of private credit over money supply is also evident from the cross product. In cross product, credit to private term is positive and statistically significant with all three proxies of stock market development. One possible interpretation is that private sector in less developed countries is credit hungry and once the credit is advanced to the firms, GDP growth picks up. However, a counter to the above arguments could be that if the firms are credit hungry then why market capitalization is insignificant? Variety of possible interpretations can be put forward in this regard; (i) stock markets are generally shallow in low human developed countries or (ii) the number of enlisted firms in stock market may be low. Less developed countries are, a priori, bank based or banks are relatively more important. This has been aptly described by Shah (2009) which states that banking subsector dominates that financial sector whereas equity market plays relatively small role. Similarly, Anwar (2011) in his speech highlighted that banking system constitutes 88 percent of the total financial sector in Pakistan. The results are reported in the following Table – 6:

TABLE 6
Long Run Coefficients and Speed of Adjustment

Model of Low Human Developed Countries (Dependent Variable lnGDP)						
Variables	Coef (prob)	Coef (prob)	Coef (prob)	Coef (prob)	Coef (prob)	Coef (prob)
Indicators of Stock Market Development						
lnMC	0.057 (0.78)			-0.169 (0.06)		
lnST		0.03 (0.56)			-0.23 (0.07)	
lnTURNRA			-0.11 (0.47)			-0.148 (0.02)
Indicators of Banking Sector Development						
LnBMS	0.07 (0.65)	-0.08 (0.01)	0.128 (0.122)			
lnDCTPS				-0.08 (0.5)	0.23 (0.02)	0.05 (0.55)
Control Variables						
lnMIG	0.79 (0.26)	-0.18 (0.75)	1.32 (0.05)	1.49 (0.00)	1.00 (0.06)	1.66 (0.00)
lnREMIT	0.029 (0.06)	0.034 (0.05)	0.033 (0.47)	-0.01 (0.62)	-0.09 (0.16)	-0.041 (0.25)
lnCPI	-0.06 (0.283)		-0.17 (0.02)	0.091 (0.25)		0.12 (0.24)
Cross Products						
lnMC * lnBMS	-0.01 (0.83)					
lnST * lnBMS		-0.008 (0.59)				
lnTURNRA * lnBMS			0.035 (0.47)			
lnMC * lnDCTPS				0.059 (0.04)		

lnST * lnDCTPS					0.10 (0.04)	
lnTURNRA * lnDCTPS						0.06 (0.03)
CONSTANT	-5.55 (0.58)	-5.59 (0.471)	-5.26 (0.23)	18.03 (0.00)	19.31 (0.00)	16.89 (0.00)
Adjusted Coefficients						
lnMC	0.023			-0.003		
lnST		0.003			0.052	
lnTURNRA			0.0076			0.02
lnBMS	0.046	-0.07	0.177			
lnDCTPS				0.062	0.151	0.13
Joint Wald Test for Testing Significance of Adjusted Coefficients						
Inst1 & (Inst1 * inst 2) ⁷	0.66 (0.72)	1.03 (0.60)	0.52 (0.77)	4.50 (0.10)	5.04 (0.08)	5.32 (0.06)
Inst2 & (Inst1 * inst 2) ⁸	0.75 (0.69)	7.84 (0.02)	3.30 (0.19)	36.32 (0.00)	5.43 (0.07)	8.79 (0.01)
Convergence & significance ⁹ [ecm _{t-1}]	-0.34 (0.02)	-0.38 (0.02)	-0.73 (0.00)	-0.14 (0.00)	-0.55 (0.00)	-0.20 (0.00)
Models	CMG	CMG	CMG	MG	CMG	MG

Note: Values reported in () are the probability values.

The individual coefficients do not conform to the theory. Beyond doubt, growth is a complex process and it can be safely assumed that institutions are not pro-growth in low human developed countries. Besides, there is need to look in the substitutability and complementarities of the relationship. There is a complementarity between private sector credit and stock market proxies. Interestingly, all the individual coefficients of stock market which were negative and significant turned up positive and significant in the interaction term with credit to private sector. This means that banking and stock exchange are complementary in low human developed countries. For the net effect, adjusted coefficients are the representative ones. The net effects in case of equity market proxies, given the level of money supply remain insignificant. This is not surprising, as we have already raised the point that if money supply is going into the deficit financing, the positive significant effect is highly improbable. For instance, as highlighted by Fundanga (2011), in Zambia, which is also in the sample, though budget

⁷ This is joint coefficient restriction test on the stock market indicator and the cross product

⁸ This is joint coefficient restriction test on the banking sector indicator and the cross product

⁹ This is the value of ECM in short run and its probability value. For the convergence to exist it must be negative and significant

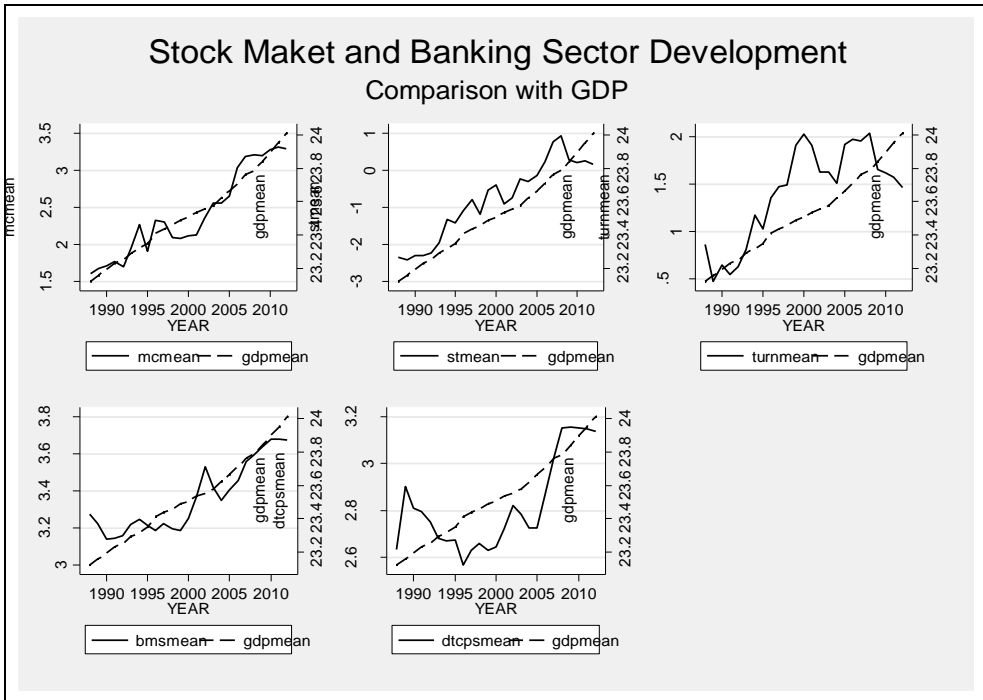
deficit declined to 2.2 percent of GDP in 2010 but it was 8 percent of GDP in 2001. Contrary to the money supply, the net effects in case of equity market proxies, given the level of private sector credit is positive and significant. Similarly, the net effect of credit to private sector conditioned upon the level of equity market proxies is positive and significant. This all warrants that credit to private sector is a crucial variable for the GDP growth. This is, of course, quite intuitive also.

Comparing with the existing literature, the following situation emerges. Qayyum *et al.* (2012) found that liquid liabilities and private sector credit did not affect economic growth significantly but the interaction terms of both liquid liabilities and domestic credit to private sector with inflation were leaving significant and negative effect on economic growth in 9 selected low income countries. The findings further reveal that market capitalization and value of traded stocks were significantly enhancing economic growth but interaction terms of these measures with inflation were significantly hindering economic growth into these selected countries. The results are in contrast with ours. Enisan and Olufisayo (2009) also found that long run relationship does not exist in case of Cote d'Ivoire, Nigeria, Kenya, and Zimbabwe. However, the results of Chaudhry *et al.* (2012) confirmed long run co-integration between financial development and economic growth in Pakistan. This is in line with this study.

To an extent the relationship between GDP growth and market capitalization, stock traded and turnover ratio can also be explained through the graphic relationship between the two, respectively. The sharp divergence between turnover ratio and GDP is also evident from the negative sign of the coefficient (See Figure 1).

Regarding, control variables, migration impacts economic growth positively and significantly. Keeping this in mind, it can be safely assumed that Lewis (1954) model of development is at work in the low human development countries. On the whole, it can be concluded that domestic credit to private sector emerges as a significant determinant of GDP growth.

FIGURE 1
 Relationship between Stock Market, Banking Sector and
 Economic Growth in Low Human Development Countries



As far as the short run coefficients for these six sub models are concerned, we are only reporting the coefficients of ecm_{t-1} in Table 6. The negative and significant coefficient of ecm_{t-1} will ensure convergence hypothesis which reveals that if any macroeconomic shock hits in low human developed countries then the six proposed models have power to restore to stable and long run equilibrium. From the results we could see that the coefficient of ecm_{t-1} has found to be negative and significant therefore, it confirms the prevalence of convergence hypothesis in low human developed countries.

DIAGNOSTIC TEST

The Table 7 provides summary of all the diagnostic tests for all the estimated models for low human developed countries. The diagnostic tests include F test of the overall model to see its fitness and its p value to

decide which hypothesis is accepted¹⁰, RMSE value to compare efficiency with other models, Heteroskedasticity test to see presence of heteroskedasticity in the model, Residual stationary test to see if the model is cointegrated or spurious, cross sectional dependence test which checks the cross sectional correlation among the model, convergence and significance test provides the coefficient of convergence variable in the short run model and its probability value (P – Value) showing its significance. The results reported in Table 7 show that the value of F – test is significant for all the six specifications at 1% level of significance, which shows that all of the models are fit and the proposed independent variables are significantly explaining the variation in the dependent variable. While comparing the value of Root Mean Square Error, it could be seen that all of the values are almost similar showing that the efficiency level is almost similar for all six models. Heteroskedasticity test uses the R square and the sample size of the residual equation as illustrated in the methodology chapter, the product of these two follows chi – square distribution, if this chi – square value is smaller than the critical value we can safely say that there is not heteroskedasticity since null hypothesis will be accepted¹¹.

Since there are 5 independent variables in the heteroskedasticity test equation so the degree of freedom is 5 and at 5% level the critical value from the chi square distribution table is 10.07 and while comparing all of the six values it can be seen that there is no evidence of heteroskedasticity in all the six models of low human developed countries. The fourth diagnostic is the stationarity test of the residuals, the purpose of this test is to confirm whether residuals are stationary or not or whether all the I (1) variables are forming cointegrated relation or are the estimated results are spurious. The CIPS panel unit root test is used to test stationarity of residuals, the null hypothesis of the test is that the variable is non stationary and the alternative hypothesis is that the variable is stationary in nature at this level. The table shows the CIPS test value and p value. It can be seen that all of the P values are less than 0.05 ensuring acceptance of alternative hypothesis at 5% level. Hence it can be said that all the six estimated residuals are stationary leading to equations being cointegrated.

¹⁰ Ho: Model not fit , H1: Model is fit

¹¹ Ho: no heteroskedasticity, H1: model has heteroskedasticity

The fifth diagnostic is the cross sectional autocorrelation test also called cross sectional dependence, the null hypothesis is that the cross sections are independent and the alternative hypothesis is that the cross sectionals are dependent. From the results we may see that for all the six estimated equations, none of the probability value is less than 0.05 confirming acceptance of null hypothesis in all the cases hence there is not cross sectional autocorrelation issue in low human developed countries. The results are given in Table 7:

TABLE 7
Overall Diagnostics for all the Groups

Group	Low Human Developed Countries
Model Fitness and Comparison	
F test (Probability – Value)	12.78 (0.04), 24.45 (0.00), 57.09 (0.00), 112.7 (0.00), 104.4 (0.00), 201.6 (0.00)
RMSE ¹²	0.018, 0.015, 0.019, 0.067, 0.060, 0.050
Diagnostics	
Heteroskedasticity Test (chi2 value) ¹³	250*0.02 = 5.00, 250*0.02 = 5.00, 249*0.016 = 4.98, 250*0.029 = 7.25, 250*0.025 = 6.25, 249*0.017 = 4.2
Residual Stationarity / Autocorrelation test (CIPS P value) ¹⁴	-11.14 (0.00), -11.63 (0.00), -10.11 (0.00), -3.69 (0.00), -4.58 (0.00), -4.74 (0.00)
Cross Dependence Test Test (p value) ¹⁵	-0.02 (0.98), -0.56 (0.57), -1.58 (0.11), 1.65 (0.10), 1.44 (0.15), 0.42 (0.67)

Note: Values reported in () are the probability values.

¹² RMSE is used to compare across models since all of them are almost similar hence they have similar efficiency level

¹³ The critical value from the chi square table at 5% is 14.067, the first row is background calculation and the second row is the calculated chi square value which is compared against the critical value. The null hypothesis here is that there is no heteroskedasticity.

¹⁴ This is panel unit root CIPS test p value, here null hypothesis is that the residuals are non-stationary

¹⁵ These are p values of cross sectional dependence test where null hypothesis is that residuals are cross sectionally independent.

V. CONCLUSION AND POLICY IMPLICATIONS

In this study, the impact of stock market and banking sector development is tested on economic growth using sample period from 1989 to 2013 for low human developed countries. This study uses mean group and common mean group to find out long run coefficients whereas error correction specification for finding short run coefficients. The empirical findings represent that in a model of market capitalization and domestic credit to private sector: adjusted coefficient of domestic credit to private sector leaves positive and significant effect on economic growth in long run in low human developed countries. The coefficient of interaction term of market capitalization and domestic credit to private sector is also found to be positive and significant which concludes that both market capitalization and domestic credit to private sector are important to elevate economic growth in low human developed countries.

Moreover, the adjusted coefficients of traded stock and credit to private sector along with their interaction term are significantly elevating economic growth in case when traded stock is regressed with credit to private sector in long run in low human developed countries. The same is found for the case when turnover ratio is regressed with credit to private sector. This shows that traded stocks and turnover ratio (proxies of stock market development) are significantly appreciating economic growth when they are regressed with domestic credit to private sector which is taken as proxy for banking sector development. The interaction terms of all the three proxies of stock market development with domestic credit to private sector are showing that both sectors should be taken together to enhance economic growth in low human developed countries. The positive and significant effect of domestic credit to private sector on economic growth is supported by Adusei (2013) and Malki and Assaf (2014) whereas the positive and significant effect of stock traded and turnover ratio on economic growth is supported by Hailemariam and Guotai (2014). Additionally, the coefficients of internal migration and remittances represent positive and significant effect on economic growth in four and two models out of six models in long run in low human developed countries respectively. In one out of four models, this study finds negative and significant effect of inflation on economic growth in long run in low human developed countries. The positive and significant effect of internal migration on economic growth is supported by Lewis

(1954) whereas the positive and significant effect of remittances on economic growth is supported by Fayissa and Nsiah (2010). The finding related to negative effect of inflation on economic growth is consistent with Bittencourt *et al.* (2015).

As credit to private sector is very important in low human developed countries so, the governments must focus banking sector but it does not rule out the efforts to improve the capital market. As the banking sector is more important so does the well-defined property rights because it provides the source of collateral and this point has already been emphasized by Stiglitz (1989). Moreover, the findings also represent that among the proxies of stock market, market capitalization emerges as one of the robust proxy that enhances economic growth in low human developed countries relative to stock traded and turnover ratio in case when market capitalization interacts with domestic credit to private sector. This study suggests that while formulating policies related to stock market development, policies which broad the scope of market capitalization may be given more importance to increase economic growth in low human developed countries..

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