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**Stock market development and economic growth:
Evidence from least developed countries**

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***Stock market development and economic growth:
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Abstract

Purpose – The objective of this paper is to examine the impact of stock market development on economic growth for a sample of least developed countries.

Design/methodology/approach – A panel of 10 countries for the period 1995 to 2009 was used. Taking into account the possible existence of endogeneity in stock market-growth modelling, the study considers both static and dynamic panel data estimates. Econometric analysis is based on estimation of a dynamic panel model with GMM estimators which in fact proves the presence of dynamism in the model.

Findings – The results show an overall insignificant relationship between stock market development and economic growth for least developed countries. However, the results show that banking development and education are the main factors contributing towards growth of these economies. In particular, these results can be explained by the fact that these economies are mostly banking oriented and that their stock markets are relatively young.

Originality/value – Relationship between stock market development and economic growth has been of a major concern among academics, policy makers and economists around the world in the recent decades. The importance of stock market development has been analysed empirically quite extensively, but conclusions on such importance varied across different studies. The paper attempts to fill the research gap in the existing literature underlining the impact of financial market development on economic growth in least developed countries.

Keywords: *Stock market development, economic growth, developed countries, least developed countries.*

1.0 Introduction

Since the past few decades, the relationship between stock market development and economic growth has been of a major concern among academics, policy makers and economists around the world. The importance of stock market development has been analysed empirically quite extensively, but conclusions on such importance varies across different studies.

Various studies (Demirguc-Kunt and Levine, 1996; Levine and Zervos, 1996; and Filer et al., 2000 amongst others) have supported the view that stock markets promote economic growth. Adjasi and Biekpe (2005) and Adamopoulos (2010) found a significant positive impact of stock market development on economic growth in developed countries. Some studies, including Atje and Jovanovic (1998), showed a large impact of stock markets on economic growth but did not find a significant link between banking development and economic growth. Nevertheless, some authors (Rousseau and Wachtel, 2000 and Beck and Levine, 2003) noted that it is not only the stock market but also the banking sector that contribute in boosting economic growth given the countries studied are mostly banking oriented economies. Following the increasing role of stock markets in both developed and developing countries, contemporary studies are now trying to model stock markets, banks and economic growth together in their empirical work. However, Stiglitz (1985) and Bhide (1993) viewed stock markets as being harmful to economic growth such that their increasing liquidity may negatively affect growth, since there may be a reduction in savings rates because of externalities in capital accumulation. They added that corporate ownership is dispersed because of the existence of stock markets and such dispersion may decrease the performance of firms and therefore may not bring about growth.

On the other hand, it is argued that well-developed domestic financial sectors in advanced countries can significantly contribute to raising savings and investment rates and hence, lead to economic growth (Becsi and Wang, 1997). Thus, to improve the efficiency of their financial intermediaries and promote growth, many developing countries have implemented reforms in their economic and financial systems.

The significant contribution of the financial system in the growth of an economy has widely been confirmed by existing literature (Levin and Zervos, 1998; Demirguc and Maksimovic, 2002 Gerald, 2006; Seetanah, 2008 amongst others) though Rousseau and Wachtel (2000) have recently argued that this contribution has been diminishing. By allocating funds in the best productive manner, and allowing the market to be more liquid, the financial system induces firms to produce output to their best with less inefficiency. These studies state that the more organised and well managed a financial system is, mediated by efficient banks and smoothly functioning stock markets, the higher will the pace of growth in such countries be.

When we consider this literature on economic growth and stock market development it is apparent that research studies focusing on emerging and least developed countries are relatively few. As such, the objective of this paper is to examine the impact of stock market development on economic growth for a sample of least developed countries. The study examines this link based on a set of different variables pertaining to economic and stock market indicators over a period of 15 years (1995-2009).

2.0 Prior Research

The relationship between economic growth and stock market development has been the focus of rigorous theoretical and empirical studies. A growing literature argues that, for an economy to function properly, there needs to be an efficient stock market that moves funds from people who save to people who have productive investment opportunities. Therefore, a sound stock market acts as a catalyst for sustainable economic growth.

In this respect, the importance of stock market development in the process of growth has been understood to act through various channels. Indeed, a stock market is likely to induce economic growth by boosting the domestic savings and increasing the quantity and the quality of investment (Yartey and Adjasi, 2007). It also mobilises savings for investment by providing individuals with an additional financial instrument to suit their range of risk preferences and liquidity needs. Without access to capital, many production processes would be constrained to economically

inefficient scales. Furthermore, through the mobilisation of capital, financial markets and institutions create small denomination instruments that provide opportunities for households to hold diversified portfolios, invest in firms, and increase their asset liquidity (Sirri and Tufano, 1998). It is also argued that without pooling, households would have to buy and sell entire firms. Hence, by mobilising financial capital, households are able to widen their risk diversification and liquidity preferences and in turn promote the productive sector of the economy by inducing efficient resource allocation. The stock market is a cheaper way of raising capital for firms. This brings down the credit risk since firms are expected to be less dependent on banks. Therefore, stock markets boost economic growth by inducing savings amongst individuals on one hand and by introducing a new way of financing firms on the other.

Another way through which stock market development may influence economic growth is by mitigating the principal agent problem and consequently increasing productivity (Verrecchia, 1982). In an efficient stock market, the stock price reflects a firm's performance and its long term value. Having the manager's compensation tied with the stock prices may imply a reduction in the incentives for improper corporate governance and thus an increase in the firm's value, as shown in Jensen and Meckling (1976).

Moreover, a stock market provides for the possibility of corporate takeover and this mechanism is expected to promote better corporate control and firm's value. This simply means that in case a corporation is poorly controlled its management might face contingencies like takeovers. Various studies (Kumar, 1984; Morck, Shleifer and Vishny, 1990a) showed that this threat of takeover for management of listed companies may lead to efficient management of resources. However, there has been some criticism concerning actual operations with regard to pricing and takeover mechanism and that these practices may lead to lowering the rate of long term investment in a well developed stock market. According to Binswanger (1999), such perverse incentive and compensation of the industry for short term rewards, immediate profits and annual bonuses does not induce managers to perform effectively and that it undervalues long term investments, harming the company's

interest in the long run. It has also been observed that these incentives do not create new wealth and thus do not generate growth.

Stock market liquidity is expected to have a positive impact on growth as Neusser and Kugler (1998) argue that investors do not lose access to their savings during the investment project period, since the liquid market allows savers to buy and sell quickly and cheaply their stake in the company whenever they wish to alter their portfolio. Without a market that promotes liquidity, savers would be reluctant to place their money in projects that require long run capital commitment, effectively reducing the levels of investment. A stock market improves the allocation of capital and thereby enhances prospects for long-term growth, as pointed out by Levine (1991) and Bencivenga, Smith and Starr (1996). While on one side savers can hold liquid assets, the market on the other side can ease investment in long term, potentially for more profitable projects. The positive role of liquidity has also been stressed by Holmstrom and Tirole (1993). They observe that liquidity improves corporate governance in firms in the way that liquidity encourages investors to acquire more information on firms which in turn encourages corporate managers to put in their best efforts in interest of shareholders. However, the theory is ambiguous about the exact impact of greater stock market liquidity on economic growth and, thus, it may reduce saving rates and, consequently, curb growth, as shown by Demirguc-Kunt and Levine (1996)¹.

Stock markets provide a vehicle for diversifying risk (Saint Paul, 1992; Devereux and Smith, 1994; and Obstfeld, 1994). According to Obstfeld (2009), greater risk sharing through global diversification makes high risk, high return domestic and international projects viable, and as a consequence leads to more efficient allocation of savings amongst investment opportunities. The absence of efficiently run capital markets limits investors from diversifying their portfolios. As a result, people may avoid investing in equity stakes since they are too risky. Hence raising equity

¹Three channels exist. Firstly, it may bring a fall in the savings rate through income and substitution effect. Secondly, since the uncertainty linked with investment is reduced, greater stock market liquidity may reduce the savings rate because of the ambiguous effects of uncertainty on savings. Thirdly, it induces investor myopia and, as a result, it may lead to bad corporate governance and thus slowing growth.

capital becomes a headache for firms. Through stock markets, firm-specific risks can be diversified, thus making investment in firms more attractive. The work of Atje and Jovanic (1998) demonstrated that stock markets provide greater opportunity for risk spreading and risk pooling. Investors are able to adjust their investment based on their level of risk preference.

Efficient stock markets may also play a prominent role in reducing the costs of information. This is possible through the creation and spreading of firm specific information that efficient stock prices reveal. According to Fama (1980), stock markets are said to be efficient when all available information has been reflected in the price. This results in minimising the costs of acquiring information on projects and helps in monitoring and evaluating their performance (Diamond, 1984). Such reduction in the costs of acquiring information is expected to facilitate and improve the acquisition of information about investment opportunities and thereby improve resource allocation. These publicly available stock prices and information might help investors to take prudent investment decisions which may lead to better allocation of funds among firms and induce a higher growth rate for the economy (Grossman and Stiglitz, 1980).

In the economics literature, some studies included the contribution of banking services while trying to link stock market development with economic growth. The first group of studies (Allen and Gale, 1999; Arestis and Demetriades, 1998 amongst others) argued that there has been essentially no difference in the way the banking sector and stock markets impact economic growth. The focus is rather laid more on the overall level of financial development and the extent to which the legal system is efficient in protecting outside investor's rights. However, a second group of studies (Levine and Zervos, 1998; and Beck and Levine, 2003) found that the impact on economic growth is not the same for the different services provided by these two financial sectors. However, they concluded that both stock market liquidity and banking development are essential and foremost pre-requisite for economic growth. Bearing this in mind, the present study considers not only stock market development but also banking development in examining their relationship with economic growth.

A large number of recent studies have endorsed the fact that stock market development is a necessary ingredient to boost the economic growth. For instance, Caporale et al. (2004) examined the causal linkage between stock market development, financial development and economic growth for a sample of seven countries. They concluded that an efficient stock market boosts economic growth. Adjasi and Biekpe (2005), found that the relationship between stock market development and economic growth is significant for upper middle income African countries. Similarly, positive correlation between stock market development and economic growth has been established through several studies like Paudel (2005), Bahadur and Neupane (2006) and Siliverstovs and Duong (2006). In a similar vein, Levine and Zervos (1996) found that stock market liquidity is positively and significantly correlated with current and future rates of economic growth, capital accumulation, and productivity growth. Using a sample of 49 countries from 1976 to 1993, they concluded that the stock market is a robust predictor for economic growth. In addition, regression analysis used in the study also found banking development in individual countries to be a significant determinant of economic growth. This result confirmed Bencivenga, Smith, and Starr's (1995) theoretical predictions and showed that both stock market and bank development are important for determining economic growth.

Earlier panel studies suffered from various statistical weaknesses relating to endogeneity and causality. Taking note of such shortcomings, later studies—for instance Beck and Levine (2002)—applied the GMM techniques developed for dynamic panels for overall financial development from 1976 to 1998. The results confirmed stock markets and banks to have a positive and significant influence on growth through the use of alternative conditioning information sets and alternative panel estimators. After controlling for country specific effects, the authors concluded that stock market and banking development are among the key ingredients to economic growth. It is noteworthy to emphasise the work of Seetanah (2008), where a simultaneous examination of the banking sector development, stock market development and economic growth was carried out in a unified framework. The study used a panel VAR framework, estimated by GMM, for 27 developing countries for the period 1991 to 2007 and concluded that stock market and banking development are complementary to each other in inducing economic growth. This

study showed the importance of both sectors in positively influencing growth in developing economies. This positive link between stock market development and economic growth is evident from the experiences of the following developing countries: India (Deb and Mukherjee, 2008), Zimbabwe (Mutenheri and Green, 2003), Ghana (Bokpin and Isshaq, 2008) and Mauritius (Nowbutsing, 2009).

However, there are studies which are unable to conclude a link between stock market development and economic growth. This class of studies seem to argue that there were other important factors such as the development of the banking sector coupled with the liberalisation process introduced in their financial systems, as well as sound government policies, which together contributed significantly towards positive economic growth. For instance, Sarkar (2007) examined the importance of stock market in India since mid 1970s and did not find any link between stock market development and economic growth either in the short run or in the long run. Again, a relationship between stock market development and economic growth was not established, either theoretically or empirically in the work of Rousseau and Xiao (2006) though it confirmed an important role for the banking sector in the Chinese economy. Naceur and Ghazouani (2005) did not find a significant relationship between banking, stock market development and economic growth mainly due to underdeveloped financial systems in the MENA region. The study was based on an unbalanced panel data set.

3.0 Research Methodology

The objective of this paper is to estimate the relationship between stock market development, banking development and economic growth, based on a panel data set of 10 least developed countries² (as per the latest UN classification). The sample covers a time period from 1995 to 2009 and the annual data has been collected from the International Financial Statistics of the IMF and from the World Bank's 'World Development Indicators'.

² See Appendix for list of countries.

Based on the theoretical models of various previous studies (King and Levine, 1993; Ram, 1999; and Seetanah, 2008), the following model is used.

$$\text{GDP} = f(\text{SMDEX}, \text{BANKGDP}, \text{CPI}, \text{EDUC}, \text{EXGDP}) \quad (1)$$

In the above equation, the proxy for the dependent variable, that is the output of the country, is the per capita GDP. SMDEX refers to the stock market development index, where such index comprises of two measures, namely SIZE and LIQUIDITY. These measures of the index have been widely used in previous studies including Levine (1996) and Rousseau and Wachtel (2000). SIZE is proxied by the concentration ratio. This ratio is measured by dividing market capitalisation of the stock exchange over GDP. If a market is dominated by only few companies, there is likely to be manipulation in the price formation process. Highly concentrated markets are mostly found in poor economies. Thus market concentration (as it implies a lower share of market capitalisation over GDP) is assumed to be negatively correlated with market size and market liquidity. The second measure LIQUIDITY includes trading value ratio and turnover ratio. The former, which equals the value of listed shares divided by GDP, is taken as the indicator for stock market development, given its extensive use in the literature. This ratio measures the stock market size, and shows the ability to mobilise capital through diversification of risk. It represents organised trading of firm equity as a share of national output and therefore should positively reflect liquidity in the economy (Garcia and Lin Liu, 1999). The turnover ratio, second component of liquidity, is measured as the value of total shares traded divided by market capitalisation.

BANKGDP shows banking development and the proxy used here is domestic credit provided by financial intermediaries to the private sector over GDP. This measure is used following Beck and Levine (2003). This indicator has been popularly used since it excludes credit to the public sector and thereby measures more specifically the contribution of financial institution in funding the private sector. The study of Boyd and Smith (1996) suggests that banks and stock markets may be complements rather than substitutes to each other. Also, Demirguc-Kunt and Levine (1996) show that the degree of stock market development is positively related to bank

development. Thus it is expected that there is a positive correlation between stock market development and banking development and that they grow simultaneously.

Inflation, proxied by the CPI, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at particular time intervals. Various studies including Fischer (1993) and Barro (1996) concluded that inflation is not good for long term economic growth. Thus a negative correlation between inflation and economic growth is expected.

EDUC demonstrates the quality of human capital by having secondary enrolment ratio as the proxy. Secondary education aims at laying the basics for lifelong learning and human development, regardless of age. EXGDP are total exports divided by the GDP of the country. It has been used as the proxy for trade openness. This export amount includes the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. It is noted that this value does not consider compensation of employees and investment income (formerly called factor services) and transfer payments.

Based on the above explanations, a panel regression is specified as follows;

$$\text{gdp}_{it} = \beta_0 + \beta_1 \text{smdex}_{it} + \beta_2 \text{bankgdp}_{it} + \beta_3 \text{cpi}_{it} + \beta_4 \text{educ}_{it} + \beta_5 \text{xgdp}_{it} + \varepsilon_{it} \quad (2)$$

where i stands for the different countries in the sample, t denotes the time dimension and ε is the error term. The small letters denote the natural logarithm of the variables. The model used in this paper is a linear-logarithmic one and the available panel data set for the ten countries is balanced.

3.1 Static Panel

To overcome the limitations in the use of single-equation OLS cross sectional regression models and pooled OLS, Kennedy (2003) advises the use of panel data techniques. In this paper, we use of panel data analysis which allows both spatial (ten countries) and temporal dimension (15 years) in regression analysis. Of the

main types of panel data models, our analysis incorporates both the fixed effect and random effect models.

The assumption made under the fixed effects estimates is that the individual specific effect is correlated with the independent variables, thereby confirming the existence of significant heterogeneity across countries. In other words, it will show that each country's situation is different from that of the others. On the other hand, in case of random effects modelling, a random constant term is included in the regression. In particular, any deviation from the constant of the cross-sectional unit (country) has to be uncorrelated with the errors of the variables. The benefit of such model is that it allows for time-invariant variables to be included among the regressors.

The Hausman specification test would determine whether to use the fixed or random effects model in the current analysis. The problem lies in determining whether there is significant correlation between the unobserved country-specific random effects and the explanatory variables. In case there is no such correlation, it will be most appropriate to use the random effects model. However, if there is such a correlation, the random effects model would be inconsistently estimated, and therefore the fixed effects model will be more powerful. The null hypothesis is that there is no correlation.

3.2 Dynamic Panel

A dynamic panel data model is used for the analysis since the growth of GDP per capita depends on its previous values. The idea behind the use of dynamic panel data is not only to control for unobserved cross country heterogeneity, but also because it allows inspection of dynamic relations. To examine the relationship between stock market development, bank development and economic growth, the Generalised Method of Moments (GMM) estimators developed for dynamic panel models by Arrellano and Bond (1991) has been used. GMM, according to Green (1997), yields consistent and efficient estimates in the presence of arbitrary heteroskedasticity. The Ordinary Least Square (OLS) technique has not been

considered because it is likely to give biased and inconsistent estimates (Gujarati, 2003).

The growth regression can be modelled as follows:

$$\text{gdp}_{i,t} - \text{gdp}_{i,t-1} = \alpha_t + \beta' X_{i,t} + \eta_i + \varepsilon_{it} \quad i = 1, \dots, N ; t = 1, \dots, T_i ,$$

(3)

where gdp_{it} denotes the per capita real GDP ; X_{it} represents the vector of explanatory variables, α_t is the period specific intercept term to capture changes common to all countries. η is an unobserved country-specific effect, ε is the error term, and the subscripts i and t represent country and time period, respectively.

According to Arellano and Bond (1991), equation (3) should be differenced such that it becomes as follows:

$$(\text{gdp}_{i,t} - \text{gdp}_{i,t-1}) - (\text{gdp}_{i,t-1} - \text{gdp}_{i,t-2}) = \alpha_t - \alpha_{t-1} + \beta' (X_{i,t} - X_{i,t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1})$$

(4)

In this specification, the country specific effect is dropped out, but a new kind of bias arises since the new term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ is correlated with the lagged dependent variable, $(\text{gdp}_{i,t-1} - \text{gdp}_{i,t-2})$. Hence, Arellano and Bond (1991) proposed the following moment conditions:

$$E [\text{gdp}_{i,t-s} (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T$$

(5)

$$E [x_{i,t-s} (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t = 3, \dots, T$$

(6)

Equations (5) and (6) are based under the assumptions that the error term, ε , is not serially correlated, and that the independent variables, X , are weakly exogenous. Bearing these conditions in mind, Arellano and Bond (1991) propose a two-step GMM estimator. In the first step, the error terms are assumed to be independent and homoskedastic across countries and over time. While in the second step, the residuals retained in the first step are used to construct a consistent estimate of the

variance-covariance matrix, thereby relaxing the assumptions of independence and homoskedasticity. However, the first step GMM estimator will be used since it has demonstrated to yield more reliable inferences. The asymptotic standard errors from the two step GMM estimator have been found to have a downward bias (Blundell and Bond 1998).

It may be noted that the above specification is not estimated through the OLS method since it might retain the problem of endogeneity if gdp_{t-1} is endogenous to the error terms through $\varepsilon_{i,t-1}$.

3.2.1 Sargan test

For the GMM estimator to be consistent, both instruments related to lagged endogenous variables and explanatory variables along with the assumption that the error terms do not exhibit serial correlation should hold. To address these issues, the Sargan specification test suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) has been employed. It is a test of over-identifying restrictions such that it tests the overall validity of the instruments by analyzing the sample analogue of the moment conditions used in the estimation process. The Sargan test has the belief that the residuals should be uncorrelated with the set of exogenous variables if the instruments are truly exogenous.

3.2.2 Arellano-Bond autocorrelation test

It is obvious that the Sargan test is testing more than just autocorrelation in the errors. Thus, no autocorrelation is necessary but not sufficient to pass this test with reasonable certainty. According to Arellano and Bond (1991), the Sargan test is less sensitive to autocorrelation as compared to the autocorrelation test formulated by them. This implies that the two tests sometimes disagree, with the Sargan test being sensitive to other types of violations of assumptions, but being less sensitive to particular violations associated with autocorrelation. With this understanding, the Arellano-Bond autocorrelation test has been used in our analysis to check for the presence of any residual autocorrelation. This autocorrelation test is valid under many forms of dynamic panel model estimation, even if it is presented as a two-step robust estimation by Arellano and Bond.

4.0 Analysis and Results

In this section, the ability of stock market development to impact on economic growth is tested in a panel analysis combining data for 10 countries. The panel analysis further examines whether this relationship is influenced by other country-specific characteristics.

The econometric model to be examined is as follows:

$$gdp_{it} = \beta_0 + \beta_1 smdex_{it} + \beta_2 bankgdp_{it} + \beta_3 cpi_{it} + \beta_4 educ_{it} + \beta_5 xgdp_{it} + \varepsilon_{it} \quad (7)$$

To obtain some preliminary results, we use the static panel data analysis. The analysis considers use of both random effects estimates and fixed effects estimates.

4.1 Random Effects and Fixed Effects estimates

The Hausman specification test demonstrates that a fixed effects model is the most appropriate in this case. Based on the Hausman specification observations, the fixed effects model has been applied and its results are shown in table 1.

Table 1 Robust Fixed Effects estimates 1995-2009

Independent variables	Fixed Effects
Sample of Least Developed Countries	
Smdex	0.21
P Value	(.567)
Bankgdp	0.35*
P Value	(0.067)
Cpi	-3.47**
P Value	(0.026)
Educ	2.27**
P Value	(0.045)
Exgdp	1.35**
P Value	(0.032)
Number of observations	150
Number of Countries	10

** Significant at 5% level; * Significant at 10% level

The results from the above table show that there is no significant relationship between stock market development and economic growth for our sample of least developed countries. In particular, these results are inconsistent with a number of previous studies³. However, it may be useful to note that there have been some studies (Bencivenga et al. 1996; Naceur and Gazouani, 2005; and Adjasi and Biekpe, 2005) which did not find the role of stock markets to be significant in determining economic growth. In particular, an insignificant role of stock markets in contributing towards economic growth may be attributed to the very structure of the financial sector in least developed countries, which are mostly banking oriented. Moreover, one would tend to think that the stock markets may not have reached the threshold to have effects on and be able to sufficiently influence economic growth. As such, as per the above results, there seems to be a significant positive contribution of banking development towards economic growth. In effect, the stock

³ Levine (1992), Adjasi and Biekpe (2005), Adamopoulos (2010) amongst others.

markets in least developed countries are relatively young since most of them have been setup in the early 1990s and as such, do not have a sophisticated trading system as in developed markets. For instance, in many of these countries, trading happens few days a week, it is still based heavily on the outcry system and, moreover, the clearing system may still be lagging behind. Also, the trading volumes on these markets are significantly lower compared to developing and developed country markets and there are fewer participants. In effect, the limited number of participants may be due to the low financial literacy rate among the population. In contrast, stock markets from developing and developed countries have relatively larger number of participants who understand the opportunities offered to them. It is likely that most individuals in least developed countries channel their investments and savings through banks rather than through the stock markets. Therefore, authorities in these countries should set up appropriate awareness campaigns on the role and functions of stock markets, to inform the population at large of the investment opportunities available to them.

As far as the other variables are concerned, there seems to be a significant negative relationship between economic growth and inflation, consistent with the studies of Fischer (1993) and Barro (1996). Indeed, inflation reduces the competitiveness of a given country, and could as such be a long term obstacle to economic growth. On the other hand, the results show that higher education and trade openness contributes positively to economic growth.

4.2 Dynamic Panel Data Estimation

The GMM dynamic panel estimator, introduced by Arellano and Bond (1991) has been used in the same way as in Beck and Levine (2002). The latter applied the GMM to address the statistical problems characterising pure cross-sectional studies. Since the endogenous variable in the model has been lagged among the set of explanatory variables, this may weaken the efficiency of estimators. In relation to this issue the GMM has been used, since it can deal with problems of simultaneity bias, reverse causality and omitted variables. To incorporate dynamics into the model, it can be reformulated into an AR (1) model which is as follows:

$$gdp_{i,t} - gdp_{i,t-1} = \alpha[gdp_{i,t-1} - gdp_{i,t-2}] + \beta'X_{i,t} + \eta_i + \varepsilon_{it} \quad (8)$$

Table 2 Results from the Dynamic Panel Data Estimation (First Step GMM estimator) 1995-2009

Variables	Least developed countries
ΔGdp_{t-1}	0.24**
P-Value	0.017
Smdex	0.13
P-Value	0.531
Bankgdp	0.25*
P-Value	0.065
Cpi	-2.556**
P-Value	0.044
Educ	0.21**
P-Value	0.024
Exgdp	0.17
P-Value	0.38
Number of Observations	150
Number of Countries	10

** Significant at 5% level;* Significant at 10% level

The results from the dynamic panel analysis support the hypothesis that, in our sample of countries, stock market development is not growth conducive, even in the short run. It is observed that the coefficient of ΔGDP_{t-1} , from table 2, is positive and significant for our sample. The result concludes that lagged growth of the country contributes positively towards the current level of economic growth, confirming the existence of dynamism and endogeneity in the model being studied. This is consistent with studies done by Li and Liu (2005) and Seetanah (2008). Interestingly, most of the other explanatory variables were noted to have lower coefficients, meaning weaker short-run effects. It may be the case that these explanatory factors can only effect in the long run. This proves the presence of

dynamism in the model. The results are consistent with the previous table except for trade openness which is insignificant now.

4.3 Sargan test and Arellano-Bond autocorrelation test

Table 3 Diagnosis tests

Diagnosis tests		
Sargan test	Prob > Chi2	0.2001
Arellano-Bond test of 2nd order autocorrelation	Prob > Chi2	0.233

As it is observed in table 3, the Sargan test confirms that there is no correlation between the used instruments and the residuals for the entire specification, thereby, concluding that the overidentification restrictions are valid. The test for autocorrelation confirms no second order autocorrelation for the specifications in the sample data, since the prob>chi2 is greater than 5 percent. Therefore, we do not reject the null hypothesis of validity of lagged variables in level and in difference as instruments. We also do not reject the hypothesis of the absence of second order autocorrelation. Thus, the error terms do not exhibit second order serial autocorrelation and it can be argued that the model specification is correct and that all the instruments used are valid.

5.0 Conclusion

This paper examines the relationship between stock market development and economic growth for the case of 10 least developed countries, over the period 1995-2009 and it uses both static and dynamic panel data analysis. The results from the static analysis show a positive but insignificant effect of stock market development on the level of economic growth for the least developed countries. This finding is inconsistent with the theoretical literature. The authors argue that given the structure of the financial sector in least developed countries, these countries are mostly banking-oriented. Given smaller size of the stock markets relative to that of the developed countries, the contribution of stock market development towards

economic growth may be lower. To deal with key problems like omitted variable bias and simultaneity bias, the GMM system dynamic panel estimator has been used, and again this showed no significant relation between the stock market development and growth rate.

However, the impact of bank development on growth is tested and a significant impact on growth is reported. Similarly, the study shows that inflation and education are also key elements towards economic growth. The study calls for new policies to be implemented in least developed countries to encourage more participants and to increase the dynamism of the local stock markets. In particular, policies should be geared towards more local and foreign investor participation as well as towards increasing the number of listed companies.

6.0 References

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APPENDIX

List of countries

10 countries 1995-2009

Bangladesh

Sudan

Uganda

Zambia

Nepal

Tanzania

Senegal

Cambodia

Lesotho

Malawi

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