IOSR Journal of Economics and Finance (IOSR-JEF)
e-ISSN: 2321-5933, p-ISSN: 2321-5925.Volume 6, Issue 2. Ver. III (Mar.-Apr. 2015), PP 65-70
www.iosrjournals.org

Foundations of Financial Sector Mechanisms and Economic Growth in Emerging Economies: A Panel–Data Approach towards a Nexus

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Abstract: *In this paper, we try to uncover the economic foundations of financial sector development and its impacts on accelerating economic growth in the given context of emerging economies. We theorize and empirically test a causally-motivated relationship among economic growth and related key financial sector variables pertinent to this problem. We accomplish this by analyzing a 20 year panel-data constructed for 30 countries falling within the categorization of an 'emerging economy'. We estimate the appropriate statistical models along with related diagnostic tests. Finally, we comment on the strengths and weaknesses of our approach and we try to explicate the economic rationale and justification for our formulation and the evidences that follow.*
Keywords: *Economic Growth, Financial Development, Emerging Economies, Panel Data*

I. Introduction

Economists hold startlingly dissimilar opinions regarding the significance of the financial system for economic growth. Walter Bagehot (1873) and John Hicks (1969) dispute that it played a critical role in igniting industrialization in England by facilitating the mobilization of capital for "massive works." Joseph Schumpeter (1912) challenges that well-functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best possibilities of comprehensively implementing innovative products and production processes. Contrary to that, Joan Robinson (1952, p. 86) asserts that "where enterprise leads finance follows." According to this view, economic development entails demands for particular types of financial arrangements, and the financial system channels automatically to these demands. Moreover, some economists just do not trust that the finance-growth relationship is imperative. Robert Lucas (1988, p. 6) asserts that economists "badly over-stress" the role of financial factors in economic growth, while development economists in emerging economies frequently express their skepticism about the role of the financial system by ignoring it. In light of these conflicting views, this paper uses present theories to systematize an analytical framework of the finance-growth nexus and then assesses the quantitative importance of the financial system in economic growth. Although conclusions must be stated cautiously and with sufficient qualifications for optimisms, the preponderance of theoretical reasoning and empirical evidence induces a positive, first order relationship between financial development and economic growth.

We specifically tackle the issues of 'emerging economies' having 'emerging markets' due to two specific reasons. The first is that, in thinking about developing-country macroeconomic issues, it is often necessary to modify the conceptual frameworks that are generally available in research published keeping industrial countries in mind. All macroeconomic models are built upon stylized descriptions of the environment in which economic agents interrelate and interact, and this environment often diverges in important ways in emerging economies from that in industrial countries. The second reason is possibly more important. It is that, in particular because of the "emergent" nature of these economies, the most significant policy issues that economists and policymakers in developing countries face are often quite different from those that typically occupy center stage in industrial-country setting.

II. Literature Review

Although a burgeoning empirical literature suggests that well-functioning financial system accelerate economic growth, these studies generally do not simultaneously examine stock market and other monetary transmission mechanisms in context of development. King and Levine (1993a,b) illustrate that bank development – as computed by the total liquid liabilities of financial intermediaries (e.g., M3) divided by Gross Domestic Product (GDP) helps explain economic growth. Levine (1998, 1999) and Levine, Loayza, and Beck (2000) substantiate this finding but advance upon King and Levine (1993a,b) by (1) using measures of bank development that comprise only credit to private firms and therefore eliminate credit to the public sector and by (2) using instrumental variable procedures to control for simultaneity bias. This literature, however, omits measures of transaction mechanism development because measures of specification problems. Further, while theory motivates the potential relationship between economic growth and the simultaneous level of financial development, Levine and Zervos (1998) use primary values of stock market and bank development. While recent work has endeavored to solve some of the statistical deficiencies in the Levine and Zervos (1998) study, statistical and conceptual problems persist. Arestis, Demetriades and Luintel (2000) use quarterly data and apply time series methods to five developed economies and show that while both banking sector and stock market development explain subsequent growth, the effect of banking sector development is substantially larger than that of stock market development. Rousseau and Wachtel (2000) make a vital input to the literature by using panel techniques with annual data to evaluate the relationship between stock markets, banks, and growth. They use M3/GDP to measure bank development and the Levine and Zervos (1998) measures of stock market size and activity. Rousseau and Wachtel (2000) use the difference panel estimator. But all of the studies focus predominantly on developed economies. Researchers have not undertaken the systematic study of emerging economies yet.

III. Variables And Model Specification

We divide the financial system into three schemas: micro variables, intermediate variables and macro variables. Each of these schemes of variables groups itself according to its generic functionalities. Seemingly, micro variables tend to capture the ‘credit and stock’ part of financial system. Intermediate variables perform the ‘channeling’ function of the system, whereas macro variables measure the ‘aggregate’ and ultimate impact of economic interactions. In our panel-data model, we let GDP growth (annual %), represented in the model as [GDPg], to be the dependent variable. Hence, the list of pertinent independent variables is as follows:

1. Real interest rate (%) [R]
2. Domestic credit provided by banking sector (% of GDP) [DCBank]
3. Domestic credit to private sector (% of GDP) [DCPvt]
4. Foreign direct investment, net inflows (% of GDP) [FDI]
5. Broad money growth (annual %) [BMg]
6. Stocks traded, turnover ratio (%) [STTr]
7. Trade (% of GDP) [T]
8. Market capitalization of listed companies (% of GDP) [MktCLC]
9. Gross capital formation (annual % growth) [GCK]
10. Gross savings (% of GDP) [GS]

Ultimately, the empirical model to be regressed is formulated as

$$\mathbf{GDPg_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 DCBank_{it} + \beta_3 DCPvt_{it} + \beta_4 FDI_{it} + \beta_5 BMg_{it} + \beta_6 STTr_{it} + \beta_7 T_{it} + \beta_8 MktCLC_{it} + \beta_9 GCK_{it} + \beta_{10} GS_{it} + u_{it}}$$

Here, the subscripts ‘i’ stands for the panel variable and ‘t’ stands for the time variable.

IV. Data Collection And Data Sources

As per the terming of ‘emerging economies’ is concerned for developing countries with a strong market potential, we use the classification suggested by Goldman Sachs Investment Bank to fulfill the additional criteria of macroeconomic stability, political maturity, openness of trade and investment policies, and the quality of education. Hence, we construct our sample with all the countries belonging to the ‘G-20’ developing countries, the ‘Next Eleven’ countries and the ‘BRICS’ economies. Thus, we retain a sample of 30 countries. We set the time period ranging from 1991 to 2010. Ultimately, we have the exhaustive and comprehensive panel-data for 30 developing countries, each with a 20 years’ time period, culminating into 600 observations. We extract all the data from the ‘World Development Indicators- 2012’ sources downloaded from the World Bank Website. We use the ‘Stata’ econometric software for all of our calculations and estimations.

V. Model Estimations And Data Analysis

1. Fixed-Effects Regression Model:

We use fixed-effects (FE) whenever we are only interested in analyzing the impact of variables that vary over time. As it explores the relationship between explained and explanatory variables within an entity, each entity is assumed to have its own individual characteristics that may or may not influence the explanatory variables. We estimate the fixed-effects regression as follows:

Dependent Variable: GDPg				
Variables	**Coefficients**	**Standard Error**	**T-Statistic**	**P-Value**
R	**-.0272779**	**.004344**	**-6.28**	**0.000**
DCBank	**-.0846366**	**.0142968**	**-5.92**	**0.000**
DCPvt	**.048861**	**.0158309**	**3.09**	**0.002**
FDI	**.0425632**	**.0676509**	**0.63**	**0.530**
BMg	**.0013025**	**.007886**	**1.65**	**0.099**
STTr	**.0005864**	**.0025602**	**0.23**	**0.822**
T	**.017933**	**.0092052**	**1.95**	**0.052**
MktCLC	**.0146168**	**.0039961**	**3.66**	**0.000**
GCK	**.1622208**	**.0077012**	**21.06**	**0.000**
GS	**.0262967**	**.0241351**	**1.09**	**0.276**
Constant	**3.865992**	**.707186**	**5.47**	**0.000**

R-squared (overall): 0.4422, Rho: 0.37831972, F-Statistic (10, 560): 70.77, Prob (F-Statistic): 0.0000

We see here, GDPg is negatively related to the variables R and DCBank, of which not a single one is statistically significant; also GDPg is positively related to all other variables in question. By judging the p-values, the variables FDI, T and STTr are statistically significant, whereas GCF is statistically strongly significant as suggested by t-values and still practically significant by p-value. All other variables are not statistically significant as suggested by p-value. The value of rho suggests that 37.83% of the variance is due to difference across panels. F-test suggests strong joint statistical significance in this fixed-effects setting. We also compute heteroskedasticity-adjusted coefficients for this model later on as suggested by statistical inquiries.

2. Random-Effects GLS (Generalized Least Square) Model:

In the random-effects (RE) model, the variation across entities is expected to be random and uncorrelated with the predictor or independent variables included in the model. The principal difference between fixed and random effects is whether the overlooked individual effect represents elements that are correlated with the regressors in the model. As our formulation permits, we estimate the random-effects GLS regression as follows:

Dependent Variable: GDPg				
Variables	**Coefficients**	**Standard Error**	**Z-Statistic**	**P-Value**
R	**-.0266909**	**.0040492**	**-6.59**	**0.000**
DCBank	**-.0536369**	**.0119721**	**-4.48**	**0.000**
DCPvt	**.0427272**	**.0137091**	**3.12**	**0.002**
FDI	**.0815038**	**.0636519**	**1.28**	**0.200**
BMg	**.0005622**	**.0007623**	**0.74**	**0.461**
STTr	**.0029296**	**.0022894**	**1.28**	**0.201**
T	**-.0002247**	**.0061107**	**-0.04**	**0.971**
MktCLC	**.0096576**	**.0036567**	**2.64**	**0.008**
GCK	**.165643**	**.0077263**	**21.44**	**0.000**
GS	**.0493951**	**.0192563**	**2.57**	**0.010**
Constant	**3.0177**	**.5574642**	**5.41**	**0.000**

R-squared (overall): 0.5385, Rho: 0.14126239, Wald Chi-sqaured Statistic: 707.84, Prob (Chi-sqaured Statistic): 0.0000

In this random-effects model, we see, GDPg is negatively related to the variables R, DCBank and T, where neither is statistically significant; GDPg is positively related to all other variables in question. By judging the p-values, the variables FDI, BMg, STTr and T are statistically significant, whereas all other variables are not statistically significant as suggested by p-value. The Value of rho suggests that 14.12% of the variance is due to difference across panels. F-test suggests strong joint statistical significance in this random-effects setting. We also compute heteroskedasticity-adjusted coefficients for this model. But we notice, due to huge Wald chi-square values as compared to table-values, the whole random-effects formulation can be called into question. We can further demonstrate the acceptability of models by Hausman Test.

3. Hausman Test:

If the error terms are correlated then Fixed-Effects (FE) model is not appropriate since inferences may not be correct. Then we need to model that relationship by using Random-Effects (RE) model. This is the main rationale for the Hausman test as it presents a criterion of choosing Fixed Effects (FE) or Random Effects (RE) models one over another. We perform the Hausman test as follows:

Dependent Variable: GDPg				
Variables	**Coefficients (Fixed)**	**Coefficients (Random)**	**Difference**	**Standard Error**
R	**-.0272779**	**-.0266909**	**-.000587**	**0.0015728**
DCBank	**-.0846366**	**-.0536369**	**-.0309998**	**0.0078146**
DCPvt	**.048861**	**.0427272**	**.0061338**	**0.0079168**
FDI	**.0425632**	**.0815038**	**-.0389406**	**0.0229146**
BMg	**.0013025**	**.0005622**	**.0007404**	**0.000202**
STTr	**.0005864**	**.0029296**	**-.0023522**	**0.001146**
T	**.017933**	**-.0002247**	**.0181577**	**0.0068845**
MktCLC	**.0146168**	**.0096576**	**.0049592**	**0.0016115**
GCK	**.1622208**	**.165643**	**-.0034221**	**-**
GS	**.0262967**	**.0493951**	**-.0230984**	**0.0145498**
Constant	**3.865992**	**3.0177**	**.8482911**	**0.4351388**

Chi-squared Statistic: 36.59, Prob (Chi-squared Statistic): 0.0001

We see the Prob (>Chi-squared Statistic) = .0001 is less than permitted band of .05. So, we can strongly reject the null hypothesis and state that unique errors are not correlated with regressors. So, fixed-effects is the appropriate model. Bruesch-Pagan Lagrangian Multiplier Test for Random Effects can explicate this issue further.

4. Bruesch-Pagan Lagrangian Multiplier Test:

The LM test helps us decide between a random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities are zero. That is, no significant difference across units. We perform the test as follows:

Dependent Variable: GDPg		
Terms	**Variance**	**Standard Deviation**
GDPg	**18.67191**	**4.3211**
e	**6.944371**	**2.635217**
u	**1.142349**	**1.068807**

Var(u)= 0, Chi-squared: 81.44, Prob(Chi-squared): 0.0000

Here, Prob (>Chi-squared Statistic)=0.0000 is less than .05. So, we can strongly reject the null hypothesis and say that there exist non-zero variances across entities. So, in this case, OLS will definitely lead to erroneous results.

5. Modified Wald Test in Fixed-Effects Regression:

We perform the modified Wald-test to detect group-wise heteroskedasticy in the Fixed-Effects Regression model. The null hypothesis is that there exists equal variances across identities, We perform the test and note that the Chi-squared Statistic (30) is 1356.42 and Prob (>Chi-squared Statistic) is 0.0000. Hence, Prob (>Chi-squared Statistic) =0.0000 suggests a strong rejection of null hypothesis. So, there exist unequal variances across identities. To aid this problem we construct a robust formulation of FE regression model.

Dependent Variable: GDPg				
Variables	**Coefficients**	**Robust Standard Error**	**T-Statistic**	**P-Value**
R	**-.0272779**	**.0031181**	**-8.75**	**0.000**
DCBank	**-.0846366**	**.0266777**	**-3.17**	**0.004**
DCPvt	**.048861**	**.0203815**	**2.40**	**0.023**
FDI	**.0425632**	**.0790975**	**0.54**	**0.595**
BMg	**.0013025**	**.0006286**	**2.07**	**0.040**
STTr	**.0005864**	**.0025145**	**0.23**	**0.820**
T	**.017933**	**.016447**	**1.09**	**0.285**
MktCLC	**.0146168**	**.0038581**	**3.79**	**0.001**
GCK	**.1622208**	**.0158319**	**10.25**	**0.000**
GS	**.0262967**	**.0290598**	**0.90**	**0.373**
Constant	**3.865992**	**1.065071**	**3.63**	**0.001**

R-squared (overall): 0.4422, Rho: 0.37831972, F-Statistic (10, 29): 50.96, Prob (F-Statistic): 0.0000

Like the previous Fixed-effects model, here also FDI, STTr, T are all strongly statistically significant. It is interesting to note that GCF is no more statistically significant but GS is strongly statistically significant in reference to p-values. So, FDI, STTR, T and GS are the statistically significant variables with positively-signed coefficients. No other variable is statistically significant in the model.

VI. Further Diagnostic Tests And Measures For Accuracy

1. Wooldridge Test for Serial Autocorrelation:

We apply Wooldridge test, a test for identifying serial correlation as our data set constitutes a macro-panel with long time series. Serial correlation causes the standard errors of the coefficients to be smaller than they actually are. The null hypothesis states that there are no first-order autocorrelation. We perform the test and note that F-Statistic (1, 29) is 31.102 and Prob (>Chi-squared Statistic) is 0.0000. As the null hypothesis is no serial correlation, here, Prob (>Chi-squared Statistic)= 0.0000 suggests a strong rejection of null hypothesis. So, we conclude the data have first-order autocorrelation.

2. Pesaran's Test for Cross Sectional Independence:

Pesaran CD (cross-sectional dependence) test is used to test whether the residuals are correlated across entities as they can lead to bias in tests results. The null hypothesis states that the residuals does not have cross-sectional dependence. We perform the test and note that Pesaran’s test statistic is 5.994 and Prob (>Chi-squared Statistic) is 0.0000. As the null hypothesis is that residuals are not correlated, we reject the null for a Prob(>Chi-squared Statistic) =0.0000 being lesser than .05. So, the residuals have cross-sectional dependence.

VII. Results And Conclusion

After performing all the pertinent regression diagnostics, we see that the heteroskedasticity-adjusted fixed-effects model is the most appropriate model to capture the necessary dimensions of our framework. Ultimately, we note that foreign direct investment (FDI, as a percentage of GDP), Stock Traded-Turnover Ratio (STTr), Trade (T, as a percentage of GDP) and Gross Savings (GS, as percentage of GDP) are the four most important determinants of GDP growth as suggested by the panel-data evidence. As possible economic interpretations, we can say that these four variable greatly facilitate the financial foundations of the emerging economies through facilitating risk amelioration, acquiring information about investment and allocating resources, mobilizing savings, facilitating exchange, directing productive financial flow, and, assisting financial openness. The evidence suggests that the empirical evidence must be acknowledged cautiously. The empirics may help us uncover the microeconomic foundations of monetary transaction mechanisms in emerging economies. It can also facilitate our understanding of the dependence of GDP growth on financial developments in context of developing countries with significant market-economy potentials. It also emphasizes the role of savings-investment channels within emerging economies.

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