The Finance-Growth Nexus: Evidence from Emerging Markets

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Abstract: The finance growth literature ignores the role of bond markets in financing private investments. Moreover, the impact of bank crisis on the finance growth link has been largely overlooked. This paper aims at casting light at the finance growth link in emerging economies by accounting for bond markets and controlling for banking sector crises. Data on economic growth and financial development indicators for 15 emerging economies (drawn from Africa, Asia, Latin America, and Europe) were analysed using a system generalized-method-of-moments (GMM) technique. It is observed that while banking sector development is related to economic growth (albeit negatively), no statistically significant relation is observed between stock markets and/or bonds markets and economic growth. Moreover, a banking crisis is found to affect the finance growth link in such a manner that the link weakens when a banking crisis is introduced to the model. Our results are robust to omitted variable bias, simultaneity problem, heteroscedasticity and autocorrelation.

Keywords: *Stock markets; Bond markets; Banks; Economic growth*

1. Introduction

Financial markets and institutions have many functions that include, among others, maturity intermediation where they make a large long-term loan out of small short-term deposits, help entrepreneurs diversify risk by raising capital through issuance of debt and equity securities, and serve as lubricants of the economy by facilitating transactions. Although many agree on the foregoing functions of financial markets and intermediaries, the question of whether or not financial development drives economic growth has been the subject of debate for many decades. The debate produced a large body of theoretical and empirical literature. Theory predicts that finance promotes economic growth by ameliorating the information asymmetry problem, increasing investment efficiency, encouraging capital accumulation and human capital development (Blackburn et al. 2005; De Gregorio and Kim 2000; Greenwood and Jovanovic 1990; Bencivenga and Smith 1991). The empirical test of the finance-growth nexus, pioneered by Goldsmith (1969), produced a large body of literature with assorted results. Early empirical studies by (King and Levine, 1993; Atje and Jovanovic, 1993) and later by (Levine and Zervos 1998; Rajan and Zingales, 1998; Beck and Levine, 2004) and more recently by (Dawson, 2008; Bittencourt, 2012, Herwartz and Walle, 2014) found that financial development promotes economic growth. On the other hand, (Naceur and Ghazouani 2007; Ram, 1999) found no such relationship in their studies. Some found bidirectional relationships between the two (Thangavelu et al., 2004) and others found growth driving financial development (Chakraborty, 2008).

Both theoretical postulates and empirical findings are far from conclusive. The major theoretical debate is on the direction of causality and on the channels through which finance can promote economic growth. Similarly, empirical studies could not produce conclusive evidence on the direction of causality and on the strength of the relationship. This is attributed to, among others, an inability to find appropriate measures of financial development, unavailability of data, lumping together countries of different levels of economic growth, and using a wrong econometric specification. Consequently, our understanding of the finance-growth link is still incomplete. For this reason, the current study examined the finance-growth link by using the annual data from 15 emerging economies over the period 1997–2011. To circumvent simultaneity, a system generalised methods-of-moments (GMM) model was used. The study contributes to the existing body of literature by introducing bond markets and financial crisis into the model. Empirical tests have only focused on banks and stock markets, disregarding bond markets. The author argues that bond markets play no lesser role than banks and stock markets. Although emerging markets did not have well-developed bond markets in the past, this has changed and bond markets now constitute more than 50% of the gross domestic product

(GDP) in some of them (World Bank, 2013). It therefore deserves to be included in the empirical model. Besides, while it is clear that the banking sector crisis adversely affects both financial development and economic growth, empirical studies started to recognise its effect on the finance-growth link only recently (see the first attempt by Rousseau and Wachtel, 2011). The rest of the paper is organised as follows. Section 2 presents a review of related theoretical and empirical literature; section 3 presents data and methodology; section 4 presents the findings; and the last section concludes.

2. Literature Review

Financial markets and institutions channel savings of surplus units to deficit units, and help foster investment activities. However, whether this function of financial markets and institutions can boost economic growth remains contentious. The relationship between financial development and economic growth was first postulated by Schumpeter (1934) who argued that the financial system can be used to channel resources into the most productive use, hinting that financial development can lead to economic growth. In contrast, a few decades later, Robinson (1952) argued that financial development does not lead to economic growth, but rather follows it. This sparked interest among scholars and led to the emergence of a large body of theoretical and empirical studies.

Theoretical underpinnings: The theoretical model underpinning the link between finance and growth is based on the ability of financial markets and institutions in: (1) ameliorating the problem of information asymmetry (Diamond, 1984; Bose and Cothren, 1996; Blackburn and Hung, 1998; Morales, 2003; Blackburn et al., 2005); (2) increasing the efficiency of investments (Greenwood and Jovanovic, 1990); (3) enhancing investment productivity (Saint-Paul, 1992); (4) providing liquidity, thereby allowing capital accumulation (Bencivenga and Smith 1991); and (5) allowing human capital formation (De Gregorio and Kim 2000). Diamond (1984) emphasised on the ability of financial intermediaries to monitor investment projects at a lower cost, which eventually increases entrepreneurs' access to funds. In the absence of intermediaries, monitoring costs would be too large as to discourage credit to entrepreneurs. As shown by Bose and Cothren (1996), this particular attribute of intermediaries promotes resources allocation thereby leading to economic growth.

Various other theoretical models have been developed with emphasis on a particular channel through which finance affects growth. For instance, Blackburn and Hung (1998) show that intermediaries contribute to economic growth by managing the moral hazard problem by designing incentive-compatible loan contracts. The contracts are used to avoid diversion of funds towards other purposes. Bencivenga and Smith (1991) emphasised on the ability of intermediaries in attracting deposits from a large number of depositors out of which they create loans that can be used to finance long-term investment projects. This, according to Bencivenga and Smith, promotes capital formation, thereby leading to economic growth. Saint-Paul (1992) explains the benefits of financial markets in promoting technology specialisation. He shows that entrepreneurs can engage in a specialised technology that poses more risk but they can diversify the risk with the help of financial markets. De Gregorio and Kim (2000) focus on intermediaries' ability to allow individuals to specialise in skills useful in industrial development.

However, researchers disagree on the direction of causality between finance and growth. While most theories predict unidirectional causality where finance leads to economic growth, some (de la Fuente and Marín, 1996; Saint-Paul, 1992; Greenwood and Jovanovic, 1990; Khan, 2001) show that finance and growth have a bidirectional causal relationship. Saint-Paul (1992) shows that when innovation increases, so does the demand for financial services, which in turn leads to growth in the intermediary sector. Similarly, Khan (2001) posits that growth enhances financial development by raising borrowers' collateralisable net worth and finance promotes growth by increasing return on investment, and hence the rate of economic growth. In sum, although different theoretical models have been developed to explain the link between finance and growth, disagreements prevail on the direction of causality between the two.

Empirical evidence: Empirical testing of the finance-growth theory was pioneered by Goldsmith (1969), who set the stage for a series of studies over the last two decades. Goldsmith (1969) concluded, with caveats, that financial development is positively linked to economic growth. The empirical inquiry into the finance

growth nexus was reignited later by King and Levine, 1993a) who found a strong correlation between financial development indicators and economic growth parameters. They also concluded that the level of financial development of a nation can be used in predicting that nation's economic growth for 10 to 30 years to come. King and Levine developed a theoretical model in another paper (King and Levine, 1993b) to reveal the channels through which finance can boost economic growth, and reconfirmed this through sets of empirical evidences that combined cross-country studies, country cases on financial reform, and firm-level data. However, concern emerged among scholars that the econometric model used in King and Levine (1993a) might have been affected by the estimation bias caused by simultaneity, omitted variables, and country-specific fixed effects. To mitigate the simultaneity bias, Atje and Jovanovic (1993) introduced initial-level financial development indicators into their model, and found that stock market development has a significant effect on economic development, but to their surprise, the banking sector did not have a similar effect on economic growth. Similarly, Levine and Zervos (1998) concluded that both stock market development and banking sector development are important in explaining economic growth. While the empirical studies by (King and Levine 1993; Atje and Jovanovic, 1993; King and Levine 1993; Levine and Zervos, 1998) focused on the effect of financial depth on economic growth at a macro level, Rajan and Zingales (1998) attempted to test the theory using firm-level data. In their pioneering work, Rajan and Zingales show that external finance-dependent industries grow quickly in countries with developed financial systems, implying that finance boosts growth through its effect on industrial activities.

Benhabib and Spiegel (2000) moved a step forward by testing the effect of financial development on total productivity growth and investment activities using the generalised method of moments (GMM), and found that financial development promotes growth by enhancing total productivity and investment activities. They introduced the GINI coefficient into their model to capture country-specific attributes and noted that their findings changed when country-specific effects were introduced, implying that financial development indicators are broad measures of a country's financial sector. This left a lesson that a more vivid picture of the finance-growth nexus can be understood by finding proxies that can capture country-specific indicators of financial development. Calderón and Liu (2003) confirm a positive effect of finance on growth for the whole sample of 109 countries but they also found bidirectional causality when the sample is split between developed and developing countries. Dawson (2008), on the other hand, found a strong positive relationship between finance and growth when financial development is measured using growth in M3. Surprisingly, his proxy model where financial development is measured using depth, i.e. the ratio of M3 to GDP, revealed a negative relationship between finance and growth. Due to conflicting results, he cautions that proxies for financial development should be prudently selected before arriving at any valid conclusion.

In contrast to the foregoing studies that found finance leading growth, Blanco (2009) found that it is economic growth that drives financial development. Further, by splitting the sample into different income groups, he found that there is bidirectional causality for the middle-income group, even contradicting a study on countries in the same region by Bittencourt (2012) who found a strong relationship between finance and growth. More surprisingly, Hartmann used data for 74 economies over the period 1975–2005, employing In-sample tests and the Out-of-sample forecast comparison technique to establish causality between finance and growth, and found that economic growth promotes financial development but not vice versa, ruling out the popular view that finance drives growth. Their finding is robust even after grouping samples into different income groups. However, Herwartz and Walle (2014), using mostly the same number of countries as in Hartmann et al. (2012) over the period 1975–2011, utilising a flexible semi-parametric technique, found that the finance-growth link is stronger in high-income economies than in low-income ones. They also reveal that the finance growth link turns negative for low-income economies when they have a large government or if they are open to international trade.

While the foregoing studies only considered the role of financial intermediaries, researchers (Rousseau and Wachtel 2000; Durham, 2002; Enisan and Olufisayo, 2009; Cooray, 2010) studied the role of stock markets on economic growth. Rousseau and Wachtel, 2000; Durham, 2002) focused on countries from all income groups but Cooray (2010) focused on developing countries. They found that a liquid stock market development promotes economic development. In contrast, Durham (2002) finds that a positive relationship between stock market development and growth holds only for high-income countries. Enisan and Olufisayo (2009) found the role of the stock market on financial development to vary from country to country even within

Africa. Similarly, studies that considered both financial intermediaries and stock market development are not conclusive. For instance, researchers (Levine, Zervos 1998; Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 2002; Levine, 2002; Beck and Levine, 2004; Masoud and Hardaker, 2012) found that both stock markets and financial intermediary development are important for economic growth. But Naceur and Ghazouani (2007), who examined the finance-growth link in 11 Middle East and North African (MENA) economies, found no impact of either financial intermediary or market development on growth. They even reveal that the link between financial development and growth turns negative when controlling for stock market development.

Although many of the finance growth studies are based on large sets of cross-country data, there are some country case studies. Adu et al. (2013), who examined Ghanaian data over the period 1961–2010, found that financial development affects economic growth. They noted that the relationship between finance and growth is as good as the proxy selected. In their model, the finance growth nexus became positive only when they used financial development indicators such as private credit to GDP and private credit to total credit. The relationship turned negative when they used broad money (M3) as a proxy. On the other hand, Carp (2012), found no relationship between stock market development and growth based on Romanian data for 1995–2010, while Marques et al. (2013) found a bidirectional relationship between stock market development and growth in Portugal based on quarterly data from 1993–2011. For China, Allen et al. (2005) found no relationship between finance and growth, and justify this on the ground that credit allocation in the country is based on relationship and reputation rather standard mechanisms. This contrasts with the findings by Rousseau and Xiao (2007), who found that banks are important for Chinese economic development.

While most of the previous studies report a linear relationship between finance and growth, recent studies report non-linear relationship (see Law and Singh, 2014; Samargandi Fidrmuc and Ghosh, 2015). Law and Singh (2014) reported that finance can spur economic growth only up to a certain threshold, beyond which it impedes growth. This was confirmed by Samargandi Fidrmuc and Ghosh (2015) who reported that too much finance curtails economic growth in middle income economies. This in fact begs a legitimate question of how much finance is too much? An answer to this question has been provided by Ductor and Grechyna (2015) who reported that growth in private credit that exceeds growth in real output would be too much. Other recent studies recognized the importance of institutional quality in affecting the finance growth link. For instance, Law Azman-Saini and Ibrahim (2013) reported that a country needs to achieve a certain threshold level of institutional development for its financial development to spur economic growth.

In general, despite existence of a large body of theoretical and empirical literature, the theoretical prediction as well as empirical evidence is far from conclusive. Theories on the direction of causality are divided. The controversy is apparent in empirical literature too. While (King and Levine, 1993a; Atje and Jovanovic, 1993; Levine and Zervos, 1998; Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 2002; Beck and Levine 2004; Herwartz and Walle, 2014; Demirgüç-Kunt et al., 2013) conclude that there is a significant effect of finance on growth, (Durham, 2002; Calderón and Liu, 2003) found that bidirectional causality emerges when the sample is split into developed and developing countries. Similarly, Rioja and Valev (2004) found that the finance growth link is uncertain for low-income regions, strongly positive in intermediate regions, and small in high-income regions. Therefore, as Kirkpatrick (2005:632) rightly puts it, “our understanding of the fundamental relationship between financial development and economic growth therefore remains incomplete”. Many reasons can be presented as causes of the disagreement. Firstly, some of the disagreements are attributed to differences in the indicators of financial development used by different authors. For instance, Dawson (2008) and Adu et al. (2013) reveal that their findings vary by the financial development indicator used. Secondly, cross-country studies are believed to be plagued by the omitted variable bias, the simultaneity problem and the country-specific bias (Rajan and Zingales, 1998; Wachtel, 2003). Finally, as noted by Ericsson et al. (2001), averaging of long cross-sectional data over years, common in most cross-country studies, induces estimator bias.

3. Data and Methodology

Data: Data for financial development indicators for 15 emerging economies over the period 1997 to 2011 were obtained from Global Financial Development Database (GFDD) of the World Bank updated on April

2013. Data for economic growth indicators over the same period were obtained from World Development Indicators (WDI) of the World Bank. The author intentionally selected emerging economies following empirical findings that the finance-growth nexus varies across different income groups. Besides, unlike previous studies, original data rather than aggregated averages are used following the findings of Ericsson *et. al.*, (2001) that aggregated averages induces simultaneity bias, causing estimated coefficients to deviate significantly from underlying parameters.

The number of emerging economies selected mainly depended on data availability, and 15 emerging economies¹ were identified of which one from Africa six from Asia five from Latin America, and three from Europe. The countries in the sample had a strongly correlated per capita GDP among themselves. The author adopted financial development indicators used in Beck and Levine (2004), and added bond markets, which have been excluded from finance-growth link literature. Inclusion of the bond market is justified based on two grounds. Firstly, firms use bonds as an additional source of financing besides stocks and bank loans. Secondly, the bond market is growing in magnitude in many emerging economies. For instance, volume of bond markets in 2011, measured using outstanding private debt securities to GDP (%) was 58% in Malaysia, 23% in China, 21% in Brazil, and 18% in South Africa (World Bank, 2013). Following the findings of Rousseau and Wachtel (2011) that crisis has a dampening effect on the finance growth link, banking sector crises dummy was used to control for financial crisis. The banking crisis dummy, detailed in periods, presented in Table 1.

Table 1: Banking crisis periods

Country	Crisis period
Argentina	2001-2003
Brazil	1997-1998
China	1998
Colombia	1998-2000
Czech Republic	1997-2000
Indonesia	1997-2001
Malaysia	1997-1999
Philippines	1997-2001
Thailand	1997-2000
Turkey	2000-2001

Source: Global Financial Indicators, World Bank

Financial development indicators were regressed on growth while controlling for banking crisis, initial per capita GDP, government size (general government consumption expenditure to GDP ratio), trade openness (sum of import and export to GDP ratio), secondary school enrolment rate, and inflation. Economic growth is measured using change in per capita GDP, and financial development indicators are measured using stock market turnover to GDP ratio (stock market development), private credit by deposit money banks and other financial institutions to GDP ratio (banking sector development), and outstanding private debt securities to GDP ratio (bond market development). Control variables used in the model are all log transformed. Moreover, a dummy variable for banking crisis was introduced. The following general panel model specification was used:

$$Y_{it} - Y_{i,t-1} = \beta_1 Y_{i,t-1} + \beta_2 F_{it} + \beta_3 X_{it} + \eta_i + \varepsilon_{it} \quad [1]$$

Where Y_{it} is the log of GDP per capita of each country and $Y_{i,t-1}$ is its lagged value, F_{it} is a matrix of financial development indicators, *i.e.*, bond market development, stock market development, and bank development, X_{it} is a matrix of control variables, and η is a country fixed effect. The above dynamic panel model is estimated

using a system GMM², developed by Arellano and Bover (1995) and Blundell and Bond (1998). Arellano and Bond (1991) proposed a two-step GMM estimator with the following moment conditions

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

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

$$E[F_{i,t-s} (\varepsilon_{i,t} - \varepsilon_{i,t-1})] = 0 \text{ for } s \geq 2; t=3, \dots, T, \quad [4]$$

In the two steps GMM, the error terms are assumed independent and homoscedastic in the first step. Residuals obtained in the first step are then used in the second step to construct a consistent estimate of the variance covariance matrix. However, Arellano and Bover (1995) and Blundell and Bond (1998) noted that lagged levels of persistent explanatory variables are weak instruments for the equation in differences. They suggested a system that combines regression in differences with regression in levels, with the following additional moment conditions.

$$E[y_{i,t-s} - y_{i,t-s-1} (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1, \quad [5]$$

$$E[F_{i,t-s} - F_{i,t-s-1} (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad [6]$$

$$E[X_{i,t-s} - X_{i,t-s-1} (\eta_i + \varepsilon_{i,t})] = 0 \text{ for } s = 1 \quad [7]$$

Therefore, a system GMM that satisfies all the above moment conditions and that is also heteroscedasticity and autocorrelation consistent was used.

4. Findings

Summary statistics: The descriptive statistics in Table 2 show that variation in the dependent variable across nations is not significant, indicating that sample economies are at the same level of economic growth. However, the between-economies variation (0.337) is larger than variation within each economy across time (0.185). This was true for the rest of the variables as well except inflation, which had a within variation of 8.804 compared to cross-country variation of 7.39. A look at financial development indicators shows that with a coefficient of 41.474, cross-country variation is the highest in the banking sector followed by bond markets (11.725). A very wide range between the minimum and maximum value of stock market turnover ratio implies that countries are different in terms of extent of stock market liquidity.

Table 2: Descriptive statistics of variables in the dataset

Variable	Mean	Std. Dev Overall, between, within	Min	Max
Growth indicator				
Log of GDP per capita	3.5456	0.375 (0.337) (0.185)	2.629	4.337
Financial development indicators				
Bond market capitalisation	8.7847	12.019 (11.725) (3.946)	0.000	62.810
Bank credit	52.8009	41.683 (41.474) (11.176)	9.774	165.802
M2	63.812	37.71 (38.037) (8.1052)	22.89	180.779
Stock market turnover ratio	59.4840	53.829 (48.921) (25.571)	1.559	313.477
Standard control variables				
Initial per capita GDP	3.4164	0.351 (0.362) (0)	2.631	3.914
Government size	1.127766	0.128 (0.127) (0.036)	0.755	1.357
Trade openness	1.769105	0.254 (0.25) (0.077)	1.2	2.343
Inflation	7.359525	11.345 (7.39) (8.804)	-1.408	85.733
Secondary school enrolment rate	1.88175	0.082 (0.073) (0.042)	1.645	2.022

Table 3 presents correlation among variable in the dataset. Initial GDP per capita is strongly correlated with log of GDP per capita. Among the main repressors, bond market has a significant positive correlation with the dependent variable while stock market turnover has a strong negative correlation. Bank credit does not have a statistically significant correlation with the dependent variable. Among the control variables, secondary school enrolment rate, government size and trade openness are significantly correlated with per capita GDP while inflation does not have a significant correlation.

Table 3: Correlation results among the study variables

	Logarithm of GDP per capita	Initial per capita GDP	Bond market capitalization	Bank credit	Stock market turnover ratio	Govt. size	Trade openness
Initial per capita GDP	0.8196***						
Bond market capitalization	0.2961***	0.2844***					
Bank credit	-0.013	-0.0563	0.5881***				
Stock market turnover ratio	-0.235***	-0.4243	-0.0944	0.143**			
Government size	0.4862***	0.4475***	0.0572	0.192***	-0.0222		
Trade openness	0.1638**	0.0923	0.4823***	0.486***	-0.089	0.1322**	
Inflation	-0.0761	0.0198	-0.2073***	-0.234***	0.314***	-0.1459**	-0.128*
Secondary school enrolment rate	0.6903***	0.547***	-0.1117*	-0.1135*	-0.374***	0.3829***	0.134**

***p<0.01 **p<0.05 *p<0.1

Table 4: System GMM results: Banking Crises not controlled

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Bond market capitalization	-0.011	-0.0147	-0.0192	-0.0197	-0.0174
Bank credit	-0.0254***	-0.0166**	-0.0214**	-0.0171**	-0.0018**
Stock market turnover ratio	0.0161	0.083	0.0054	0.0654	0.0156
Log of initial per capita GDP	0.0634*	0.0504	0.0413	0.0432	0.0718*
Secondary school enrolment rate	0.2547**	0.2119**			
Government size	0.0874**		0.1092		
Trade openness	-0.0378			-0.0133	
Inflation	-0.0127				-0.0138
Observations	210	210	210	210	210
Arellano-Bond test for AR(2) in differences(P-value)	0.9	0.95	0.854	0.831	0.923
Sargan test of overid. Restrictions(P-value)	0.224	0.373	0.395	0.416	0.258
F-stat(P-value)	0.0000	0.0000	0.0000	0.0000	0.0000

***p<0.01 **p<0.05 *p<0.1

Analysis and discussion: Five different models were implemented by introducing different combinations of the control variables. As evidenced by the p-value of the Arellano-Bond test for AR (2) in differences, all the models are free from autocorrelation problem. The models are also free from over-identification problem as implied from the p-values of Sargan test of over-identified restrictions. Each of the models represents a good predictive power with all the variables, as implied from a statistically significant F-stat ($P<0.01$). In the first model, where all control variables were introduced, bond market capitalization and stock market turnover did not have statistically significant effect on growth. However, bank credit has a statistically significant negative effect on growth. This is consistent with the prediction of Bose and Cothren (1996) that output decreases when banks invest in sophisticated monitoring technology. This was also confirmed by empirical findings of Dawson (2008) and Naceur and Ghazouani (2007). In the second model, where secondary school enrolment was controlled together with initial per capita GDP, the result remains the same except that the coefficients of both bond market capitalization and stock market turnover have decreased, but that of bank credit has increased. The result remains the same in the remaining three models except a slight change in the size of the coefficients. Stock market turnover and bond market capitalization have no statistically significant

relation with growth, and bank credit has a statistically significant negative relationship with growth. This remains true regardless of whether the financial development indicators are introduced into the model together or individually³.

To check the effect of banking crises on the finance-growth link, a bank crises dummy variable was introduced. Table 5 reports system GMM results wherein banking crises is controlled. The coefficients for bond market capitalization and stock market turnover have a slight change but both have still a statistically insignificant relationship with growth. Similarly, a statistically significant negative relation of bank credit with growth remains the same, and its coefficient has slightly increased. In models from 2 to 4, bank credit has a more statistically significant relation with growth, where significance improves moving from 5% to 1%. This is consistent with the findings of Rousseau and Wachtel (2011) that banking crises weakens the finance-growth link. In general, while bank credit has a statistically negative relationship with growth, stock market turnover and bond market capitalisation do not have a relationship with growth. To check the robustness of alternative measures of intermediary development, M2 to GDP ratio was introduced into the model, and it was found that M2 has a positive coefficient though not statistically significant. Similarly, alternative measures of stock market development, namely, stock market capitalisation and stock market value traded, were introduced into the models in lieu of stock market turnover, but the result remained unchanged.

Table 5: System GMM results: Bank Crisis controlled

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Bond market capitalization	0.0193	-0.00742	-0.006605	0.004544	-0.00473
Bank credit	-0.0031***	-0.0025***	-0.0028***	-0.0023***	-0.0025***
Stock market turnover ratio	0.0151	0.0668	0.0428	0.0534	0.0124
Log of initial per capita GDP	-0.0777*	0.0616*	0.0535*	0.0625*	0.0787**
Banking Crises	-0.0543**	-0.0597**	-0.0576**	-0.0613**	-0.0555**
Secondary school enrolment rate	0.2285**	0.2024**			
Government size	0.0877**		0.093*		
Trade openness	0.01192			0.004	
Inflation	-0.0011				-0.0012
Observations	210	210	210	210	210
Arellano-Bond test for AR(2) in differences(P-value)	0.356	0.368	0.396	0.393	0.378
Sargan test of overid. Restrictions(P-value)	0.532	0.753	0.717	0.772	0.614
F-stat(P-value)	0.0000	0.0000	0.0000	0.0000	0.0000

***p<0.01 **p<0.05 *p<0.1

5. Conclusion

Due to methodological flaws and conceptual confusions, research on the finance- growth link is inconclusive at best. Existing studies are criticized for failure to avoid simultaneity problem. Concerns are also raised about the validity of conclusions drawn from studies that lumped together countries at different levels of economic and financial development. Moreover, ignoring the effect of banking crisis on finance growth link is considered to have caused some invalid conclusions. This study was therefore set out to shed light on the finance-growth link using data from 15 emerging economies drawn from Africa, Asia, Latin America, and Europe over the period from 1997 to 2011. Unlike previous studies, this study considered bond markets in addition to banks and stock markets. Moreover, attempts were made to see the effect of banking crises on the finance-growth link, and to ameliorate simultaneity problem, a system GMM was used. Contrary to previous empirical findings, banking sector development was found to have a statistically significant negative effect on

growth in emerging economies. However, the negative effect of banking sector on growth disappears when M2 to GDP ratio is used instead of private credit by deposit money banks to GDP ratio. On the other hand, bond markets and stock markets do not have a statistically significant effect on growth. This study further confirms Rousseau and Wachtel (2011) finding that crisis dampens the finance-growth link. Three important inferences could be made from the results of this study. First, the often reported positive link between finance and growth might be caused by aggregation of countries of different economic growth and financial development. Second, as reported by Dawson (2008) and Adu et al. (2013) the finance growth link depends on the measures of financial development used. Last but not least, all economic episodes such as crisis in the banking sector need to be taken into account in studying the relationship between financial development and economic growth.

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¹ Countries in the data set included Argentina, Brazil, China, Colombia, the Czech Republic, India, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, South Africa, Thailand and Turkey.

² A system GMM, developed by Arellano and Bover (1995, *Journal of Econometrics* 68: 29–51) and Blundell and Bond (1998, *Journal of Econometrics* 87: 115–143) is an improvement on the Arellano and Bond (1991, *Review of Economic Studies* 58: 277–297) dynamic panel data estimator. Arellano and Bover (1995) and Blundell and Bond (1998) proved that difference GMM estimator suggested by Arellano and Bond (1991) results in weak instruments. They suggested that a system of equations that combines instruments in the differences equation and instruments in the levels equation results in a consistent and efficient estimates. Therefore, we employed a system GMM estimator on STATA 12 using *xtabond2* command developed by David Roodman (2009, How to do *xtabond2*: an introduction to difference and system GMM in Stata, *The Stata Journal*, 9(1) pp 86-136).

³ Models for individual financial indicators not showed but available on request.