Financial Development and Financial Structure: the Impact on Economic Growth.

Fianl Report

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(a) Introduction

Economic growth is a commodity that all countries look to achieve. The larger and more successfully an economy grows, the higher quality of life a country will have to a certain extent. The examined factor to increase economic growth in this paper is financial development. Using financial development, policy makers can implement policies to persuade the growth of private credit, encouraging economic growth. The focus of this paper is to define a regression model based on the 8 articles analyzed and determine the correlation between the two. Our regression model looks to investigate how certain variables which are indicators of financial development correlate with the growth rate of an economy.

Wealth is produced by growth, some of which directly benefits businesses and employees by raising their standard of living. Individuals can escape poverty and achieve higher living standards when earnings rise and people spend more money (*Unu-Wider).* GR is representative of the growth rate of the economy and will be the dependent variable. B0 is the intercept. All other B variables are representative of a coefficient related to each of the variables based on the country(i) and time(t). A will represent the access to the financial market. D will represent the depth of the financial market. E will represent the efficiency of the financial market. C will represent the control variables and u will represent the error term.
. In what follows section 1 will present a literature review, section 2 will provide our model, the hypotheses we intend to test and the proposed estimation procedure, section 3 will present the data sources, undertake an analysis of these data and will discuss descriptive statistics. Section 4 will present the results from the econometric estimation and section 5 will compare our results with those obtained by various authors. Section 6 will conclude."

1. **Review of Literature**

Financial Development and Economic Growth in Developing Asia- <mark>Khash</mark>

Gemma Estrada, Donghyun Park, and Arief Ramayandi, Asian Developement Bank, November 2010

This paper discusses the Asian crises of 1997-98 that started after a period of sky-high growth in Asia where the opportunities for profit were immense. To capitalize, Asian countries and investment firms poured money in many investments in their developing countries but the focus was on the quantity of investments and not the quality of individual investments therefore many of the investments failed to create economic value and repay debts notably in real estate where many projects defaulted. Low levels of financial depth in the region(as evident by large amounts of the region's capital, intermediated in other continents such as in London or New York financial centers) and their inability to efficiently intermediate the economy's' savings to produce sound investments. Following the Asian crisis, many Asian countries, although nonuniform, have strived to deepen their financial systems as the countries become more developed, the abundance of investment opportunities decreases and the importance of the efficiency of investments increases. T

 through changing strategy from trying to mobilize large amounts of capital into an abundance of available projects into a system that evaluates the risks of projects more efficacy, increasing access to financial services and also by pivoting into more profitable areas of finance such as investment banking into facilitating economic growth by evaluating and locating efficient investments. This role requires a deeper, broader, and more liquid financial system. The econometric model used found a statistically positive relationship between added financial depth and openness with economic growth in Asia.

Financial depth refers to how much the financial system diversifies from traditional banking services toward greater use of capital markets such as investment banking, hedging risks, easing the access to equity and bond markets and trading of goods and services as well as facilitating corporate governance in the economy. This figure based on the indicators, has been increasing since the Asian crisis but its impact is slowing as the financial systems in the aftermath of 2008 crisis have better managed risks and used less leverage, the overall impact of financial Development is slowing but still positive. To add on, the structure of the financial system is analyzed between a banking based one((like Germany) and a financial system based on capital markets but the results were indifference suggesting that it is not the financial structure that makes the difference but the overall financial development. The results from the regression and research from this paper found that when countries develop from low income to middle- high income countries the role of financial development shifts from facilitating the increase in quantity of investments into lifting up the efficiency of investments.

Model:

To examine the relationship between finance and growth, the literature looks at the impact on GDP, the growth of (i) Depth of financial systems measured by indicators such as the ratio of total liquid liabilities to GDP, the ratio of bank credit to stock market capitalization and (ii) the structure of the financial system measured by ratio of bank credit to stock market capitalization

The evidence from the empirical literature strongly indicates that financial depth has a significant positive effect on growth whereas financial structure (the relative weight of banks versus capital markets) does not have any appreciable effect on growth.

The region has experienced substantial financial deepening and this deepening has been driven primarily by expansion of the capital markets, in particular the equity markets.

By applying econometric techniques, the model examined the relationship between financial development and TFP growth which is measured using the neoclassical model($Y = AK1 - \alpha L$ $(hL)^{\wedge}\alpha L$) where Y is average GDP growth per capita for each country and (h) is the number of years in school to account for labor productivity.

$xi,t = \alpha + \beta[FD]i,t + \lambda[Other]i,t + \varepsilon i,t$

There are 3 main variables for financial development; Total liquid liabilities relative to GDP, Private credit deposit money banks relative to GDP and Stock market capitalization relative to GDP. Additionally in some of teh regressions an indicator of financial openness(capital inflow relative to GDP) was used that led to finding a significant impact between financial openness and growth.

The Control variables used are; GDP per capita(to account for the growth convergence effect), years of schooling and executive constraint indicator(to control for quality of governance) . Other control variables were relative trade openness, inflation and government consumption.

Results:

econometric analysis on a *panel data* of 125 countries confirms that financial development has a significant positive effect on growth, especially in developing countries. Where liquid liabilities to GDP is more impactful for developing countries.

The base model did not use financial openness as an explanatory variable but when it was used its importance was found significant. It also used the fixed effects approach to account for the unobserved heterogeneity of the sample countries. In the end, there are 2 important results of this analysis; 1. The regression evidence was consistent with empirical literature where it was stated that financial development matters much more for growth than the structure of capital markets. 2. There seems to be a large drop-off in the effect of finance on growth since the asian crisis which is interpreted as being related to a reversion of overlending and overinvestment in pre crisis period to a more sustainable level of lending and investing with more emphasis given on risk analysis. Key changes in Asian banking sectors include consolidation and rationalization, greater transparency and disclosure, increase in foreign ownership, and decline in state ownership.

In a way, the rationalization adapted in the post asian crisis as well as still lagging underdeveloped financial systems might have saved the region from the 2008 global financial crisis, where the Asia reported being largely unscathed by the momentous upheaval in the global financial markets due to the fact that region's financial institutions had very low levels of direct and indirect exposure to *subprime assets* such as mortgage backed securities and collateralized debt obligations. This could suggest that there exists a risk of overdevelopment in the financial markets that can be examined in future research efforts.

Financial Institutions and Markets across Countries and over Time – Data and Analysis- Khash

In the aftermath of 2008 financial crisis, the risk of fragile financial systems and over leveraged institutions were presenting many economies a challenge. This Paper discusses the factors for determining the level of financial development in countries across the globe and their relative performance with each other based on the *size, level of activity, efficiency, and stability* of their financial systems. Further discussed, is the impact of these variables on the corresponding country's well being.

Size of the financial system refers to the aggregate size of the financial equity and bond markets plus the activities of banks and bank-like financial institutions. *Liquid Liabilities to GDP,* which is used to calculate the financial depth of countries, varies greatly from 395% to 1% between Luxembourg and Sudan. This shows the extent in which the countries vary in terms of liquidity and size in their financial markets and presents a real challenge for countries that are lagging as the scarcity of capital can put a real constraint on the daily activity of its population. An indicator of the informal section of the economy is *currency outside the banking system to base money* where the countries with more over-the- counter goods exchanged are less developed. This also shows the inefficiency of the government effectively tax, the sales of goods and services. The size of the private and public equity(bond) markets can be found through *the market capitalization of stock market(bond market) to GDP* and is higher in high income countries, especially the bond market. *Private Credit by Deposit Money Banks and Other Financial Institutions to GDP* captures the size of the private institutions activities in the economy. Historical evidence has shown that countries with more privatization tend to grow at a faster rate and reduce poverty.

The banking system, the largest component of financial systems, is made of the deposit banks and other financial institutions as well as the assets held by the central bank, best captured through *Central Banks Assets to GDP*. It shows that as the financial system becomes more developed, the impact of the private banking system(Deposit) outweighs the central bank in most countries. How well the banking system does(efficiency) can be captured through the *cost-income ratio* of a bank's activities which compares the overhead costs and corresponding revenue earned from the activities. The stability and the risk of the banking system is determined through the *z-score* of the firms and the level of their *Bank credit to deposit ratio*. Finally their profitability is captured through *ROE and return on assets*. The Z-score captures the probability that the deposit banks face bankruptcy captured through the difference between the standard deviation of results vs expected results of the banks and how well they can manage inconsistencies between these predictions. Countries with a relatively well banking system, have a high z-score, return on equity, deposit money vs central bank assets and low cost-income ratio and moderately high but not too high Bank credit to deposit ratio.

Capital markets and insurance sector: The equity and bond markets are to raise capital and are growing among the countries especially in less developed countries with some clear outliers such as India which fosters a very active Stock market, however, for these economies, the size of the market is less important than how liquid they are, as a well-run equity(bond) market needs to have high liquidity to attest for its efficiency. This is best captured through indicators of *Stock(bond) market turnover ratio* which is the ratio of total shares traded to the stock market capitalization. This number has increased in recent times but not due to new enterprises trading their shares but rather because of the increase in trading of shares in existing companies.

financial globalization: is discussed lastly where an open policy is suggested to boost economic activity. While countries are growing their financial systems, the pace that high income countries are doing so outweighs the lower income countries especially in the area of the bond market. Indicators such as *International Debt to GDP* are very useful for this analysis since it can capture all the benefits of the openness of the country's financial systems to raise capital from across the world, but also if overdone, it can show that the country is perhaps overleveraged to other countries and that can have a very adverse impact on the country in times of low economic prosperity. Therefore countries should be striving to find the optimal international debt levels that allows them to benefit from the impacts of financial openness but not so much that the country faces credit default risks from foreign debts.

Financial Structure and Economic Development-<mark>Abdullah</mark>

Thorsten Beck

This article investigates how a financial system, such as a bank, is founded on the financial structure to some extent. Economic development is significantly influenced by a nation's level of financial development and the legislative framework in which financial markets and intermediaries operate. Economic growth, the expansion of sectors dependent on external financing, the ease of the creation of new businesses, access to external financing, and business growth all occur more quickly in nations with more developed financial sectors and legal frameworks that uphold the rights of foreign investors (Beck, T. 2000).

The goal of the article is to "trace the evolution of the national financial system during the process of economic development, assess whether the overall development of the financial system influences the rate of economic growth, and evaluate the impact of financial structure on the pace of economic development" (Beck, T. 2000). Beck's model tests our four hypotheses using a panel of 34 nations and 36 industries. Examine how industry and country characteristics interact, including how much each industry depends on foreign funding and how each country's financial system is developed. The technique and data are described in this subsection (Beck, T. 2000). The sources used include firm-level accounting data from the World scope database for the largest publicly traded manufacturing enterprises in 33 countries. We calculate a company's prospective growth rate using the conventional financial planning methodology of "% of sales" (Beck, T. 2000). The strategy created by Demirgüç-Kunt and Maksimovic (1998, 2000) to determine if a firm's expansion in an economy is financially restrained is employed in the estimating method that follows. Directly examining the relationship between financial development and structure and company growth does not account for variations in the amount of external finance required by businesses operating in the same sector but in various nations.

The results disagree with both the bank- and market-based viewpoints. More specifically, neither market-based nor bank-based financial systems lead to faster economic growth for nations, faster expansion of financially reliant industries, faster creation of new businesses, or faster access to external financing for businesses (Beck, T. 2000). Furthermore, we find that in nations where the environment is favorable for the development of the financial industry, enterprises are more likely to grow at rates that require external financing. Beyond the level that the legal system predicts, the expansion of the financial sector has no predictive value for the expansion of businesses. This is in line with how law and finance see things (Beck, T. 2000).

Stock markets, banks, and growth: Panel evidence-<mark>Abdullah</mark>

Thorsten Beck *, Ross Levine

Using panel data for the years 1976 to 1998 and contemporary generalized-method-of-moments approaches created for dynamic panels, this research examines the effects of stock markets and banks on economic development. Overall, we find that banks and stock markets have a beneficial impact on economic growth, and these results are not affected by simultaneity biases, omitted factors, or unobserved country-specific effects (Beck, T, & Levine, R., 2004). Although the sample size is quite small, it is unclear if using quarterly data and Johansen's (1988) vector error correction model fully separates from high-frequency factors influencing the stock market, banks, and growth nexus to concentrate on long-term economic growth. Although the sample size is quite small, it is unclear if using quarterly data and Johansen's (1988) vector error correction model fully separates from high-frequency factors influencing the stock market, banks, and growth nexus to concentrate on long-term economic growth (Beck, T, & Levine, R., 2004).

Third, we specify the instruments used in the two-step system estimator differently. Users of the difference and system estimator frequently consider the moment conditions as though they were applicable to a specific time-period (Beck, T, & Levine, R., 2004).

Finance and the sources of growth, the first is a Sargan test of over-identifying limitations, which examines the sample analog of the moment conditions utilized in the estimate process in order to assess the overall validity of the instruments. In the second test, it is determined whether or not the error term "i,t" is serially correlated. We examine the possibility of second-order serial correlation

for the differenced error term (by construction, the differenced error term is probably first-order serially correlated even if the original error term is not). Both tests fail to disprove the null hypothesis, which supports our model. (Beck, T, & Levine, R., 2004)The other four regressions, however, include each unique development of the stock market and banks considerably. Overall, these findings point to a separate relationship between growth and bank development as well as stock market liquidity (turnover) (bank credit) (Beck, T, & Levine, R., 2004). These findings highlight the importance of utilizing sufficiently sparse data to ignore crises and business cycles and concentrate on the economic expansion (Beck, T, & Levine, R., 2004).

Gavin

In the article, Financial development and economic growth: panel evidence from BRICS published by Biplab Kumar Guru and Inder Sekhar Yadav Humanities and Social Sciences, Indian Institute of Technology Kharagpur, Kharagpur, India. The main focus of the article was to study the relationship between finance development and growth of the economy in quickly developing economies. The economies studied were Brazil, Russia, India, China and South Africa (BRICS) between 1993 and 2014. This article helped to correlate the relationship between finance development in both the stock market and in banking. The implications of the research would conclude that countries that develop their financial markets will see growth in their economy and if a country is looking to grow their economy they should focus on the development of their financial markets.

The model used in the article was $Y_{i,t} - Y_{i,t-1} = B(Y_{i,t-1} - Y_{i,t-2}) + y(X_{i,t} - X_{i,t-1}) + (E_{i,t} - E_{i,t-1})$. The model studies 5 countries from 1993 to 2014 using several different variables

collected from the WDI which was published by the World Bank. These variables include bank size(BS), credit to deposit ratio(CDR), CPS, financial depth(FDP), value of shares traded(VT), turnover ratio(TOR), inflation(INF), exports as a percentage of GDP(EXP), enrollment in secondary education(LNESE) and real GDP per capita growth(PCI). Using PCI as the dependent variable of Y and X will be the variable above they choose to test the correlated PCI with. Variables i and t represent the country and time. With the help of sources: Hsiao 1986, Levine and Zervos (1998), Arellano and Bond (1991) and Hao (2006) the study implemented restrictions to eliminate bias and inconsistencies. Using the SYS-GMM model and testing for endogeneity the null hypothesis is equal to zero for the coefficient of the observed variable. After testing with the Sargan test and m2 test statistic the null hypothesis is not rejected. After testing it was found that there is no tradeoff between stock market development and banking development. Both are factors of financial development that are correlated with economic growth. In conclusion the article proved that financial development has a strong positive correlation with economic growth in the emerging economies of BRICS.

<mark>Gavin</mark>

In the article, Financial development and economic growth: Evidence from a panel of 16 African and non- African low-income countries by Jagadish Prasad Bist, the main focus is to analyze the exchange between financial development and economic growth in low income countries. The concern in the exchange is that financial development is not an important factor to economic growth and rather something that comes along with economic growth. The article also looks to see if the correlation between financial development and economic growth depends on the methodology applied.

The model used in the article, LGDPit = $\beta 0i$ + $\beta 1i$PRVTit + $\beta 2i$GFCit + $\beta 3i$OPEit

+$\beta 4i$CPIit + $\beta 5i$LFit + μit is based on 16 countries (Benin, Burkina Faso, Burundi, Central

African Republic, Chad, Guinea-Bissau, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger,

Senegal, Tanzania, Togo and Uganda.) over a 20 year period of 1995 - 2014. The variables are

all cited from the world development index of the world bank. First, denoted with subscripts i

and t which represent the country and time period. LGDP is the log of the real GDP and is the

dependant variable, β is representative of a constant applied to a variable, PRVT is the measure

of credit to the private sector, GFC is the ratio of gross fixed capital formation to GDP, OPE is

the trade openness, CPI is consumer price index, LF is the labour force and μ is the error. After

testing for integration and cointegration, The article tests for cross sectional dependance with a

null hypothesis equal to zero correlation. The results show that the null hypothesis is rejected. It

was found that 9 of the 16 countries had a positive and important impact on private credit on

economic growth. 3 of 16 countries had negative correlation but they were also the most

underdeveloped financially. In conclusion the article was able to show that there is a correlation

between financial development and economic growth with 9 of 16 countries having a strong

positive correlation and 3 of 16 having a negative correlation. With these findings policy makers

would find it beneficial to create policy to encourage the development of the financial markets.

Brogan O'Brien

Financial Structure and Economic Growth: Evidence from Time Series Analyses

By Philip Arestis, Ambika D. Luintel and Kul B. Luintel

Analysis Focus (Research question):

The research focus is to show empirical aspects of financial structure and economic growth. Previous studies have shown financial services to be much more relevant in economic growth compared to financial structure. Financial structure showed multiple concerns among previous empirical studies proving much of the data irrelevant with regards to economic growth. In this analysis when comparing the relationship between financial structure and economic growth cross-country heterogeneity is fully accounted for to help reduce issues of previous studies. The study aims to counter past research and show positive correlation between financial structure and economic growth.

Model and Variables:

Cobb-Douglas production function is used: $\log(Q/L)_t = a_0 + a_1 \log(K/L)_t + a_2 \log(STR)_t$ Where the variables are as follows: Q is output, L the Labour, K the Capital, and STR is the Financial Structure. STR is equal to CLR/BLR (Capitalization Ratio / Bank Lending Ratio). In the above equation financial structure directly accounts for Total Factor Productivity (TFP). The Cobb-Douglas model uses log per capita output (LYP) and capita capital stock (LKP) because time series data on labour force do not exist for the samples used. Significant a_2 coefficient implies that STR is relevant while an insignificant a_2 implies STR is irrelevant.

6 Countries are used for the model including Greece, India, South Korea, Philippines, South Africa, and Taiwan. Time series data is collected on these 6 countries for a minimum 30 years (South Korea) and maximum of 39 years (Greece). The sample is comprised of countries with varied growth experiences to resolve the issue of countries with significantly different structures who still showed the same level of growth rate economically. Like the UK and Germany from 1864-1914, despite having drastically different financial structures they had very similar growth rates (Goldsmith, 1969, p. 407).

Estimation Techniques:

Autoregressive and distributed lag model ADL(P) is used to test whether it is viable to pool the data sets of sample countries because the sample shows significantly different growth

experiences. This causes concern that panel and cross-section regressions neglect heterogeneity.

Second, they apply standard Chow-type F-tests. The null is rejected then that supports that pooling is not viable. Another measure of heterogeneity is to test if the error variances are homoscedastic across countries using the Lagrange Multiplier (LM). Rejection of the null of group wide homoscedasticity implies that error dynamics are different across countries and data sets cannot be pooled.
Maximum Likelihood approach (ML) was re-parameterized to a Vector Error Correction Model (VECM).

Data Sources:

International Monetary Fund was used to collect data to calculate Bank Lending Ratio and total population.

Global Financial Data Inc. and Standard and Poor's Emerging Markets Database were used to generate the Capitalization Ratio.

Results:

First the results of the Chop-type F-tests to test poolability. Results reject the null under all specifications. Elasticity of LYP with respect to LKP and STR is heterogeneous across sample. The LM test for the group homoscedasticity confirms error variances in the sample are significantly different supporting that the data cannot be pooled. Raising concerns about the panel and cross-sectional tests that do NOT allow heterogeneity.

Overall financial structure has explained the levels of economic growth in both the time series and panel studies. Most of the panel estimates do not correspond to country-specific estimates and the heterogeneity appears more serious towards financial structure. When comparing the time series estimates to the panel estimates the data showed that one country may be a heavy indicator for the results of the panel as whole. The results are not data driven. When suppressing the cross-country heterogeneity there is great insignificance in financial structure towards growth. The study concludes that therefore cross-country heterogeneity may be the leading factor in why financial structure plays an insignificant effect in economic growth.

Financial Development and Economic Growth: The Role of Stock Markets

By Philip Arestis, Panicos O. Demetriades, Kul B. Luintel

Analysis Focus

This paper is written to estimate how the role of the stock market development effects economic growth and as well test the views of whether bank-based financial systems or capital-market based systems are more suitable for growth. The paper utilizes time-series methods because when using cross-country relationships for the stock market and economic growth endogeneity weakens the significance of stock market indicators. Five developed countries are used controlling for the effects of the banking system and stock market volatility. To gather enough data for a long time series of stock market indicators five developed countries are used. Therefore, the results of this study are possibly not suitable for less developed countries but could be valuable to them if they adopt similar policy decisions relating to the financial system of the five developed countries. The paper is structured so that it discusses the role of the stock markets and banks in economic growth, data and econometric methodology used, the findings of the data estimates and their implications on financial systems, and lastly the summary and concluding remarks on the impact of the stock market on economic growth.

Background Information (Helps further understand the research)

Stock Market Liquidity: High liquidity in the stock market shows a positive and negative side. Positive, is that when liquid assets traded become less risky because of the ease at which they can buy and sell so quickly with cash and alter their portfolios. Less risky assets in turn improve the allocation of capital which is vital part of economic growth.

Negative, such that greater stock liquidity may increase returns on investment and lower savings. Second is with higher liquidity leads to less risky investments which in turn leads to less uncertainty in the market. With less uncertainty in the market this reduces the need for consumers to have precautionary savings. Stock market users who become unhappy with something can easily sell and cause less corporate control and adversely impact corporate governance which negatively impacts economic growth.

Volatility: Certain degrees of price volatility suggest a healthy market adjusting to new information, but an excess of volatility is likely to lead to wasted allocation of resources, increased interest rates due to uncertainty, which directly impacts the volume and productivity of investment negatively. Negative investment, negative economic growth.

Banks: When banks are more suitable to address agency issues than the stock market it is possible that the stock market may hinder economic growth if it occurs at the expense of banking system development.

Capital market based financial system that predicts a weak relationship between the stock market and corporate finance because corporate financing is not based of issuing equity. Showing a very poor relationship between the stock market and economic growth. However, increase stock market capitalization may lead to increase volume of bank business because the banks are lending money to issuers of new equity in underwriting. Overall likely that aggregate stock market growth leads to also a development in the banking system and economic growth. Overall evidence shows that the stock market reflects economic growth when hand in hand with other aspects of financial development (well-developed banks and financial

intermediaries). Well-developed countries show strong stock markets and banks/institutions, while non-developed countries do not. Volatility and growth are linked to be known as a strong and negative and is deeper explored in this paper.

Model and Variables

Time series methods are used while controlling the effects of commercial banking and stock market volatility for 5 developed countries. Germany, U.S, Japan, U.K, and France were selected because they have enough substantial data. Quarterly data is used for the output of banking system development, stock market development, and stock market volatility.

Output is measured by the log of real GDP (LY);

Where *stock market development (LMC)*: log of the stock market capitalization ratio (ratio of stock market value to GDP). Capitalization indicators are better than transaction indicators when using time-series.

Banking system development (LBY): log of the ratio of domestic bank credit to nominal GDP. Credit-based indicators are more likely to show a stable long-run output compared to deposit-based.

Stock Market Volatility (SMV): measured by an eight-quarter moving stan deviation of the end-of-quarter change of stock market prices.

Estimation Techniques

Vector Autoregression (VAR)

Results

Overall, the analysis shows that stock markets do in fact contribute to long-term output growth but their influence on growth is substantially smaller than that of the banking system. Stock markets and banks made significant contributions to output growth in France, Germany, and Japan. The U.S and U.K were statistically weak and most growth was likely from the growth in financial development instead. Findings were consistent with the view that bank-based financial markets promote more long-term growth compared to capital-market-based systems. Volatility had negative real effects in Japan and France. Stock market volatility had negative effects on both financial development and growth in the U.K. Germany stock market volatility were found to be insignificant. Normally volatility may show healthy efficiently operating markets, these findings were not supportive of that. These finding may suggest, like previous findings related to volatility, that economic uncertainty is direct a response of volatility and negatively correlated to economic growth. Stock market volatility did show a definitive conclusion on how it may affect economic activity and more research can be done. Cross-country growth regressions only show a small sample of the relationship between financial development and growth and miss out on many details. Which backs the theory that the relationship between financial systems and more importantly the stock market and economic growth may vary substantially from country to country. The conclusion that the stock market development creates growth in the economy must be viewed with caution.

2.Model and Hypothesis tested

The theoretical model is **$GR_{i,t} = B0 + B1A_{i,t} + B2D_{i,t} + B3E_{i,t} + B4S_{i,t} + B5C_{i,t} + u_{i,t}$.** In this model GR is representative of the growth rate of the GDP of the economy and will be the dependent variable. B0 is the intercept. All other B variables are representative of a coefficient related to each of the variables based on the country(i) and time(t). "A" will represent the access to the financial market. "D" will represent the depth of the financial market. "E" will represent the efficiency of the financial market." C" will represent the control variables where we will use

4 control variables accounting for Foreign Direct Investing(FDI), Trade, population and Government spending on Education and "u" will represent the error term. As variables A, D, E, S increase GR is expected to increase. Using this equation we will test for cross sectional time series regression as it will give more outputs. As we have 5 independent variables it will increase the accuracy of our tests, by its nature it will take into account variation over the years. It will incorporate pooled OLS and fixed panel effects in the model.

We will also examine the panel data using a Fixed Effect Regression to account for cultural and unique characteristics of our observation data for which the variables are the same and the model is; $GR_{i,t} = B0 + B1A_{i,t} + B2D_{i,t} + B3E_{i,t} + B4S_{i,t} + B5C_{i,t} + \alpha_i + u_{i,t}.$

α_i (i=1....n) is the unknown intercept for each entity (n entity-specific intercepts).

3. Data Sources and Analysis

Access

Bank accounts per 1000 people (1)

Number of depositors with commercial banks per 1,000 adults.When that loan is made, it increases the money supply. Positive impact predicted on economic growth.

Firms with a bank loan (4)

Percentage of small firms (5-19 workers) in the formal sector with a line of credit or a loan from a financial institution. By providing money for capital expenditures like buying equipment, buildings, and implementing new technology. Positive impact predicted on economic growth.

Market Capitalization (39)

Value of listed shares outside of the largest ten largest companies to total value of all listed shares. The price would rise if there is a significant demand for its shares due to advantageous reasons. Positive impact predicted on economic growth.

Bonds (40)

Total amount of domestic nonfinancial corporate bonds and notes outstanding to total amount of domestic bonds and notes outstanding, both corporate and noncorporate. By setting interest rates, which influence liquidity and decide whether it is simple or difficult to purchase items with credit or obtain loans for things like vehicles, homes, or education. Positive impact predicted on economic growth.

Depth

Market cap/ gdp (56)

Value of listed shares in the stock market to GDP used to determine the relative size of the country's equity marketss, calculated using the following deflation method:

$\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is stock market capitalization, P_e is end-of period CPI, and P_a is average annual CPI. End-of period CPI (IFS line PCPI) and average annual CPI is calculated using the monthly CPI values (IFS line PCPI). Positive impact predicted on economic growth.

Liquid liabilities/ gdp (46)

Ratio of liquid liabilities to GDP is the broadest measurement of the country's financial depth and it involves deposit banks, and bank- like institution's lending activities, calculated using the following deflation method: $\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is liquid liabilities, P_e is end-of period CPI, and P_a is average annual CPI. Raw data are from the electronic version of the IMF's International Financial Statistics. Liquid liabilities (IFS lines 55L, FFCD or, if not available, line 35L, FDSB); GDP in local currency (IFS line NGDP); end-of period CPI (IFS line PCPI); and average annual CPI is calculated using the monthly CPI values (IFS line PCPI). For Eurocurrency area countries liquid liabilities are estimated by summing IFS items 34a, 34b and 35, or alternatively FDSBC, FDSBT, and FDSBO. Positive impact predicted on economic growth.

International public debt(61)

Amount of public international debt securities (amounts outstanding), as a share of GDP. It covers long-term bonds and notes and money market instruments placed on international markets. It is hypothized that as the access to debt instruments increases, so does the growth of the country. Table C3, previously Table 12 (international debt amount): governments / GDP. End of year data (i.e. December data) are considered for debt securities. The figures are deflated using the following methodology: $\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is the level international public debt, P_e is end-of period CPI, and P_a is average annual CPI. GDP is from World Development Indicators. End-of period CPI is taken from IFS line PCPI month of December (or if not available Q4). Average annual CPI is constructed from the monthly CPI figure taken from IFS line PCPI. The impact on economic growth is expected to be negative for high levels of debt and positive for conservative uses of public debt.

Central bank assets (47)

Claims on domestic real nonfinancial sector by the Central Bank as a share of GDP, It is widely believed that as the country becomes more financially developed, the proportion of central bank assets to GDP decreases and deposit banks and free market's influence increases.

It is calculated using the following deflation method: $\{(0.5)*[F_t/P\_e_t + F_{t-1}/P\_e_{t-1}]\}/[GDP_t/P\_a_t]$ where F is Central Bank claims, P_e is end-of period CPI, and P_a is average annual CPI. Raw data are from the electronic version of the IMF's International Financial Statistics. Central Bank claims (IFS lines 12, a-d, FASAG, FASAOS, FASAON and FASAOP); GDP in local currency (IFS line NGDP); end-of period CPI (IFS line PCPI); and average annual CPI is calculated using the monthly CPI values (IFS line PCPI). The impact on economic growth is predicted to be negative.

Efficiency

Bank Lending deposit spread -72

. Difference between lending rate and deposit rate. Lending rate is the rate charged by banks on loans to the private sector and deposit interest rate is the rate offered by commercial banks on three-month deposits. IFS line 60P. . Positive impact predicted on economic growth as higher spreads increase the revenues of the banking sector that can be reinvested in the economy.

Stock market turnover -81

Ratio of the value of total shares traded to average real market capitalization, the denominator is deflated using the following method: $T_t/P\_at/\{(0.5)*[M_t/P\_et + M_{t-1}/P\_{et-1}]$ where T is total value traded, M is stock market capitalization, P_e is end-of period CPI. (IFS line PCPI) and annual CPI (IFS line PCPI) are from the IMF's International Financial Statistics. Positive impact predicted on economic growth as a well-run equity market requires trading volatility.

Stability

Bank z-score -82

It captures the probability of default of a country's banking system. Z-score compares the buffer of a country's banking system (capitalization and returns) with the volatility of those returns. It is estimated as (ROA+(equity/assets))/sd(ROA); sd(ROA) is the standard deviation of ROA. ROA, equity, and assets are country-level aggregate figures Calculated from underlying bank-by-bank unconsolidated data from Bankscope. This figure predicts the risk of default of the banking system of the country and is expected to have positive impact on economic growth.

Stock price volatility -89

Stock price volatility is the average of the 360-day volatility of the national stock market index. It is expected to have a negative impact on economic growth as investors value stability.

Control

Foreign direct investment to GDP

Through capital accumulation in the recipient economy, FDI is expected to be growth enhancing through encouraging the incorporation of new inputs and technologies in the production process. It is believed that more developed countries will benefit more from FDI as they possess a higher level of human capital. Positive impact predicted on economic growth.

Population

To account for the growth convergence effect, we used population of countries examined as a control variable

Exports & Imports to GDP

When there are too many imports coming into a country in relation to its exports it can distort a nation's balance of trade and devalue its currency. The devaluation of a country's currency can have a huge impact on the everyday life of a country's citizens because the value of a currency is one of the biggest determinants of a nation's economic performance and its gross domestic product (GDP). Maintaining the appropriate balance of imports and exports is crucial for a country's growth. The importing and exporting activity of a country can influence a country's GDP, its exchange rate, and its level of inflation and interest rates. Positive impact predicted on economic growth.

Education($ spent on Education by Government)

The knowledge and skills of workers available in the labor supply are a key determinant for both business and economic growth. Industries with higher education and training requirements tend to pay workers higher wages. Differences in training levels are a significant factor that separates developed and developing countries. An economy's productivity rises as the number of educated workers increases since skilled workers can perform tasks more efficiently. An economy is more valuable when equal education and labor opportunities are available across gender, race, age, and ethnicities. Positive impact predicted on economic growth.

4. Results from Estimation

reg lngdp marketcapitalizationasofGD internationalpublicdebttoGDP stockmmarketturnoverratio stockpricevolatility Trade FDI Gov_Educ Pop

```
      Source |       SS           df       MS      Number of obs   =       153
-------------+----------------------------------   F(8, 144)       =      7.85
       Model |  45.0508513          8  5.63135641   Prob > F        =    0.0000
    Residual |  103.261086        144  .717090874   R-squared       =    0.3038
-------------+----------------------------------   Adj R-squared   =    0.2651
       Total |  148.311937        152  .975736429   Root MSE        =   .84681

----------------------------------------------------------------------------------
                       lngdp | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
-----------------------------+----------------------------------------------------
 marketcapitalizationasofGD  |   .0061825   .0025614    2.41   0.017     .0011198    .0112453
internationalpublicdebttoGDP |   .0029167   .0016865    1.73   0.086    -.0004168    .0062502
  stockmmarketturnoverratio  |   .0042615   .0014566    2.93   0.004     .0013825    .0071406
        stockpricevolatility |   .0165631   .0086624    1.91   0.058    -.0005588    .0336849
                       Trade |   .0011278   .0020615    0.55   0.585    -.0029468    .0052025
                         FDI |   .0022159   .0131867    0.17   0.867    -.0238485    .0282804
                    Gov_Educ |   .1905201   .0554638    3.44   0.001     .0808918    .3001484
                         Pop |  -.0383837    .051425   -0.75   0.457    -.1400292    .0632617
                       _cons |   8.008401   .3749105   21.36   0.000     7.267362     8.74944
----------------------------------------------------------------------------------
```

In this regression, we used the semi log OLS regression to examine the impact of financial development on economic growth, with out independent variable being ln of gdp per capita(lngdp) and using Market capitalization as percentage of GDP as proxy for Financial Access, international public debt to GDP as proxy for financial Depth, Stock market turnover ratio as a proxy for efficiency and stock price volatility as proxy for stability. In accordance to out hypothesis, all financial variables have a positive coefficient, meaning, increase in said variables will lead to a higher GDP per capita and by extension, economic graowth. The Model is significant since it passes the F-test as {[Prob > F = 0.0000]< 0.05 } and since the Adj-R^2 = 26.51% , the independent variables explain 26.51% of the growth in GDP. We used the Adj-R^2 instead of R^2 since it takes in the effect of sample size. Furthermore, to examine individual variables in the model, we used the T-test where; assuming alpha $\alpha = 0.10$, all of our Financial development variables are significant since { P>|t| < 0.10 } and since stock price volatility has the highest coefficient, it is possible that trading in financial markets that borne stock price volatility is quite more beneficial than market shares that are held stagnant and not

traded. Lastly, out control variables, (Trade, FDI, Gov_Educ Pop) have positive coefficients other than population but only Gov-educ is significant according to t-test. This makes us worry about the relevance of the used control variables and more examination is needed.

```
vif

    Variable |       VIF       1/VIF
-------------+----------------------
       Trade |      1.81    0.552512
 marketcapi~D |      1.65    0.605156
 stockmmark~o |      1.30    0.770609
         FDI |      1.26    0.792169
 internatio~P |      1.24    0.805825
 stockprice~y |      1.15    0.866502
    Gov_Educ |      1.14    0.879582
         Pop |      1.09    0.921218
-------------+----------------------
    Mean VIF |      1.33
```

Since all the VIFs are < 5 , we conculde that we don't have a multicollinearity problem

reg lngdp bankaccountsper1000people liquidliabilitiestoG internationalpublicdebttoGDP bankzscores Trade FDI Gov_Educ Pop if inrange(year, 1995, 2015)

```
      Source |       SS           df       MS      Number of obs   =        69
-------------+----------------------------------   F(8, 60)        =      7.36
       Model |  87.2133265          8  10.9016658   Prob > F        =    0.0000
    Residual |   88.851154         60  1.48085257   R-squared       =    0.4953
-------------+----------------------------------   Adj R-squared   =    0.4281
       Total |   176.06448         68  2.58918354   Root MSE        =    1.2169


-------------------------------------------------------------------------------------------
                     lngdp |  Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
---------------------------+---------------------------------------------------------------
  bankaccountsper1000people |    .0004186   .0004853    0.86   0.392    -.0005522    .0013894
         liquidliabilitiestoG |    .0148669   .0204992    0.73   0.471    -.0261376    .0558715
 internationalpublicdebttoGDP |    .0197825   .0047556    4.16   0.000     .0102699     .029295
               bankzscores |   -.0133596   .0225801   -0.59   0.556    -.0585265    .0318073
                     Trade |   -.0076485   .0040765   -1.88   0.065    -.0158027    .0005058
                       FDI |    .1544889   .0501779    3.08   0.003     .0541181    .2548597
                  Gov_Educ |    .3769396   .0914969    4.12   0.000     .1939186    .5599605
                       Pop |    .0684455   .0799955    0.86   0.396    -.0915694    .2284604
                     _cons |    5.815639   .5580397   10.42   0.000     4.699394    6.931885
-------------------------------------------------------------------------------------------
```

Result is significant for all financial development cases except for Z-score. This could indicate that the banks are being too conservative with their lending activities(which will increase the z-score but decrease the overall credit available in the economy). Trade has a negetive but very small coeficient in this regression which can be due to the fact that trade is a zero-sum game in the world stage(if one country imports, another exports)

- **reg lngdp marketcapitalizationasofGD internationalpublicdebttoGDP stockmmarketturnoverratio stockpricevolatility Trade FDI Gov_Educ Pop, robust**

```
Linear regression                               Number of obs   =       153
                                                F(8, 144)       =     11.91
                                                Prob > F        =    0.0000
                                                R-squared       =    0.3038
                                                Root MSE        =    .84681

-----------------------------------------------------------------------------------
                             |               Robust
                      lngdp  | Coefficient  std. err.      t    P>|t|    [95% conf. interval]
-----------------------------+-----------------------------------------------------
  marketcapitalizationasofGD |   .0061825    .002085     2.97   0.004    .0020614    .0103037
internationalpublicdebttoGDP |   .0029167   .0012192     2.39   0.018    .0005069    .0053266
   stockmmarketturnoverratio |   .0042615   .0011189     3.81   0.000     .00205     .0064731
        stockpricevolatility |   .0165631    .009273     1.79   0.076   -.0017657    .0348918
                       Trade |   .0011278   .0017547     0.64   0.521   -.0023404    .0045961
                         FDI |   .0022159    .007996     0.28   0.782   -.0135887    .0180205
                    Gov_Educ |   .1905201   .0528297     3.61   0.000    .0860983    .2949419
                         Pop |  -.0383837   .0987548    -0.39   0.698    -.23358     .1568125
                       _cons |   8.008401   .3555936    22.52   0.000    7.305544    8.711258
-----------------------------------------------------------------------------------
```

To effect for heteroskedasticity, we used the same regression but added "Robust" option to the end, and since the result didn't change much we conclude that heteroskedasticity did not effect the regression using these variables.

- **reg lngdp marketcapitalizationasofGD centralbanktogdp banklendingdepositspreads bankzscores Pop Gov_Educ FDI Trade**

```
      Source |       SS           df       MS      Number of obs   =        81
-------------+----------------------------------   F(8, 72)        =      6.02
       Model |  48.924841          8   6.11560512   Prob > F        =    0.0000
    Residual |  73.1909592        72   1.0165411    R-squared       =    0.4006
-------------+----------------------------------   Adj R-squared   =    0.3340
       Total |   122.1158         80   1.5264475    Root MSE        =    1.0082

-----------------------------------------------------------------------------------
                      lngdp  | Coefficient  Std. err.      t    P>|t|    [95% conf. interval]
-----------------------------+-----------------------------------------------------
  marketcapitalizationasofGD |    .017039   .0045374     3.76   0.000    .0079938    .0260842
              centralbanktogdp |   .0364514   .0149606     2.44   0.017    .0066279    .0662749
    banklendingdepositspreads |  -.0320155   .0164022    -1.95   0.055   -.0647126    .0006816
                  bankzscores |  -.0559266   .0148322    -3.77   0.000   -.0854939   -.0263592
                          Pop |   .1688645   .0665429     2.54   0.013    .0362136    .3015153
                     Gov_Educ |   .2340357   .0891505     2.63   0.011    .0563174    .4117539
                          FDI |   .0137157   .0343132     0.40   0.691   -.0546864    .0821178
                        Trade |  -.0058151   .0041254    -1.41   0.163   -.0140389    .0024087
                        _cons |   8.419093   .6181686    13.62   0.000    7.186796    9.651389
-----------------------------------------------------------------------------------
```

In this model, Adj-R^2 is 33.4% but 2 of the financial development variables(Z-scores and banklendingdepositspread) are negative which were contraroray to the empirical studies and our hypothesis. A reason for negative impact of Banklendingspreads is that the higher the spread for banking services, the less demand there will be for them as the cost of partaking in the banking activities is higher. To examine why the coefficient for z-scores is negative was harder to hypothesize why and points to the fact that this regression might not be most reliable.

- Xtsset country1 year
  xtreg gdpg marketcapitalizationasofGD centralbanktogdp banklendingdepositspreads bankzscores Trade FDI Gov_Educ Pop, re

```
Random-effects GLS regression              Number of obs     =         61
Group variable: country1                   Number of groups  =         28

R-squared:                                 Obs per group:
    Within  = 0.0643                                     min =          1
    Between = 0.5515                                     avg =        2.2
    Overall = 0.2620                                     max =          5

                                           Wald chi2(8)      =      18.46
corr(u_i, X) = 0 (assumed)                 Prob > chi2       =     0.0180

------------------------------------------------------------------------------------------
                    gdpg | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
-------------------------+----------------------------------------------------------------
marketcapitalizationasofGD | -.0171191   .0193081   -0.89   0.375    -.0549622     .020724
         centralbanktogdp | -.0189563   .0597594   -0.32   0.751    -.1360825    .0981699
 banklendingdepositspreads | -.1220518   .0578359   -2.11   0.035     -.235408   -.0086956
             bankzscores |   .021593   .0586284    0.37   0.713    -.0933166    .1365025
                   Trade |  .0246194   .0177961    1.38   0.167    -.0102603    .0594991
                     FDI |  .0601851   .1284213    0.47   0.639    -.1915161    .3118863
                Gov_Educ | -.2418006   .3647918   -0.66   0.507    -.9567794    .4731782
                     Pop | -.8491569   .2595312   -3.27   0.001    -1.357829   -.3404851
                   _cons |  4.322764   2.395269    1.80   0.071    -.3718772    9.017405
-------------------------+----------------------------------------------------------------
                 sigma_u |         0
                 sigma_e | 3.8510579
                     rho |         0   (fraction of variance due to u_i)
------------------------------------------------------------------------------------------
```

We used random effects regression in this model and found the model to be significant while haing R2 of 26.20% and {Prob> chi2= 1.8% < .05} therefore the model is significant but the variables are not since they don't pass the Z-test other than the bank deposit spread.

xtreg gdpcap marketcapitalizationasofGD liquidliabilitiestoG banklendingdepositspreads stockpricevolatility Trade FDI Gov_Educ Pop,fe

```
Fixed-effects (within) regression              Number of obs     =        109
Group variable: country1                       Number of groups  =         30

R-squared:                                      Obs per group:
     Within  = 0.0901                                      min =          1
     Between = 0.0508                                      avg =        3.6
     Overall = 0.0290                                      max =          8

                                                F(8,71)           =       0.88
corr(u_i, Xb) = -0.1075                         Prob > F          =     0.5385


------------------------------------------------------------------------------------------
              gdpcap | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
---------------------+--------------------------------------------------------------------
marketcapitalizationasofGD | -13.38805   94.25149    -0.14   0.887    -201.3202    174.5441
      liquidliabilitiestoG |  105.7431   496.8984     0.21   0.832    -885.0441     1096.53
 banklendingdepositspreads | -298.5239    958.682    -0.31   0.756    -2210.082    1613.034
       stockpricevolatility |  134.8496   222.4083     0.61   0.546    -308.6199    578.3191
                     Trade | -128.9057   63.07745    -2.04   0.045    -254.6786   -3.132863
                       FDI |  492.4928   283.9983     1.73   0.087    -73.78382    1058.769
                  Gov_Educ |  2352.435   1650.071     1.43   0.158     -937.713    5642.582
                       Pop |  138.7986   1818.218     0.08   0.939    -3486.625    3764.222
                     _cons |  32102.49   11777.15     2.73   0.008     8619.517    55585.46
---------------------+--------------------------------------------------------------------
                   sigma_u |  23046.669
                   sigma_e |  11142.87
                       rho |  .81052773   (fraction of variance due to u_i)
------------------------------------------------------------------------------------------
F test that all u_i=0: F(29, 71) = 8.17                      Prob > F = 0.0000
```

xtreg gdpg marketcapitalizationasofGD liquidliabilitiestoG banklendingdepositspreads stockpricevolatility Trade FDI Gov_Educ Pop,fe robust

```
Fixed-effects (within) regression              Number of obs     =         89
Group variable: country1                       Number of groups  =         28

R-squared:                                      Obs per group:
     Within  = 0.0849                                      min =          1
     Between = 0.2345                                      avg =        3.2
     Overall = 0.0485                                      max =          8

                                                F(8,27)           =       6.17
corr(u_i, Xb) = -0.7399                         Prob > F          =     0.0002

                                          (Std. err. adjusted for 28 clusters in country1)
------------------------------------------------------------------------------------------
                     |              Robust
                gdpg | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
---------------------+--------------------------------------------------------------------
marketcapitalizationasofGD | -.0402405   .0344981    -1.17   0.254    -.1110248    .0305438
      liquidliabilitiestoG | -.1678568   .1318733    -1.27   0.214    -.4384385    .1027248
 banklendingdepositspreads | -.2763436   .6208336    -0.45   0.660    -1.550189    .9975017
       stockpricevolatility |   .036445   .0796496     0.46   0.651    -.1269826    .1998725
                     Trade | -.0198133   .0196179    -1.01   0.321    -.0600658    .0204393
                       FDI | -.0327974   .0766214    -0.43   0.672    -.1900114    .1244166
                  Gov_Educ |  .4757621    .587012     0.81   0.425    -.7286871    1.680211
                       Pop | -.9575029   1.446475    -0.66   0.514    -3.925425    2.010419
```

```
             _cons |   6.474451   4.754186     1.36   0.185   -3.280332    16.22923
-------------------------+----------------------------------------------------------------
           sigma_u |  3.2350969
           sigma_e |  3.6586879
               rho |  .43878577   (fraction of variance due to u_i)
-----------------------------------------------------------------------------------------
```

This model was also found significant, however, the coefficient of financial depth, efficiency and size are negative. But since non of them pass the t-test to be found significant variables, their coefficient sign is irrelevant in this model

xtreg gdpg marketcapitalizationasofGD liquidliabilitiestoG banklendingdepositspreads stockpricevolatility Trade FDI Gov_Educ Pop,re robust

```
Random-effects GLS regression                 Number of obs    =        89
Group variable: country1                      Number of groups =        28

R-squared:                                    Obs per group:
    Within  = 0.0001                                        min =         1
    Between = 0.5753                                        avg =       3.2
    Overall = 0.1769                                        max =         8

                                              Wald chi2(8)     =     34.58
corr(u_i, X) = 0 (assumed)                    Prob > chi2      =    0.0000

                                    (Std. err. adjusted for 28 clusters in country1)
-----------------------------------------------------------------------------------------
                          |              Robust
                     gdpg | Coefficient  std. err.      z    P>|z|    [95% conf. interval]
-------------------------+----------------------------------------------------------------
marketcapitalizationasofGD |  -.0129732   .0105563    -1.23   0.219   -.0336632    .0077168
     liquidliabilitiestoG |    .038117   .0550261     0.69   0.488   -.0697322    .1459663
 banklendingdepositspreads |   -.182866   .0524802    -3.48   0.000   -.2857252   -.0800067
      stockpricevolatility |   .0021549   .0425364     0.05   0.960   -.0812149    .0855248
                    Trade |    .012467   .0064404     1.94   0.053    -.000156    .0250899
                      FDI |  -.0150715   .0691573    -0.22   0.827   -.1506173    .1204743
                 Gov_Educ |   .0558539   .2700136     0.21   0.836    -.473363    .5850707
                      Pop |   -.490605   .1327128    -3.70   0.000   -.7507173   -.2304928
                    _cons |   3.215984    2.16569     1.48   0.138   -1.028691    7.460659
-------------------------+----------------------------------------------------------------
                  sigma_u |          0
                  sigma_e |  3.6586879
                      rho |          0   (fraction of variance due to u_i)
-----------------------------------------------------------------------------------------
```

The model passes the f-test therefore it is significant, according to the random effect robust regression, we can conclude that financial development has a positive impact on growth of the gdp and economy

Summary, correlation and Descriptive statistics

. sum bankaccountsper1000people liquidliabilitiestoG stockmmarketturnoverratio bankzscores lngdp

```
    Variable |        Obs        Mean    Std. dev.        Min        Max
-------------+---------------------------------------------------------
bankaccoun~e |        149     593.698    327.0078          5       1219
liquidliab~G |      1,037    5.922078    10.27822    1.10e-13     186.61
stockmmark~o |        440    43.34218    54.25109     .081498    426.262
  bankzscores |        489    13.96411    8.912021     .055701    50.3921
       lngdp |      1,359     8.87025    1.595556    5.113046   11.66267
```

Descriptive Stats

. describe bankaccountsper1000people liquidliabilitiestoG stockmmarketturnoverratio bankzscores lngdp

```
Variable       Storage   Display    Value
    name         type    format     label       Variable label
-----------------------------------------------------------------------------------------
---------------------------------
bankaccountsp~e long     %17.0g                 bankaccountsper1000people1
                                                bank accounts per 1000 people
liquidliabili~G double   %10.0g                 ratio of liquid liabilities to GDP
stockmmarkett~o double   %10.0g                 stockmmarket turnover ratio
bankzscores    double   %10.0g                 bank z-scores
lngdp          float    %9.0g
```

.

Correlation

. correlate gdpg bankaccountsper1000people liquidliabilitiestoG bankzscores stockmmarketturnoverratio
(obs=43)

```
             |     gdpg  bankac~e  liquid~G  bankzs~s  stockm~o
-------------+--------------------------------------------------
        gdpg |   1.0000
bankaccoun~e |  -0.2155    1.0000
liquidliab~G |  -0.0339   -0.0526    1.0000
  bankzscores |  -0.1742    0.6285   -0.0764    1.0000
stockmmark~o |   0.1803    0.0948   -0.0507   -0.0605    1.0000
```

no big correlation problem found, other than the correlation between #bank accounts per 1000 people and Bank Z-scores.

- estat dwatson

error; sample may not include multiple panels

Hausman test for comparison of Random Effect vs Fixed effect model
Output:

```
              ---- Coefficients ----
            |      (b)          (B)           (b-B)      sqrt(diag(V_b-V_B))
            |      fe           re          Difference       Std. err.
------------+-----------------------------------------------------------------
bankaccoun~e |   -.0035237    -.0032212     -.0003024         .0129563
liquidliab~G |    1.851668    -.0234544      1.875123         3.515582
banklendin~s |    2.351384     .2261089      2.125275         .9287054
 bankzscores |    3.652399    -.0093467      3.661745         4.969063
         FDI |   -.7684876    -.3099262     -.4585614         .9711611
    Gov_Educ |    2.552511    -.2498783       2.80239          5.94179
         Pop |    2.672322    -.5521151      3.224438         10.47371
       Trade |    .5001363     .1570836      .3430527          .5364887
------------------------------------------------------------------------------
                   b = Consistent under H0 and Ha; obtained from xtreg.
           B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

    chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
            =   12.99
Prob > chi2 = 0.1122
```
.

Output: using the Hausman test to compare between random effect and fixed effect model, with the null hypothesis being Random effects model is better and alternative hypothesis being that the fxed effect model is better. The decision after the hausman test on the regressors, shows that Prob > chi2 = 0.1122 which is smaller than our alpha= 0.05, therefore we reject the null hypothesis that random effects model is better and decide to use the Fixed effect model instead.

5. Results Compared to Empirical Studies

Overall, out regression results yielded similar to those done in empirical studies that confirms the impact of financial development on economic growth of a country is significant. To get the conclusion we examined the effect of different aspects of financial development(namely; Access, stability, depth and efficiency) in a panel data comprising of 68 countries(appendix) and found significant link between the overall financial development and a country's wellbeing. For example, the regressions from *Financial Development and Economic Growth in Developing Asia by Gemma Estrada, Donghyun Park, and Arief Ramayandi No. 233 | November 2010:* found that the impact of Liquid liabilities to GDP, Bank Credit, Stock market capitalization and openness of economy all have a positive significant impact on Country's growth in countries in Asia since the Asian crisis. Some of the studies used different control variables and they have a different sample countries than ours, also our chosen years(2000, 2020) is more recent than the other articles and recent events such as covid-19 can have an impact in skewing our results which was non existent in the previous years.

6. Conclusions

In conclusion, we have made progress with our OLS regressions but are getting some insignificant models when running a Fixed effect and random effect regressions. Our results have so far been consistent with the empirical studies and are in favor of the positive role of financial development on GDP growth. Furthermore, by using the z-test and the t-test for indiduual variables, we have found that access to financial services, the depth of the financial market as well as its stability and efficiency are all positively significant for the growth of a economy. For the final case study, we need farther work in developing graphs, tests for autocorrelation and heteroskedasticity.

Appendix

I. Countries and data sources

Albania	Finland	Nepal
Algeria	France	Niger
Angola	Gabon	Norway
Australia	Germany	Oman
Austria	Ghana	Panama
Bahrain	Greece	Peru
Belarus	Guam	Poland
Belgium	Haiti	Qatar
Bermuda	Iceland	Samoa
Bolivia	India	Senegal
Brazil	Iraq	Serbia
Cameroon	Ireland	Slovenia
Canada	Italy	Spain
Chad	Kenya	Sweden
Chile	Latvia	Switzerland
Croatia	Libya	Togo
Cuba	Mali	Tonga
Denmark	Malta	Tunisia
Estonia	Mexico	Uganda
Fiji	Morocco	Ukraine
		Vietnam
		Zambia

Data sources:

Thorsten Beck, Aslı Demirgüç-Kunt and Ross Levine, (2000), "A New Database on Financial Development and Structure", World E

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Martin Čihák, Aslı Demirgüç-Kunt, Erik Feyen, and Ross Levine October2019globalfinancialdevelopmentdatabase-2

The World Bank. (n.d.). *Exports of goods and services (% of GDP)*. Data. Retrieved October 23, 2022, from https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?view=chart

The World Bank. (n.d.). *Foreign direct investment, net inflows (% of GDP)*. Data. Retrieved October 23, 2022, from https://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS

The World Bank. (n.d.). *Government expenditure on education, total (% of GDP)*. Data. Retrieved October 23, 2022, from https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?view=chart

The World Bank. (n.d.). *Imports of goods and services (% of GDP)*. Data. Retrieved October 23, 2022, from https://data.worldbank.org/indicator/NE.IMP.GNFS.ZS

Beck, T. (2000). Financial structure and economic development: firm, industry, and country evidence (Vol. 2423.). World Bank, Development Research Group, Finance.

Beck, T., & Levine, R. (2004). Stock markets, banks, and growth: Panel evidence. Journal of Banking & Finance, 28(3), 423–442. https://doi.org/10.1016/S0378-4266(02)00408-9

Unu-Wider : Blog : Why Should I Care about Economic Growth? https://www.wider.unu.edu/publication/why-should-i-care-about-economic-growth.

II. Graphs and Scatter plots

III. Regression table results

```
      Source |       SS           df       MS      Number of obs   =       153
-------------+----------------------------------   F(8, 144)       =      7.85
       Model |  45.0508513         8   5.63135641   Prob > F        =    0.0000
    Residual |  103.261086       144   .717090874   R-squared       =    0.3038
-------------+----------------------------------   Adj R-squared   =    0.2651
       Total |  148.311937       152   .975736429   Root MSE        =    .84681
```

```
--------------------------------------------------------------------------------------
                    lngdp | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
--------------------------+-----------------------------------------------------------
 marketcapitalizationasofGD |   .0061825   .0025614     2.41   0.017     .0011198    .0112453
internationalpublicdebttoGDP |   .0029167   .0016865     1.73   0.086    -.0004168    .0062502
   stockmmarketturnoverratio |   .0042615   .0014566     2.93   0.004     .0013825    .0071406
          stockpricevolatility |   .0165631   .0086624     1.91   0.058    -.0005588    .0336849
                       Trade |   .0011278   .0020615     0.55   0.585    -.0029468    .0052025
                         FDI |   .0022159   .0131867     0.17   0.867    -.0238485    .0282804
                    Gov_Educ |   .1905201   .0554638     3.44   0.001     .0808918    .3001484
                         Pop |  -.0383837    .051425    -0.75   0.457    -.1400292    .0632617
                       _cons |   8.008401   .3749105    21.36   0.000     7.267362     8.74944
--------------------------------------------------------------------------------------
```

```
      Source |       SS           df       MS      Number of obs   =        69
-------------+----------------------------------   F(8, 60)        =      7.36
       Model |  87.2133265         8   10.9016658   Prob > F        =    0.0000
    Residual |   88.851154        60   1.48085257   R-squared       =    0.4953
-------------+----------------------------------   Adj R-squared   =    0.4281
       Total |  176.06448         68   2.58918354   Root MSE        =    1.2169
```

```
--------------------------------------------------------------------------------------
                    lngdp | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
--------------------------+-----------------------------------------------------------
  bankaccountsper1000people |   .0004186   .0004853     0.86   0.392    -.0005522    .0013894
          liquidliabilitiestoG |   .0148669   .0204992     0.73   0.471    -.0261376    .0558715
internationalpublicdebttoGDP |   .0197825   .0047556     4.16   0.000     .0102699     .029295
                 bankzscores |  -.0133596   .0225801    -0.59   0.556    -.0585265    .0318073
                       Trade |  -.0076485   .0040765    -1.88   0.065    -.0158027    .0005058
                         FDI |   .1544889   .0501779     3.08   0.003     .0541181    .2548597
                    Gov_Educ |   .3769396   .0914969     4.12   0.000     .1939186    .5599605
                         Pop |   .0684455   .0799955     0.86   0.396    -.0915694    .2284604
                       _cons |   5.815639   .5580397    10.42   0.000     4.699394    6.931885
--------------------------------------------------------------------------------------
```

```
Linear regression                              Number of obs   =        153
                                               F(8, 144)       =      11.91
                                               Prob > F        =     0.0000
                                               R-squared       =     0.3038
                                               Root MSE        =     .84681


-------------------------------------------------------------------------------------------
                              |               Robust
                        lngdp | Coefficient  std. err.      t    P>|t|     [95% conf. interval]
------------------------------+------------------------------------------------------------
    marketcapitalizationasofGD |   .0061825    .002085    2.97   0.004    .0020614    .0103037
internationalpublicdebttoGDP |   .0029167   .0012192    2.39   0.018    .0005069    .0053266
    stockmmarketturnoverratio |   .0042615   .0011189    3.81   0.000     .00205    .0064731
         stockpricevolatility |   .0165631    .009273    1.79   0.076   -.0017657    .0348918
                        Trade |   .0011278   .0017547    0.64   0.521   -.0023404    .0045961
                          FDI |   .0022159    .007996    0.28   0.782   -.0135887    .0180205
                     Gov_Educ |   .1905201   .0528297    3.61   0.000    .0860983    .2949419
                          Pop |  -.0383837   .0987548   -0.39   0.698     -.23358    .1568125
                        _cons |   8.008401   .3555936   22.52   0.000    7.305544    8.711258
-------------------------------------------------------------------------------------------
```

```
      Source |       SS           df       MS      Number of obs   =         81
-------------+----------------------------------   F(8, 72)        =       6.02
       Model |  48.924841          8  6.11560512   Prob > F        =     0.0000
    Residual |  73.1909592        72  1.0165411    R-squared       =     0.4006
-------------+----------------------------------   Adj R-squared   =     0.3340
       Total |   122.1158         80  1.5264475    Root MSE        =     1.0082


-------------------------------------------------------------------------------------------
                        lngdp | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
------------------------------+------------------------------------------------------------
   marketcapitalizationasofGD |    .017039   .0045374    3.76   0.000    .0079938    .0260842
             centralbanktogdp |   .0364514   .0149606    2.44   0.017    .0066279    .0662749
   banklendingdepositspreads |  -.0320155   .0164022   -1.95   0.055   -.0647126    .0006816
                  bankzscores |  -.0559266   .0148322   -3.77   0.000   -.0854939   -.0263592
                          Pop |   .1688645   .0665429    2.54   0.013    .0362136    .3015153
                     Gov_Educ |   .2340357   .0891505    2.63   0.011    .0563174    .4117539
                          FDI |   .0137157   .0343132    0.40   0.691   -.0546864    .0821178
                        Trade |  -.0058151   .0041254   -1.41   0.163   -.0140389    .0024087
                        _cons |   8.419093   .6181686   13.62   0.000    7.186796    9.651389
-------------------------------------------------------------------------------------------
```

```
Random-effects GLS regression                    Number of obs     =        61
Group variable: country1                         Number of groups  =        28

R-squared:                                       Obs per group:
     Within  = 0.0643                                          min =         1
     Between = 0.5515                                          avg =       2.2
     Overall = 0.2620                                          max =         5

                                                 Wald chi2(8)      =     18.46
corr(u_i, X) = 0 (assumed)                       Prob > chi2       =    0.0180

------------------------------------------------------------------------------------------
                 gdpg | Coefficient  Std. err.      z    P>|z|     [95% conf. interval]
----------------------+-------------------------------------------------------------------
marketcapitalizationasofGD |  -.0171191   .0193081    -0.89   0.375    -.0549622     .020724
        centralbanktogdp |  -.0189563   .0597594    -0.32   0.751    -.1360825    .0981699
 banklendingdepositsspreads |  -.1220518   .0578359    -2.11   0.035     -.235408   -.0086956
              bankzscores |    .021593   .0586284     0.37   0.713    -.0933166    .1365025
                    Trade |   .0246194   .0177961     1.38   0.167    -.0102603    .0594991
                      FDI |   .0601851   .1284213     0.47   0.639    -.1915161    .3118863
                 Gov_Educ |  -.2418006   .3647918    -0.66   0.507    -.9567794    .4731782
                      Pop |  -.8491569   .2595312    -3.27   0.001    -1.357829   -.3404851
                    _cons |   4.322764   2.395269     1.80   0.071    -.3718772    9.017405
----------------------+-------------------------------------------------------------------
              sigma_u |          0
              sigma_e |  3.8510579
                  rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------------------


xtreg gdpcap marketcapitalizationasofGD liquidliabilitiestoG banklendingdepositsspreads
stockpricevolatility Trade FDI Gov_Educ Po
> p,fe

Fixed-effects (within) regression                Number of obs     =       109
Group variable: country1                         Number of groups  =        30

R-squared:                                       Obs per group:
     Within  = 0.0901                                          min =         1
     Between = 0.0508                                          avg =       3.6
     Overall = 0.0290                                          max =         8

                                                 F(8,71)           =      0.88
corr(u_i, Xb) = -0.1075                           Prob > F          =    0.5385
------------------------------------------------------------------------------------------
               gdpcap | Coefficient  Std. err.      t    P>|t|     [95% conf. interval]
----------------------+-------------------------------------------------------------------
marketcapitalizationasofGD |  -13.38805   94.25149    -0.14   0.887    -201.3202    174.5441
     liquidliabilitiestoG |   105.7431   496.8984     0.21   0.832    -885.0441     1096.53
 banklendingdepositsspreads |  -298.5239    958.682    -0.31   0.756    -2210.082    1613.034
     stockpricevolatility |   134.8496   222.4083     0.61   0.546    -308.6199    578.3191
                    Trade |  -128.9057   63.07745    -2.04   0.045    -254.6786   -3.132863
                      FDI |   492.4928   283.9983     1.73   0.087    -73.78382    1058.769
                 Gov_Educ |   2352.435   1650.071     1.43   0.158     -937.713    5642.582
                      Pop |   138.7986   1818.218     0.08   0.939    -3486.625    3764.222
                    _cons |   32102.49   11777.15     2.73   0.008     8619.517    55585.46
----------------------+-------------------------------------------------------------------
              sigma_u |  23046.669
              sigma_e |   11142.87
                  rho |  .81052773   (fraction of variance due to u_i)
------------------------------------------------------------------------------------------
```

```
F test that all u_i=0: F(29, 71) = 8.17                    Prob > F = 0.0000
```

IV. Stata codes

- Command: reg lngdp marketcapitalizationasofGD internationalpublicdebttoGDP stockmmarketturnoverratio stockpricevolatility Trade FDI Gov_Educ Pop

- Vif

- reg lngdp bankaccountsper1000people liquidliabilitiestoG internationalpublicdebttoGDP bankzscores Trade FDI Gov_Educ Pop if inrange(year, 1995, 2015)

- reg lngdp marketcapitalizationasofGD internationalpublicdebttoGDP stockmmarketturnoverratio stockpricevolatility Trade FDI Gov_Educ Pop, robust

- reg lngdp marketcapitalizationasofGD centralbanktogdp banklendingdepositspreads bankzscores Pop Gov_Educ FDI Trade

- Xtsset country1 year

  xtreg gdpg marketcapitalizationasofGD centralbanktogdp banklendingdepositspreads bankzscores Trade FDI Gov_Educ Pop, re

- xtreg gdpcap marketcapitalizationasofGD liquidliabilitiestoG banklendingdepositspreads stockpricevolatility Trade FDI Gov_Educ Pop,fe

- sum bankaccountsper1000people liquidliabilitiestoG stockmmarketturnoverratio bankzscores lngdp

- describe bankaccountsper1000people liquidliabilitiestoG stockmmarketturnoverratio bankzscores lngdp

- correlate gdpg bankaccountsper1000people liquidliabilitiestoG bankzscores

  stockmmarketturnoverratio(obs=43)

- estat dwatson

- codebook

- Hausman test:

  ```
  -  quiet xtreg gdpg bankaccountsper1000people liquidliabilitiestoG banklendingdepositspreads bankzs cores
  FDI Gov_Educ Pop Trade,fe
  -  estimates store fe
  -  quiet xtreg gdpg bankaccountsper1000people liquidliabilitiestoG banklendingdepositspreads bankzscores
  FDI Gov_Educ Pop Trade,re
  * estimates store re
        * hausman fe re, sigmamore
  ```