Does Financial Development cause Economic Growth: A Perspective?

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Abstract

This paper explores the empirical link between financial development and economic growth. I use data from the World Bank's World Development Indicators and the Financial Development database constructed by Thorsten Beck and Ed Al- Hussainy (World Bank). Based on a broad sample of 79 countries that covers the 1975- 2005 period, I find that financial development indicators are strongly associated with economic growth. To analyze causality, I employ the Generalized Method of Moments (GMM) and the Instrumental Variables (IV) approaches that correct for simultaneity bias, which characterizes the finance and growth nexus. I conclude that financial development's impact on growth is sensitive to model specification, i.e. inclusion of macroeconomic policy or social development indicators. My replication of a seminal study by Beck *et al.* (1999) and my own analysis makes me believe that well functioning and accessible financial intermediaries stimulate capital accumulation, mobilization and productivity enhancements with positive repercussions for long run growth.

1: Introduction

Stiglitz (1998) likened the financial system to the 'brain' of an economy. In theory the financial sector performs the complex task of allocating scarce resources across space and time in an environment of uncertainty. His view is perhaps shaped by the strong positive correlation exhibited by Financial Development (FD) and economic growth, which is often presented and conceived as the evidence that financial development causes economic growth by promoting investment and making the allocation of resources more efficient. The question is, do better functioning financial markets exert a causal influence on economic growth by better addressing information asymmetries and facilitating transactions?

The answer to this question has policy implications for developing as well as developed countries. In terms of policy, if financial intermediaries do impact growth significantly, then this raises the degree of urgency attached to legal, regulatory, and policy reforms designed to promote financial development.

Recently, many studies that examined the FD and economic growth nexus drew the conclusion that the presence of a strong and efficient financial sector spurs economic growth. Prominent empirical researches; King and Levine (1993), Levine and Zervos (1998), and Levine, Loayza and Beck (1999) employed cross country data on the size and depth of an economy's financial system (e.g. private credit to GDP) to arrive at the conclusion that financial development is an important determinant of growth. Cross country estimation is, however, plagued by omitted variable bias, as it ignores the country specific effects, and must be viewed with skepticism. Beck *et al.* (1999) have employed GMM dynamic panel estimation to further establish that the exogenous component of financial development exerts a positive influence of growth.

This paper is organized as follows. Section 2 presents and discusses major studies that have analyzed the relationship between Financial Development (FD) and economic growth. Section 3 introduces growth, social development, and FD measures employed in this study. In section 4, I discuss findings of the cross sectional analysis, which are recognizably constrained by limited data. Section 4 also contains static panel analysis and the computational difficulties that confine the analysis. Methodologically, this study uses two econometric techniques; (i) Generalized Method of Moments (GMM) Static Panel/ Instrumental Variable (IV) estimation and (ii) GMM/ IV Cross- Sectional estimation. The pure Cross Sectional estimation follows directly from

traditional growth studies, and the panel estimator uses pooled cross-country and time-series data to exploit the information provided by the country and time specific effects. Although the Cross Sectional estimation does not deal as precisely as the panel estimators with the potential problems induced by simultaneity, omitted variables, and unobserved country specific effects, it does however serves as a consistency check on the relationship between finance and growth. As in Beck *et al.* (1999), I use an IV approach to extract the exogenous component of financial development. Section 5 offers concluding remarks, and scope of future research is presented in Section 6.

This paper supports the growth enhancing view of financial development advocated by Bagehot (1873), Schumpeter (1911), and King and Levine (1993). Similarly, this paper's findings are consistent with theoretical models suggesting that better functioning financial sector accelerate economic growth. Finally, this paper emphasizes the importance of country specific effects (e.g. incidence of infectious disease, respect for the rule of law, risk of appropriation and protection of creditors and debtors' rights), which can enhance as well as undermine the potential benefits that can be reaped from FD and any other potential determinants of economic growth.

2: Literature Review

Levine (1997), a major contributor to the finance and growth theory, identified five basic functions of financial intermediaries, which are discussed below.

Savings mobilization

The growth in output of any economy depends on capital accumulation which in turn requires investment and an equivalent amount of savings to match it, but savings could be in kind i.e. gold, cash or real estate. The question is how productive can gold be?

An efficient financial sector attracts savings by building households' and institutional investors' confidence that their savings are not only secure but they will also fetch positive returns through intermediation process.

Savings mobilization i.e. converting liquid yet unproductive assets into liquid but productive assets and channeling these savings to productive investments is one of the most critical functions

of the financial sector. This is how savings mobilization critically impacts capital accumulation (both human and physical), productivity enhancements and thus growth. A well functioning financial sector also reduces the need of self financing, which is crucial for the small and medium enterprises.

Facilitation of exchange and Reduction in transaction & information costs

Well developed financial sectors facilitate trade by devising the mechanism to make and receive payments and by reducing transaction costs.

High information costs hinder the flow of capital because economic agents hesitate from investing in projects about which reliable information is missing. According to Diamond (1984) and Boyd and Prescott (1986), information gathering costs create incentives for financial intermediaries to emerge. Also, compared to a financial intermediary, it is much more costly and harder for individual economic agents to acquire and evaluate information about competing investment opportunities. FD economizes on the acquisition, evaluation and dissemination of information, which improves resource allocation.

Risk Management

In the presence of information costs and informational asymmetries, financial markets facilitate portfolio diversification, hedging and pooling of liquidity and unsystematic risk[1] (Levine, 1997). Liquidity risk is the inability to convert assets into purchasing power at predetermined prices, and is intensified by asymmetric information and transaction costs. A well functioning financial sector is vitally important for provision of liquidity because most of the high-return projects require a long-run commitment of capital, but it is not always possible for savers to surrender their savings for long periods. Therefore, if the financial system does not develop the liquidity of long-term investments, less investment is likely to occur in the high-return projects. Managing liquidity risk is therefore critical for capital accumulation, and capital accumulation is critical for growth.

Well developed financial sector also mitigates the risks associated with specific projects, firms, industries etcetera through diversification. This is intuitive. Investing in an individual project is

[1] The risk of price change is due to the unique circumstances of a specific security, as opposed to the overall market. This risk can be eliminated from a portfolio through diversification.

riskier than investing in a wide range of unrelated projects. Most of the depositors are risk averse. Therefore, financial intermediaries diversify risk by investing in many different enterprises, which facilitates financing of prohibitively risky enterprises (King & Levine, 1993).

Monitoring Managers and Exerting Corporate Control

There is a vast body of literature evaluating the relationship between corporate financial structure (external financing: debt or equity) and efficiency with which the funds are used. Although, there are conflicting views, but generally speaking financiers and firm owners negotiate terms and conditions aimed at ensuring efficient management of corporations. The absence of such covenants that enhance corporate control may impede the mobilization of savings from disparate agents and hence keep capital from flowing to profitable investments (Stiglitz and Weiss 1981, 1983).[2]

Various functions performed by a financial sector complement each other. For example, reliable information about investment opportunities alters the savings behavior, if not the savings rate. Moreover, monitoring the use of funds ensures "efficiency" on the individual firm level, which implies "good quality assets" for financial intermediaries and that gets translated into "higher returns on savings" for depositors, which further encourages savings and hence capital accumulation and growth (Fig. 1).

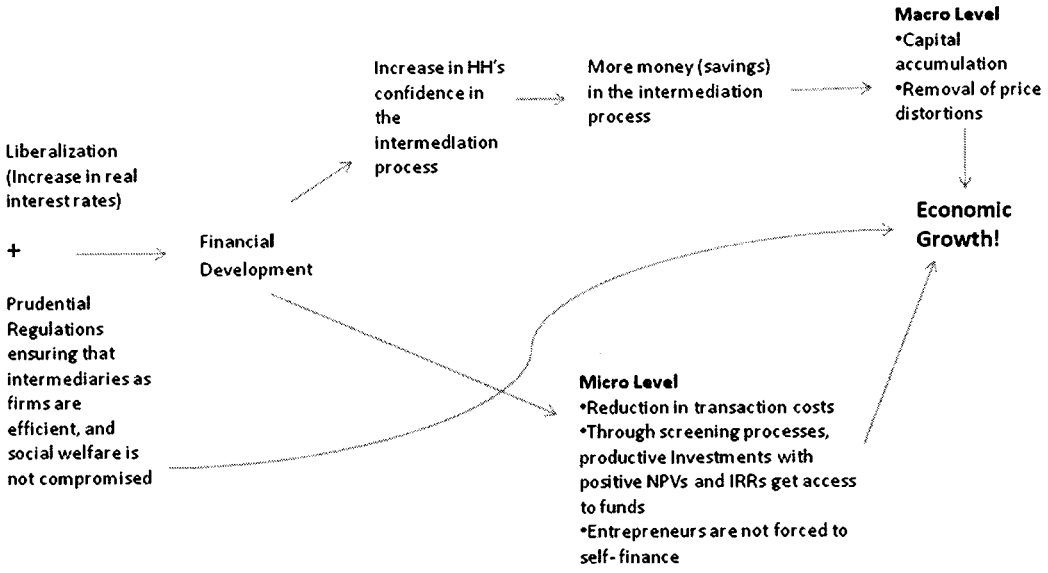
The more efficiently any country's financial sector performs the aforementioned functions, the more developed it is. It is critical to note that prudent regulatory framework is indispensable for FD as it ensures that financial intermediaries do not indulge in behavior that compromises social welfare.

[2] Financial covenants are agreements between a company and its creditors that the company should operate within certain limits. The purpose of debt covenants is to ameliorate a common agency problem. A company may, for example, agree to limit other borrowing or to maintain a certain level of gearing. Other common limits include levels of interest cover, working capital and cash flow.

Fig.: 1

Financial Development and Economic Growth

Theoretical Framework and Transmission Channels



2.1: Financial Development (FD)

The economic upheaval of 1970s was followed by economists' renewed attention on the importance of the financial sector. At that time, developing economies were characterized by repressive financial regimes where the primary role of the financial sector was the financing of public deficits at interest rates, which were kept low artificially.[3] Also, commercial banks faced high reserve requirements and government intervention, which prohibited them from facilitating the process of efficient credit dissemination.

McKinnon and Shaw (1973) highlighted the importance of adopting liberal as opposed to repressive financial policies.[4] They argued that demand for real money balances (M/P) was inversely related to the opportunity cost of holding money $d - \pi^e$, the real interest rates i.e. the higher the real interest rates or the real return on deposits, greater will be the incentives for economic agents to deposit money instead of holding it. This was expected to enhance capital

[3] Financial repression is referred to as a set of government regulations, laws, and other non-market restrictions that prevent the financial intermediaries of an economy from functioning at their full capacity.

[4] Financial liberalization is referred to as the elimination of credit controls, deregulation of interest rates, privatization and autonomy of the banking sector, and free entry into and exit from the financial sector.

accumulation and eventually growth, given that economic agents would be more inclined to save in presence of higher real interest rates enabling them to earn higher returns on their deposits.

It could be argued that an increase in the cost of money or the real interest rates would potentially discourage investment, but McKinnon and Shaw (1973) hypothesized that; (i) financial liberalization, an initial stage of development represented a move from negative to positive real interest rates and encouraged savings; (ii) a higher cost of capital would discourage the governments from viewing financial sector as sources of easy revenues and finally; (iii) given that financial intermediaries specialize in resource allocation, funds will be extended to the most viable enterprises with positive Net Present Values and Internal Rates of Return.

The proposition of McKinnon and Shaw was validated by Gelb (1988) who empirically established that severely repressive regimes have low growth per capita and low investment to GDP ratios. Gelb suggested that real interest rates held well below market clearing levels reduce capital formation by hurting the incentives to save.

Roubini and Sala-i-Martin (1992) theoretically and empirically established that financial repression adversely affected long term economic growth through inflation and reduced capital accumulation. They showed that countries with repressive financial policies tend to grow less than countries with liberal financial policies. A liberal financial system meant that financial intermediaries operated in a competitive environment where competition generally enhanced efficiency. Also, the role of the government is limited as a regulator and supervisor, and since it is mostly looked over by the private sector, government is no longer in a position to use it as a cheap financing tool. There findings remained valid even after controlling for the other determinants of growth used by Barro (1991) such as initial income, initial investment in education, government consumption, price distortions for investment goods or measures of social unrest such as number of assassinations and military coups.

Over time, the term "financial liberalization" was replaced by the term "Financial Development," whereas the underlying idea behind both these terms remain the same; liquid, efficient, well regulated aand accessible financial markets. Financial Sector Team of the Department for International Development (DFID) defines FD as "all the wholesale, retail,

formal and informal institutions in an economy offering financial services to consumers, businesses and other financial institutions" (DFID - 2004c, page 6). According to DFID, FD is described as; (i) high volume of money intermediated through the financial sector in relation to the base money; (ii) wide access to financial services, especially to the private sector; (iii) efficiency inducing competition in the financial sector and finally; (v) a prudent regulatory framework that watches over social welfare. Moreover, World Economic Forum (WEF), in its Financial Development Report (2008) defines FD as, "the factors, policies, and institutions that lead to effective financial intermediation and markets, and deep and broad access to capital and financial services" (WEF - 2008, page 3).

2.2: FD and Economic Growth

FD and its effects on economic growth have attracted considerable attention in recent times. Theoretical reasoning and empirical evidence suggest a positive, economically significant relationship between FD and economic growth. According to modern growth theory, this effect takes place through; (i) capital accumulation and; (ii) technological progress. The World Bank maintains that, ''efficient financial systems help economies to grow, partly by mobilizing additional financial resources and partly by attracting those resources to the best uses." (World Bank – 1989, p. 40)

It is important to mention here that the relationship between FD and growth was accompanied by controversial thoughts. Robinson (1952, p. 86) declared that "where enterprise leads, finance follows," which implied that enhanced economic activity results in an increase in the demand for external financing, which results in financial innovation; a subset of FD. Moreover, Lucas (1988, p. 6) asserted that economists "badly over-stress" the role of financial factors in economic growth. Likewise, some development economists expressed their skepticism about the importance of FD for growth by ignoring it as a potential determinant of development.

Bagheot (1873) and Hicks (1969) suggested that FD ignited industrialization in England by facilitating the mobility of capital. Schumpeter (1911) argued that banks play a critical role in economic development by ensuring that loans are extended to the most efficient of the competing investment opportunities. He thus highlighted the impact of banks on productivity growth and

technological progress. Accordingly, the banking sector affects economic growth by efficient allocation of finance and not necessarily by affecting the economy wide savings rate.[5]

An early development economist, Lewis (1954) was among the first to argue that finance and growth relationship is bi-directional. He stated that the financial intermediaries develop as a result of economic growth, and in turn stimulate economic growth. Later, Greenwood and Jovanovic (1990), in a well cited paper theorized that the finance and growth relationship is bi-directional: growing enterprises increasingly require access to finances, giving financial intermediaries incentives to develop, and well developed financial sectors offer higher rates of return to depositors and ensure optimal resource allocation leading to economic growth.

In his seminal work, Goldsmith (1969) attempted to study the impact of FD on economic growth by using financial intermediary assets, to be precise banks assets as a ratio of GNP to gauge FD's impact on growth. He assumed that the size of the financial system approximates the provision and quality of financial services. His study employed the data on 35 countries from 1860 to 1963 (where available) and concluded that; (i) a rough parallelism can be observed between economic growth and FD if periods of several decades are considered; and (ii) there are indications that periods of more rapid economic growth have been accompanied, though not without exception, by an above-average rate of FD (Goldsmith - 1969, p. 48). Although a stepping stone in the finance and growth field, Goldsmith's work was recognized to have several weaknesses by Levine and Renelt (1992). They argued that Goldsmith's study suffered from four weaknesses; (i) the sample size was small; (ii) it did not control for other factors that influence growth; (iii) it did not identify the mechanism (productivity enhancement or capital accumulation or both) through which FD affects growth and finally; (iv)it did not identify the direction of causality between FD and growth.

In a series of influential papers, Barro (1991) empirically established that distortions in goods, labor and money (financial) markets influence growth negatively. The famous Barro growth regressions included initial schooling, life expectancy, political stability, distortions in capital markets, rule of law and fertility rates as the control variables, and demonstrated these variables to be significantly affecting growth. Life expectancy at birth, measured as the number of years a

[5] Allocative efficiency refers to the efficiency with which markets are allocating resources. A market will be allocatively efficient if it is producing the right goods for the right people at the right price. An allocatively efficient market is therefore one which has no imperfections. This will be true when marginal cost is equal to average revenue in the market. It occurs where a firm produces at MC = AR (marginal cost pricing).

newborn is expected to live if prevailing patterns of mortality at the time of its birth were to stay the same, affects economic growth through its impact on increase in population. Life expectancy and economic growth have an uncertain relationship since it can be coined as both; an increase in the dependency ratio and a proxy for the availability of health care services. Fertility rate measured as the number of children born to a woman if she were to live to the end of her childbearing years is said to be inversely related to growth (Barro 1991). Scarce resources and high fertility rates especially in the context of developing countries result in compromised human capital acquisition and hence impede economic growth. There are two schools of thought regarding government expenditure's influence on economic growth; the first argues that a larger government is typically detrimental to efficiency, productivity and growth as the public sector is not responsive to market signals and is subject to an arduous regulatory framework that results in higher production costs. The other school however, claims that a larger government facilitates the needs for provision of certain goods and services (e.g. libraries, community welfare centers and health care) that will not be provided by the private sector. There is a lack of consensus on the role of the government; Barro (1991), Landau (1986) and Grier and Tullock (1989) have empirically established a negative relationship between the size of the government and growth, whereas, Ram (1986) and Aschauer (1989) have exhibited that governments positively affect growth. As far as openness to trade is concerned, economic theory suggests significant positive impact of trade on growth, so much so that, policies conducive to open trade were a major part of the World Bank's structural adjustment program (SAP). This view is shared by major economists like Anne Krueger (1998) and Joseph Stiglitz (1998); for example, according to Stiglitz (1998), "most specifications of empirical growth regressions find that some indicator of external openness- whether trade ratios or indices of price distortions or average tariff level is strongly associated with per- capita income growth."

Although, the objective of this study is to assess the relationship between FD and growth, I realize that controlling for FD while ignoring other growth determinants can lead to serious omitted variable bias. Therefore, in addition to FD indicators, I control for Barro's growth determinants.

Saint Paul (1992) stressed the relationship between FD and productivity enhancement. In line with Adam Smith, Saint Paul suggested that division of labor, though risky, results in productivity gains. Financial markets on one hand facilitate financing for specialized, risky but potentially viable investment opportunities and on the other hand allow agents to hedge against

the risk by allowing them to diversify portfolio investments. In short, according to Saint Paul (1992), FD affects economic growth through technological advancements.

King and Levine (1992, 1993a and 1993b) addressed the deficiencies in the previous researches and studied 80 countries over the period 1960–1989. In addition to constructing FD indicators, the controlled for other factors that are known to affect growth e.g. initial income, initial secondary school enrollment rate, ratio of government expenditures to GDP, inflation rate and ratio of export plus imports to GDP. The first measure, DEPTH (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries divided by GDP) gauged the size of financial intermediaries relative to GDP. The second measure, BANK (ratio of bank credit divided by bank credit plus central bank domestic assets) was used as a proxy of the relative importance of the commercial banks vis-à-vis the central bank. Development literature suggests that a higher BANK measure is indicative of a developed financial system. The third and fourth measured the allocation of credit i.e. the funds channeled to the private sector relative to the public sector. Theses are; (i) PRIVATE (ratio of credit allocated to private enterprises divided by the total domestic credit) and; (ii) PRIVY (credit to private enterprises as a percentage of GDP). King and Levine concluded that there is a strong positive relationship between each of the four FD indicators and the three growth indicators; (i) GDP per capita growth rates; (ii) capital accumulation and; (iii) productivity growth. Establishing the channels through which FD impacts economic growth was a significant contribution. They also stated that initial level of FD was a good predictor of the subsequent levels of economic growth.[6]

Using firm level data from 30 developed and developing countries for the period 1980-1991, Demirguç-Kunt and Maksimovic (1996) established that firms with access to well developed stock markets grow faster than the firms that do not have access to equity financing when they face comparable business environments.

Berthelemy & Varoudakis (1996) suggest that competitive financial systems are critical for growth. According to them, oligopolistic financial sectors tend to be inefficient with high administrative costs, which result in low real deposit rates and hence a lower level of "capital accumulation," which increases the likelihood for an economy to be caught in poverty trap. They theorize that countries with high levels of educational attainment but poor financial systems have

[6] See Gelb (1989), Gertler and Rose (1991), Roubini and Sala-i-Martin (1992) and Easterly (1993).

lower standards of living than countries with a comparable level of educational attainment and relatively well developed financial sectors. Their conclusion that lack of sufficiently well developed financial sector can undermine the otherwise growth inducing factors has serious policy implications. They base their results on the assumption that beyond a certain level of FD, the growth effects resulting from human capital accumulation become conditional upon efficient investment allocation, which is not always possible when financial sector is underdeveloped.

In an attempt to identify the sources of growth accompanied by FD, Beck *et al.* (2000) refined their research by; (i) deflating the FD indicators and; (ii) using Private Credit (credit extended by financial intermediaries to the private sector as a ratio of GDP).[7] Private Credit is a better indicator of the size of the deposit money banks as it excludes the credit issued by the central bank and the development finance institutions (DFI), and also the credit extended to the public sector and cross claims of one group of intermediaries on another. The other indicators that they included were; (i) Liquid Liabilities measured as Currency plus Demand and Interest-Bearing Liabilities of financial intermediaries and Nonbank financial intermediaries as a ratio of GDP; (ii) Commercial-Central Bank, which equals the ratio of Commercial Bank Domestic Assets divided by Commercial Bank plus Central Bank Domestic Assets and; (iii) Bank Credit measured as Credit by Deposit Money Banks to the private sector as a share of GDP. Commercial-Central Bank reflects upon the importance of the private financial intermediaries versus the central bank, and the higher this ratio, the more developed a financial sector is perceived to be. Using both cross section and panel data for a sample of 32 countries over the period 1980-1995, they found a positive relationship between FD and productivity growth and FD and economic growth. However, they failed to find a robust positive relationship between FD and capital accumulation. On the same lines, Luintel and Khan (1999) used a multivariate vector auto-regression time series framework for a sample of 10 developing countries and established that the relationship between FD and growth is bi-directional. Moreover, Huang (2005c) empirically investigated the existence and direction of causality between private investment and FD on a panel dataset of 43 developing countries over the period 1970-1998. He shows positive causal effects going in both directions.

Deidda and Fattouh (2002) used a sample of 61 countries over 1960–1989 and studied the relationship between finance and growth for (1) high income countries, (2) low income countries

7 The measure Private Credit used by Beck et al. (2000) is more refined than what was used by King and Levine (1993) as it excluded the credit issued by the central bank and the development finance institutions (DFI) to the "private sector", and also the credit extended to the public sector and cross claims of one group of intermediaries on another. Privy used by King and Levine (1993) isolated the credit extended to the private sector whereas it failed to identify whether the central bank or the private commercial banks were extending most of the credit.

and (3) a broad sample of countries without threshold effects. They established that a positive significant relationship holds in the case of high income countries, whereas the same is not true for the low income countries.

Rioja and Valev (2004) employed Generalized Method of Moments (GMM) on a panel data of 74 countries over the period 1961–1965 to analyze whether FD affects growth in different ways in developing and developed countries. They concluded that at lower levels of economic development, finance affects growth mainly through capital accumulation; however, at higher levels of FD, productivity enhancement is the main channel through which growth takes place. Finally, the analysis pertaining to FD's impact on growth is confined by lack of data on the volume and efficiency of DFIs; financial intermediaries geared towards the poor.

2.3: Determinants of FD

Having agreed upon the channels through which FD potentially affects growth, many economists have attempted to explore the factors that contribute to FD, since factors that spur FD are expected to spur economic growth as well.

La Porta & al (1997, 1998) and Mayer & Sussman (2001) explained cross country differences in the level of FD by; (i) legal codes, which substantially influence the treatment of creditors and shareholders and the efficiency of contract enforcement; (ii) regulations concerning information disclosure and accounting standards and finally; (iii) trade policies.

Huybens and Smith (1999) theoretically and Boyd *et al.* (2001) empirically established that economies with high inflation are more likely to have inefficient financial systems. Rajan and Zingales (2003) pointed out that competitive markets and open trade policy undermine rent seeking activities carried out by vested interest groups. This necessitates well functioning financial markets as that facilitates access to capital without having to resort to undue political favors. Huang and Temple's (2005) finding echoed those of Rajan and Zingales that openness of goods market has a positive effect on FD.

Huang (2005a, 2005b) argued that political liberalization weakens the influence of elite groups over policy making and is typically followed by FD at least in the short run. However, according to him, the establishment of democracy could potentially exert negative effects on policy aimed at financial reform. Huang further stated that geographic variables mainly affect FD through the

demand side. For example, the production of certain crops or primary goods and transportation needs could affect the demand for external finances.

Levine (1997, 2004), Jaffee and Levonoan (2001), Greenwood and Jovannovic (1990) and Saint Paul (1992) have emphasized that income level, economy-wide savings rates, population level, religion and culture also to some extent explain the cross country differences in levels of FD. They demonstrated that levels of GDP per capita and savings rates have positive effects on the banking sector (bank assets, number of branches and employees, and reduced transaction costs) in particular.

2.3.1: Institutional quality; a key determinant of FD

According to Douglass North (1990), long term economic performance is determined by institutions since they structure the incentives and goals of economic agents. Institutions are the key to strong economic performance because they reduce the cost of exchange and production (North – 1990). He defines institutions as "the humanly devised constraints that shape political, economic and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct) and formal rules (constitutions, laws, property rights)"(North - 1991, page 97).

La Porta *et al.* (1997, 1998) made distinguished contributions to the topic concerning the legal determinants of FD. They used a cross section of 49 developing and developed countries and demonstrated that legal environment, described as legal rules and their enforcement, matters for the size and extent of a country's financial markets. Their results are consistent with economic theory as an effective legal environment increases the confidence level of the potential financiers and depositors, augmenting the efficiency of financial markets.

2.3.2: Institutional quality; a key determinant of economic growth

The proposition that institutional quality determines economic performance could not be validated due to lack of data till 1995, when Knack and Keefer (1997) constructed a new set of data on institutional quality and demonstrated that the security of property rights and the enforcement of contracts have a positive and economically significant effect on economic growth.

Hall and Jones (1999) attribute more than 50% of the variation in cross country output per worker to social infrastructure[8], implying that the impact of social infrastructure on output is more than that of country wide differences in physical capital per worker and human capital per worker (Hall and Jones, 1999). Instituitional quality can safely be assumed to have a positive interrelation with social infrastructure. Institutions i.e. media, judiciary, executive and legislature are supposed to ensure that economic policies are geared towards developing physical and intellectual infrastructure, which is a necessary condition for growth.

Due to lack of data on institutional quality, especially for developing countries, most of the researchers have evaluated the effect of institutions on growth using only one measure. Barro (1996) controlled for institutional quality by using respect for rule of law as a proxy to analyze democracy's contribution to growth. Sachs and Warner (2001) also used the respect for the rule of law to control for institutional quality in their study of the resource curse. The rationale for using one measure of institutional quality is the strong positive inter-correlation between different measures of institutional quality. A drawback of this approach is that it fails to identify which institutions matter the most for growth.

Gallup & al. (1999) and Sachs & Warner (2001) studied the effects on growth of institutional quality, and ecologic and geographic variables such as malarial prevalence, latitude and the proportion of country's population living within the tropics and argued that the latter also constrains growth. Later, Acemoglu & al (2001) used a cross section analysis of the effect of institutions on economic growth and concluded that the propositions made by Sachs & Warner (1995) loose their explanatory power once institutions' influence on growth is accounted for. Likewise, Rodrick & al (2004) proposed that once the effects of institutions on growth are controlled for, geographic and ecologic variables are found to have weak direct influences on growth.

Property rights and their legal protection were identified as the key determinants of economic development by North (2005). "Secure property rights increase the returns on cooperative activity, increase the returns on investment and decrease the transaction costs". (North - 2005, page 18). Absence of secure property rights encourage economic agents to engage in rent seeking activities that are ineffective and inefficient. North identified the lack of an effective legal system

[8] Social infrastructure is defined as a system of social services, networks and facilities that support people and communities.

of enforcement of well defined property rights as the key to the underdevelopment of third world countries (North - 2005, chapter 12).

It is well established that institutional quality spurs both; FD and economic growth but FD is not the only channel through which institutional quality spurs economic growth. Moreover, it is safe to assume that institutional quality is directly linked to the effectiveness of the regulatory framework, which ensures that financial intermediaries operate efficiently as firms and do not indulge in activities that compromise social welfare. Therefore, one channel through which institutional quality leads to economic growth is through FD; the higher the FD, the higher will be the security of property rights resulting in higher level of trust on the financial sector. A well trusted and prudently regulated financial sector is better able to attract deposits and disseminate those funds for productive purposes.

3: Data

To assess whether FD causes economic growth, this study uses macroeconomic policy variables financial, and social development indicators. I cover 79 countries, of which, 35 are high income and 44 belong to low and lower middle income group. The data included is annual, country level data that spans through 1975-2005.

Growth, macroeconomic policy, and social development measures (e.g. GDP per capita, secondary school enrollment rates, inflation, and openness to trade) have been retrieved from the World Bank's premiere "World Development Indicators" database. FD indicators have been retrieved from the FD database constructed by Thorsten Beck and Ed Al- Hussainy (World Bank) in 2008. The source behind FD data base is the International Monetary Fund's (IMF), International Financial Statistics (IFS) database.

It should be noted that the panel dataset used in this empirical study is unbalanced - a common problem in the development literature. In particular data for FD indicators other than those related to traditional Deposit Money Banks is not available for a large number of developing countries. For the countries for which these measures are available, there still are gaps in the time series. The data limitations are further discussed in Section 4 and Appendix 3.

3.1: Economic growth measures

Endogenous growth theory emphasizes the importance of capital accumulation and productivity enhancements; channels through which growth takes place. I use three variables to capture economic growth; (i) GDP per capita (Constant at 2000 US$); (ii) Gross Capital Formation (% of GDP); and (iii) Research & Development expenditure (% of GDP). The need for the inclusion of the aforementioned growth measures lies in identifying the transmission channels through which FD affects economic growth. King and Levine (1993) have demonstrated that FD affects growth through capital formation and technological innovation.

The importance of efficiency improvements and technological innovation for economic growth is well recognized. Improvements in efficiency and technology are hard to quantify; a possible indicator however, could be the number of new patents registered in a country.[9] Unfortunately, data on registered patents is not readily available; therefore, I use Research & Development expenditure (% of GDP) as a proxy for efficiency and technology improvements. It can be assumed that the greater the resources devoted to research, the higher will be the chances of efficiency gains.

3.2: Financial development measures

This study includes FD measures that cover the volume of the major segments (banks, insurance companies, debt, and equity markets) of the financial sector. Private Credit by Deposit Money Banks and other Financial Institutions (% of GDP) measures the overall level of capital mobilized through the financial sector, where capital mobilization is the primary function of the financial sector. Private Credit by Deposit Money banks, a traditional measure of the depth of the banking sector is also included in the analysis. Volume of the debt, equity, and insurance markets is measured as; (i) debt market capitalization (% of GDP); (ii) stock market capitalization (% of GDP); and (iii) insurance market premiums (% of GDP).

It is notable that the Private Credit by Deposit Money Banks and other Financial Institutions and by Deposit Money Banks only; isolate the credit extended to the private sector which, in modern economics is viewed as the engine for growth. The higher these ratios, the lower is the need for self financing for the private sector and small/ medium enterprises. Another significance of this

9 A patent is a set of exclusive rights granted by a state (national government) to an inventor or his assignee for a limited period of time in exchange for a public disclosure of an invention. A higher number of registered patents indicates that successful research is taking place in an economy.

measure, when viewed along the savings rates is that it is a good indication of the proportion of deposits (received by banks) that are converted into credit. Private credit by deposit money Banks and other Financial Institutions (% of GDP) paints a more comprehensive picture of the importance given to the private sector when allocating resources, however, so far it is not particularly usable for two reasons; (i) a universal definition of "other financial institutions," has not evolved yet; and (ii) this measure is largely unavailable for developing and less developed countries.

Insurance services are capable of generating significant productive impact within an economy. For example, the offering of risk transfer and indemnification services aids risk-averse individuals in purchasing large-expense items. Thus insurance coverage has positive externalities in terms of increased purchases, profits, and employment both within and alongside the insurance sector. In addition, insurance facilitates innovation within an economy by offering to underwrite new risks. This study uses sum of life and non- life insurance premium (% of GDP) as a proxy of size of the insurance sector in an economy. Due to lack of documentation and underdeveloped insurance sector, this measure is missing observations for developing and less developed countries.

Economic theory deems liquid stock markets as robust predictors of GDP growth, physical capital growth, and productivity growth. Levine (1991) and Bencivenga and Smith (1995) theorize that liquid stock markets reduce the disincentives to invest in long term projects because investors can easily sell their stake in the project even before the project matures. Stock Market Capitalization (% of GDP) has been used as a measure of the size of the stock market and it equals the market value of listed domestic shares on domestic exchanges divided by GDP.

Well developed bond markets provide an alternative mode of financing to institutional and retail investors, and are important constituents of a vibrant financial system. Bond markets facilitate the execution of macroeconomic policies e.g. financing of the fiscal deficits without having to rely on the foreign currency denominated loans or aid. This study uses bond market capitalization (public and private) as a percentage of GDP as a proxy of the size and depth of bond markets.

It would be ideal to include data pertaining to the efficiency with which the financial intermediaries perform their functions i.e. attract deposits or convert deposits into productive investments. In recognition to the importance of assessing efficiency of the financial sector, Beck

et al. (2008) recommend using Bank Credits to Bank Deposits[10], Net Interest Margin[11], and Over head Costs (% of Total Assets) ratios.[12] Moreover, Stock Market liquidity, measured as the value of stocks traded (% of GDP), and stock market turnover ratio that equals the number of shares traded in a year as a percentage of the total shares outstanding, if included as stock market efficiency measures will also complement the analysis.

In response to the need of efficiency indicators data, banking sectors in developed countries have recently started documenting data on interest rate spreads, return on equity[13] and return on assets[14] etcetera. As of now, however, these efficiency indicators are subject to measurement inconsistencies and are not available for as many years, as is adequate for a meaningful econometric analysis.

Development Finance Institutions (DFIs) comprising of SME banks and Microfinance Institutions (MFIs) have attracted considerable attention in the recent times, and any study of finance growth nexus is incomplete without the inclusion of the volume and efficiency measures of DFIs. DFI's deliver products and/or services to widen ownership and economic opportunities for marginalized individuals, firms and communities, and are of great significance in developing countries. Beck *et al.* (2008) FD dataset does not include any measures pertaining to DFI development, therefore, this study does not control for development finance.

World Economic Forum (WEF) in its Global Competitiveness Report (2008- 2009) constructed a scaled measure of the ease with which a business loan can be obtained without any collateral. This measure could be used as a proxy of the presence or absence of financing constraints faced by small and medium enterprises. Unfortunately, this measure is available only for the year 2008, and for limited sample of countries.

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10 Bank Credit to Bank Deposits measures the percentage of total deposits that is extended as personal and business and loans where deposits are a bank's liabilities and loans are a bank's assets.

11 The dollar difference between interest income and interest expenses, usually expressed as a percentage of average earning assets.

12 Operating expenses divided by the sum of taxable equivalent net interest income and other operating income. This ratio shows the proportion of expenses, in relation to total income, that cannot be allocated directly to production of the good or service. Operating expenses include items such as office rent, maintenance of machinery, depreciation costs, etc. In general, companies want to minimize these costs since it is difficult to quantify the revenues generated by undertaking these costs.

13 A measure of how well a company used reinvested earnings to generate additional earnings, equal to a fiscal year's after-tax income (after preferred stock dividends but before common stock dividends) divided by book value, expressed as a percentage. It is used as a general indication of the company's efficiency; in other words, how much profit it is able to generate given the resources provided by its stockholders. investors usually look for companies with returns on equity that are high and growing.

14 A measure of a company's profitability, equal to a fiscal year's earnings divided by its total assets, expressed as a percentage.

MFIs are a relatively recent development and are functional mostly in developing and less developed countries. Microfinance Information Exchange (MIX) Market, launched by United Nations Conference on Trade and Development (UNCTAD), has initiated the collection of data on volume and depth of MFIs. As of now, MFI volume and efficiency indicators are available only for three years i.e. 2005- 2007, and hence are not included in this study.

Finally, data on the quality of prudential regulation is not available. A prudent regulatory framework is imperative for well developed financial systems since it ensures that the financial sector does not indulge in risky behavior that compromises social welfare. WEF, in its Global Competitiveness Report (2008- 2009), has devised a scaled measure of the quality of regulation but it is available only for the year 2008, and hence can not be included in the analysis.

3.3: Social development indicators

Modern economic theory recognizes the importance of a bidirectional relationship between economic growth and social development. Social development is defined as the "process of planned social changes designed to promote the well- being of the population as a whole in conjunction with a dynamic process of economic development," (Midgley (1995), p.25).

This paper includes fertility rate, life expectancy, and secondary school enrollment rates as social development measures. School enrollment rates are used as proxies of human capital and are expected to be strongly and positively related to growth.

These measures by no means reflect a comprehensive picture of the social development but Barro (1991) has verified that these contribute significantly to growth. The aforementioned measures are annual and have also been retrieved from the WDI for the selected countries.

3.4: Macroeconomic policy indicators

Governments use various instruments such as taxes, subsidies, marketable permits, and open market operations in order to ensure that economic agents exhibit socially responsible behavior. These instruments often operate in association with mandated regulations, and greatly impact sustainable development; inflation rates, government expenditure (% of GDP), and openness to trade (net exports to GDP) are three such policy indicators included in this study.

4: Econometric strategy

4.1: Correlation

Consistent with King and Levine (1993), I find a significantly positive association (correlation) between FD indicators and growth proxies i.e. GDP per capita and R&D Expenditure (Tables 1 - 3). However, Insurance Premiums have negative but insignificant correlation with Gross Capital Formation. Positive association between FD and growth indicators is intuitive and indeed a first step towards understanding the FD and growth nexus. It does not, however, determine whether FD causes growth, growth causes FD, or both cause each other, which is an important question with policy implications.

Contrary to economic theory, Bond Market Capitalization is estimated to have a negative and statistically significant correlation coefficient with Gross Capital Formation. A possible explanation of this could be the fact that bond markets in developing countries are mostly dominated by the public sector. Also, the public sector in most developing countries is marred by corruption; therefore it can be assumed that funds raised through public debt markets are not put to their optimal use and the governments sometimes have roll over debt i.e. rely on more debt- hence the retardation of the growth process.

4.2: Cross- Sectional Analysis

4.2.1: Cross- country Estimation (Replication of Beck *et al.* (1999))

In this subsection, I replicate the findings of Beck *et al.* (1999) by employing the same dataset that they used. Their dataset is available at the World Bank's Research at the World Bank website. The motivation behind this subsection was to hone my understanding of the econometric issues (e.g. simultaneity bias) that characterizes the relationship between finance and growth, and the techniques used to counter such issues. Although their study is not encompassing of modern financial sector, it is a significant first step towards understanding the intricacies of the finance and growth nexus. Moreover, their study is very relevant in context of developing and less developed countries where FD is perceived to be synonymous with an extensive banking sector since well developed and liquid stock and debt markets are generally missing.

In their cross sectional analysis, the econometric model for per capita income of country *i* is;

$$Y_i = \beta_0 + \beta_1 FD_i + \beta_2' X_i + \varepsilon_i \quad (1)$$

The data averaged over the period 1960-1995 for a sample of 63 developing and developed countries.

The dependent variable Y_i is either; (i) GDP per capita; (ii) Growth in Capital Formation (% of GDP) and; (iii) Growth in Productivity. On the right hand side, the vector X comprises of social development and macroeconomic policy indicators. To be precise, the vector X includes; (i) initial GDP per capita (1965) to control for convergence; (ii) average years of schooling as a proxy for the stock of human capital; (iii) inflation; (iv) government expenditure (% of GDP); (v) net exports (% of GDP) and; (vi) average black market premium.

For the remainder of this subsection, I address the potential endogeneity problem as it relates to the econometric model presented in Equation (1). Beck *et al.* (1999) and other previous researches pertaining to the finance and growth relationship also recognize that FD indicators (on the right hand side of the Equation (1)) and the left hand variable of the same model affect each other at the same time. For example, a well trusted financial sector encourages households to hold their savings as bank deposits, which leads to capital accumulation and resource mobilization - important ingredients for economic growth. On the other hand, with growth comes the need to expand further, and most expansions rely on external financing, which means an increased demand for financial services. This increase in demand is met through efficient and innovative financial mechanism where both efficiency and innovation augment FD.

In addition to reverse causality, omitted variable bias also poses a major problem. Important variables that assess financial sectors ability to (i) effectively reduce transaction costs and information asymmetries; (ii) provide hedging and risk management services, and; (iii) monitor the use of the borrowed funds so they are not abused by debtors are missing from the analysis due to unavailability of data. As an example, data on prudential regulation is missing, when it affects both the efficiency and volume indicators of the financial sector.

Moreover, cross country estimation does not control for country specific affects e.g. incidence of infectious disease, distance from equator, and social capital etcetera that can potentially impact economic growth. The country specific effects thus remain unobserved, and become a part of the

error term. Needless to say that the country specific effects are correlated with potential determinants of growth, implying co-movement between the error term and the explanatory variables, which results in biased estimates.

In presence of simultaneity bias, the application of Ordinary Least Squares (OLS) results in biased and inconsistent coefficient estimates. In relation to FD and growth this can be explained by an example; prudential regulations and the size of the financial sector are correlated but the former is unobserved, so the OLS coefficient estimate of financial sector size will capture the affect of both size and the prudential regulation, whereas it should do so for size only; hence the bias.

Simultaneity bias can be controlled by the use of Instrumental Variables (IVs), which are; (i) uncorrelated with the error term ε_i and; (ii) highly correlated with the explanatory variables, which is supposed to be responsible for reverse causation.

In order to ensure that finance and growth relationship is not misrepresented due to simultaneity bias, it is important to extract the exogenous component of financial development. To do so, Beck *et al.* (1999) employ legal origin (British, French, German, or Scandinavian) as an IV and employ GMM estimation. Legal origins have been shown to significantly impact laws concerning creditors and the implementation of such laws (La Porta *et al.* (1998)). Firstly, historical nature of legal origin variables leaves them uncorrelated (exogenous) with economic growth (dependent variable), which is a requirement for their plausibility. Secondly, fulfillment of contractual obligations (protection of the rights of investors) is strongly associated with financial development; another requirement for an IV to be clean. Specifically, treating legal origin indicators as proper IVs is equivalent to assuming that $E(Z'\mu) = 0$ where Z is the vector containing IVs.

Historically, most countries have adopted their legal systems through occupation or colonization by either the French or the British. Moreover, a majority of countries that adopted their legal systems after attaining independence stuck to laws of their former colonizers. According to La Porta *et al.* (1998), protection against expropriation is best under the British common law, the worst in the French law, and somewhere in the middle in the German and the Scandinavian civil law countries. They also suggested that, ceteris paribus, law enforcement is superior in richer

countries, but when per capita income is controlled for; French civil law countries have the lowest quality of law enforcement.

Beck *et al.* (1999) employed GMM estimation using Legal Origin variables (i.e. British, French, German, Scandinavian) as IVs to correct for simultaneity bias and estimated Equation (1). They also used robust estimates to control for heteroskedasticity, and applied the Hansen Test for over identifying restrictions to ensure the plausibility of the IVs.

They instrumented private credit for they considered it to be responsible for introducing simultaneity bias; also it was the only FD indicator used in their study. The widely held belief that finance and growth relationship in general is bi-directional, has deterred economists from claiming that any particular FD indicator is more endogenous than others, therefore construction of adequate number of clean IVs is important if more than one FD indicators are to be included in the analysis.

In an attempt to replicate their findings, I have not only used GMM/ IV approach to estimate Equation (1) but also the OLS approach. I have already discussed that finance and growth relationship is subject to simultaneity bias, which leads to biased OLS estimates. The reason for the inclusion of OLS estimates is to reinforce that different techniques result in different estimates. Interestingly, despite the bias, the signs of OLS estimates are consistent with the economic theory; however, the estimated coefficients lack statistical significance.

4.2.2: GDP per Capita and Financial Development

Tables 4 and 5 show the OLS and GMM estimates obtained using Beck *et al.* (1999) dataset. As in Beck *et al.* (1999), I have carried out the estimation for two specifications of Equation (1); (i) simple, and (ii) policy. The "simple" specification contains credit extended to the private sector as (% of GDP) and average years of schooling as the explanatory variables. In addition to the variables included in the "simple" specification, the "policy" specification includes inflation, black market premium, openness to trade, and government expenditure (% of GDP) as the macroeconomic policy indicators.

I was able to closely replicate the findings of Beck *et al.* (1999). For example, an increase in the secondary school enrollment by 10% results in a 15.1% increase of in GDP per capita, whereas

Beck *et al.* (1999) estimated that a 10% increase in secondary school enrollment causes GDP per capita to go up by 15.4%. It might be of interest to note that coefficient of education is economically insignificant in their as well as my estimates. Moreover, a 10% increase in openness to trade leads to an 8.1% increase in the GDP per capita but this increase is also insignificant. I was also able to replicate the negative relationship between the initial level of income and the subsequent growth rates or conditional convergence where a 10% increase in the initial income would lead to a subsequent decrease of 19.8% - a significant decrease. Also, conditional convergence holds at 5% and 10% levels of significance. Trade is found to have an insignificant (10% increase in trade leads to a 5.6% increase in the dependent variable) impact on GDP per capita although the sign of the coefficient is positive. Government size and black market premium affect growth negatively, however, the impact is neither statistically nor economically significant according to their estimates and mine. Moreover, upon estimating Equation (1) using the Beck *et al.* (1999) dataset, I find the coefficient of inflation to be positive, which is not expected. It is, however, economically insignificant. On the other hand, Beck *et al.* (1999) also found that inflation has a positive yet insignificant impact on GDP per capita, which is not consistent with the economic theory. Previous researches have shown that inflation negatively affects economic growth by hurting the propensity to invest.

Assuming that simultaneity is introduced by private credit (FD indicator), Beck *et al.* (1999) instrumented it with the legal origin indicators. I was also able to closely replicate Private Credit's statistically and economically significant impact on GDP per capita. Beck *et al.* (1999) estimated that when policy variables are controlled for, a 10% increase in Private Credit results in an increase of 32.15%, whereas I found that it leads to an increase of 33.64% where both the estimates are significant at 5% and 10% levels of significance. Likewise, in the simple specification they estimated the coefficient of Private Credit to be 2.215, which can be interpreted as a 10% increase in Private Credit leads to an increase of 22.15% in GDP per capita. I estimated that in simple specification a 10% increase in Private Credit would cause an increase of 25.15% in the GDP per capita where both the estimates are statistically as well as economically significant.

Please refer to Tables (A.1 – A.4) in Appendix 4 for regression results with OLS and GMM estimation keeping Capital Formation and Productivity growth as the dependent variables. Again my estimates echo those of Beck *et al.* (1999) where Private Credit has an economically significant and positive effect on both, capital accumulation and productivity improvements.

4.2.3: Cross Sectional Analysis

Having replicated the findings of Beck *et al.* (1999), I expanded my analysis to a relatively more recent period and included a greater number of countries. The motivation behind doing so is to analyze whether the relationship between FD and growth as predicted by Beck *et al.* (1999) and economic theory is stable over time and a different sample of countries. It may be noted that a majority of countries in this new sample are developing and less developed and are considerably different from the ones used by Beck *et al.* (1999).

In addition I use a broader set of human capital measures and macroeconomic policy indicators than what was used by Beck *et al.* (1999), which is discussed below. Moreover, modern economies are characterized by a variety of specialized financial intermediaries services (e.g. insurance, debt and equity financing), whereas Beck *et al.* (1999) confine their analysis to examining the impact on growth of the banking sector only. I, therefore, add to their analysis by adding volume indicators of four major segments of the financial sector i.e. banks, insurance, equity and bond markets.

Finally, I adopt the same econometric methodology as Beck *et al.* (1999) and correct for simultaneity bias by using the GMM estimation technique with Legal Origins as the IV for FD indicators. Lastly, to control for heteroskedasticity, I have used robust estimate of the weighing matrix for the 4 categories of legal origin.

In purely cross sectional analysis, I estimate Equation (1) using data averaged for 79 countries for the period 1975- 2005, such that there is one observation per country. Specifically the dependent variable Y_i for country i is either; (i) GDP per capita measured at 2000 USD; (ii) Gross Capital Formation (% of GDP) and finally; (iii) Research and Development (R&D) Expenditure (% of GDP). GDP per capita identifies the over all growth effects of FD, whereas Gross Capital Formation (% of GDP) looks at the capital accumulation effect - a primary function of financial intermediaries; and under the assumption that R&D improves the total factor productivity, R&D expenditure is included to quantify FD's impact on efficiency improvements. The vector X comprises of; (i) secondary school enrollment rates; (ii) fertility rates; (iii) life expectancy; (iv) inflation; (v) government expenditure as a percentage of GDP; and (vi) openness to trade. It may be noted that Barro (1991) found that the above mentioned indicators significantly affected growth. It must also be mentioned that unlike Beck *et al.* (1999), I am not controlling for initial

level of GDP per capita as this study does not aim to address conditional convergence, which is already a well established concept.

Moreover, FD_i in Equation (1) is either; (i) credit extended to the private sector by deposit money banks; (ii) credit extended to the private sector by deposit money banks and other financial institutions; (iii) insurance market premiums; (iv) bond market capitalization or; (v) stock market capitalization. The coefficient of interest in Equation (1) is β_1 which measures the percentage change in the growth measures in response to a one percent change in the level of FD for country i.

I instrument each of the FD indicators one by one using Legal Origins as the IV while keeping GDP per capita, Gross Capital Formation (% of GDP), and Research & Development Expenditure (% of GDP) as dependent variables. This approach will examine the relationship of FD indicators other than Private Credit with growth but it fails to capture various stages of FD. A well developed banking sector is generally the first step towards a vibrant financial sector; stock and bond markets come in later only to complement the services offered by banks. Therefore, I believe that any specification that controls for insurance, bond or stock, and not for banks, is perhaps ignoring the development stages that a financial sector goes through.

4.2.4: GDP per Capita and Financial Development

This sub-section discusses the results obtained from estimating Equation (1) for 5 different FD indicators where GDP per capita is the explained variable. In line with Beck *et al.* (1999), I estimated simple and policy specifications of Equation (1) and I also controlled for income levels of sample countries by adding a policy specification with income level dummies (Table 6 - 10). The Simple specification controls for education and a FD indicator only, whereas, the Policy specification controls for education, FD and macroeconomic policy variables mentioned above. Finally, "policy with income group dummies" controls for all the variables present in policy and income level dummies where income levels are classified as low income, lower middle income, upper middle income and high income respectively.

Credit extended to the private sector by deposit money banks has a significant positive impact on GDP per capita in simple specification but the magnitude of its impact changes as I include more variables in the analysis. The coefficient of private credit is negative though insignificant when I

do not control for income levels, possibly due to the fact that sample countries are dominated by lower and lower middle income countries, which generally suffer from weak institutional setup that is known to retard the growth process even when the volume of financial services or any other potential determinant of growth is on a rise (Table 6). Specifically, when income levels are not controlled for, an increase in the private credit by 10% causes a decrease in the GDP per capita by 1% but this decrease is insignificant. In the simple specification, a 10% increase in private credit causes an economically significant increase of 2.78 % in GDP per capita, which is consistent with economic theory.

Private credit extended by Deposit Money Banks and other Financial Institutions has a economically insignificant impact on GDP in all three specifications; however, the sign of the coefficient is in line with the economic theory in the simple specification only (Table 7). In the policy specification where income levels are not controlled for, a 10% increase in private credit extended by banks and other financial institutions causes GDP per capita to decrease by 0.08%, however, this decrease is not significant. I am convinced that this coefficient is prone to error because of ; (i) measurement error since a standard definition of other financial institutions is not in place yet; and (ii) missing data for a majority of countries. Generally speaking, other financial institutions include credit unions, microfinance intuitions, and small and medium enterprise banks etcetera. It may also be noticed that number of observations drop from 79 to 20 in this case, which casts a doubt on the accuracy and reliability of this estimate.

Insurance markets play a critical role in resource mobilization by offering risk management services to risk-averse investors. This makes them an important pillar of the financial sector and worth controlling for. To be specific, a 10% increase in the insurance premium volume causes GDP per capita to increase by 0.6% (Table 8). Although this increase is economically insignificant, the sign of the coefficient is in line with economic theory. Similar to Private Credit extended by Deposit Money Banks and Other Financial Institutions, the coefficient of insurance also shows sensitivity to specification changes. For example, when I control for income levels, insurance has a negative coefficient, which is not what the development economists would like to see but it is insignificant.

Bond markets have a negative yet statistically insignificant coefficient i.e. a 10% increase in the Bond Market Capitalization causes an decrease in GDP per capita by 0.06%. Economic theory, however, is suggestive of a positive correlation between bond market and economic development

as the former provides alternative sources of financing to public as well as the private sector (Table 9). Another possible explanation of the negative sign could be the omitted variable bias. As discussed above corruption is rampant in most developing countries, whereas, corruption is not a control variable. It is possible that the Bond Market Estimate is capturing the effect of some omitted variables, hence the biased coefficient.

The impact of stock markets is positive yet insignificant in the specification without income level dummies, whereas, it is negative and insignificant when I control for income levels. To be precise, a 10% increase in the Stock Market Capitalization causes an increase of 0.04% in GDP per capita. Although the magnitude of the coefficient is small, the sign is consistent with economic theory. This estimate may not be precise given that almost 25% of the observations got dropped due to gaps in data, as the stock market data is not well documented for developing and developed countries (Table 10).

The difference in estimated coefficients when I control for different variables is note worthy. In the simple specification, all the FD indicators except for the bond market capitalization have positive coefficients which are what economic theory predicts. For example, a 10% increase in private credit leads to a 2.7% increase in the GDP per capita, which is economically significant. In the simple specification, a 10% increase in private credit extended by deposit money banks and other institutions leads to an insignificant increase of 0.2% in GDP per capita, whereas both the FD indicators mentioned above have negative yet statistically insignificant coefficients when I control for policy variables. It should also be noted that none of the coefficients in the policy specifications with and without income dummies have any statistical or economic significance. From the above discussion it can be concluded that the estimated coefficients are highly sensitive to specification changes. This is in contrast to the results obtained by Beck *et al.* (1999) and my replication of their results. The coefficient of Private Credit, for example, retains its positive significance in both the simple and the policy specification when they estimate Equation (1).

As economic theory would predict, education has a significantly positive impact on GDP per capita in the simple and the policy specifications regardless of which FD indicator is controlled for, however, the magnitude of the impact varies. For example, if all else is kept constant, an increase in school enrollments by 10% causes GDP per capita to rise by 10.07%, which is a large increase (Table 6). Upon controlling for income levels, education does not have an economically significant impact on GDP per capita for high income countries, which is the reference group.

This is intuitive because high income countries have already attained maximum secondary enrollment rates, thus increase in secondary enrollment rates are perhaps insignificant for high income countries.

Growth models with endogenous fertility have established an inverse relationship between per capita growth and GDP per capita (Barro and Becker (1989)). This inverse relationship is explained by changes in the opportunity cost of bearing and raising children. Generally speaking, an increase in the cost of raising children tends to decrease fertility and increase savings (lower dependency ratio). People shift from savings in the form of children to savings in the form of physical and human capital. Specifically, when I control for Private Credit and ignore income groups, an increase of 10% in the fertility rate causes GDP per capita to decrease by 8.04%, which is significant at the 10% level (Table 6). It is worth noting that the estimated coefficients of fertility are in general consistent with the economic theory (Tables 6-10).

Life expectancy, viewed as a proxy of the health and well being standards possesses a significantly positive impact on GDP per capita when income levels are accounted and unaccounted for, which is consistent with economic theory. For example, when income levels are not controlled for, a 10% increase in the life expectancy causes an increase of 41.71% in the GDP per capita which is a highly significant increase (Table 6).

Owing to differences in theory and empirical findings, development economists have varied views on how trade impacts growth. Some believe that the transfer of goods and ideas has positive spill over effects whereas, some hold the opinion that developing and less developed countries fail to reap any benefits due to the unfavorable terms of trade. The coefficient of trade is negative in the simple and the policy specifications when income levels are not controlled for. However, trade significantly impedes growth when income levels are accounted for. Although, developed countries gain from trade; developing and less developed economies, which dominate my sample suffer from adverse terms of trade and I suspect that to be the reason of a negative sign. Here, a 10% increase in trade (% of GDP) leads to a 5.92% decrease in the GDP per capita; however, this decrease does not have economic significance (Table 6).

The government expenditure coefficient is found to be statistically insignificant irrespective of whether income levels are controlled for or not. I attribute these inconclusive results to various development stages of the sample countries. It is widely believed that government plays an important role in education, health and building infrastructure; therefore, developing and less

developed countries can potentially reap benefits from government's development budget. Contrary to that, according to Barro (1991), government consumption has no direct effect on private productivity (or private property rights); hence it impedes growth. I find that a 10% increase in Government Expenditure (% of GDP) causes GDP per capita to increase by 9.83% which is an economically and statistically significant. It may be recalled that Beck *et al.* (1999) found the coefficient of Government expenditure to be negative but lacking statistical significance.

Consistent with economic theory, the coefficient of inflation is negative and significant in most cases implying that inflation impedes economic growth by reducing the incentives to save and invest. To be more precise, a 10% increase in inflation causes GDP per capita to fall by 3.1%, which is significant at 10% level (Table 6).

I recognize that cross sectional analysis could be made more meaningful by accounting for sampling variability.[15] By this, I mean that carrying out the analysis for developing, less developed and developed countries separately would have helped me determine if the same or different financial intermediaries contribute significantly to growth at different income levels or if the same financial intermediaries contribute to growth differently at different developmental stages and that would have had policy implications. Moreover, it is known that averages/ aggregates are affected by extreme values; hence do not always aptly represent any sample. Therefore, aggregate coefficient estimates derived by broad sample cross country regressions, from a policy perspective suggest that "one size fits all," which obviously does not hold true when a wide variety of countries are included in the analysis.

Results of Gross Capital Formation (% of GDP) and Research Expenditure (% of GDP) as the dependent variables are presented in Appendix 4 (Tables A.5 – A.14). FD indicators such as private credit, insurance market premium and stock market capitalization positively impact Capital Accumulation as well as Research & Development Expenditure, which is used as a proxy for efficiency improvements.

15 Sampling variability refers to the different values which a given function of the data takes when it is computed for two or more samples drawn from the same population.

4.3: Longitudinal Analysis

4.3.1: Panel Estimation

The motivation behind using a panel is the inclusion of time dimension. This assists in analyzing the impact of changes over time in potential growth determinants on economic growth in the long run. Adding time dimension results in a greater number of degrees of freedom, thus the estimation process is more reliable. Secondly, in a cross sectional analysis, the country specific affects are unobserved parts of the error term where the possibility of correlation between unobserved country specific effects and explanatory variables can lead to biased coefficient estimates.

I use a panel spanning through 1975-2005 for 79 developed and developing countries, such that there are thirty one observations per country. The per capita income of country i at time t is estimated by the econometric model;

$$Y_{i,t} = \beta_0 + \beta_1 FD_{i,t} + \gamma' X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (2)$$

Here, $Y_{i,t}$ is either country $i's$; (i) log of GDP per capita measured at 2000 USD; (ii) Gross Capital Formation as a percentage of GDP and finally; (iii) Research and Development (R&D) Expenditure as a percentage of GDP, at time t. The FD indicators are the same as the ones used in cross sectional analysis, and so are the variables included in the Conditioning Information Set (X). Moreover, μ_i is the country- specific effect, λ_t is the time specific effect, and $\varepsilon_{i,t}$ is the unobserved time varying error term. The panel under consideration is unbalanced, and the analysis is constrained particularly by missing data for FD indicators.

I estimate three different specifications of Equation (2), where in addition to the aforementioned variables, I control for; (i) country specific effects; (ii) time specific effects; and (iii) both country and time specific effects. For the three specifications, I have GDP per capita, Gross Capital Formation (% of GDP), and R&D Expenditure (% of GDP) as the dependent variables, and I instrument each one of the FD indicators with the Legal Origins Variable because of the simultaneity bias discussed in the cross sectional analysis. In addition to verifying if the Beck *et al.* (1999) findings are robust to a sample and time span change, this panel analysis approach also evaluates the effect on economic growth of FD indicators other than Private Credit which was not

done in Beck *et al.* (1999). It may be recalled that Beck *et al.* (1999) used private credit only to control for FD.

4.3.2: GPD per Capita and Financial Development

As in the cross sectional analysis, I estimated 5 different specifications of Equation (3) (Tables 11 - 15) each with a different FD indicator instrumented with Legal Origin Variables. These specifications are then further subdivided into 3 categories; (i) GMM/ IV Estimation, controlling for time specific effects; (ii) GMM/ IV Estimation, controlling for country specific effects; and (iii) GMM/ IV Estimation, controlling for both: time and country specific effects. Moreover, to control for heteroskedasticity, I have used robust estimates of the weighing matrix for the 4 categories of legal origin.

The difference in coefficient estimates when country specific effects are ignored and controlled for is worth noting, and brings home their importance (Table 11). Consistent with the economic theory, the coefficient of education has a positive sign in all three specifications, however, it is significant when I control for time effects only i.e. a 10% increase in secondary enrollment rate leads to a 8.6% increase in GDP per capita when all else remains the same. In contrast, when I do control for country specific effects, a 10% increase in education causes GDP per capita to decrease by 0.03%, which is not significant economically. Life expectancy is theorized to have a significantly positive impact on GDP per capita but when country specific effects are controlled for, a 10% increase in life expectance leads to an insignificant increase of 4.7% in the GDP per capita. The coefficient of life expectancy is positive and economically significant when I control for time specific effects only. The estimated impact of fertility on GDP per capita is also consistent with economic theory in the panel analysis. A 10% increase in fertility causes an insignificant fall of 1.3% in GDP per capita when I control for country specific effects but contrary to this a 10% increase in fertility causes GDP per capita to fall significantly by 1.1%. As mentioned earlier, there is no right consensus about the impact of trade on the growth. I find that, at the 10% level of significance, a 10% increase in trade leads to a 2.5% increase in GDP per capita. Government expenditure is estimated to have a positive impact on GDP per capita, which has economic significance only when I control for time specific effects. In accordance with the previous studies, the coefficient of inflation is significant at the 1% level but loses its significance when I control for country specific effects.

The coefficient of credit extended to the private sector by deposit money banks is significantly positive when I control for the time specific and the country specific effects, i.e. a 10% increase in private credit causes GDP per capita to increase by 2.2%. Moreover, private credit by banks has a significantly positive impact on capital formation; one of the most important functions of the financial sector. As far as, private credit's impact on Research and Development expenditure is concerned, missing data makes it impossible to arrive at a reliable estimate.[16]

It may be noted that, if a FD indicator other than the private credit extended by the deposit money banks is instrumented with the Legal Origins indicator, the estimated signs of the coefficients are consistent with the economic theory but as previously mentioned STATA fails to compute the standard errors of the coefficients (and their p- values) because the matrix of standard errors is highly singular (Tables 12 - 16). For example, when I instrument private credit by deposit money banks and other financial institutions while controlling for time specific effects only, the estimated coefficient of life expectancy and openness to trade are 3.4 and -0.6 respectively but the software package (STATA). Similarly, this study fails to determine whether insurance premium, bond market capitalization or stock market capitalization have any significant impact on growth. It would be useful to recall here that the correlation between growth indicators and FD indicators is significant and positive. Intuitively, all different segments of the financial sector should have a positive impact on growth as each one of them offers complementary services.

Compared to above, when I control for country specific effects only, a 10% increase in private credit extended by credit money banks and other financial institutions causes GDP per capita to fall by 0.3% but this decrease is insignificant (Table 12). Likewise a 10% increase in insurance premium causes an economically significant decline of 1.4% in GDP per capita (Table 13). Similarly, bond market capitalization is estimated to negatively impact growth, which is inconsistent with economic theory (Table 14). A possible explanation for a negative coefficient could be the fact that bond markets are denominated by the public sector in the developing countries, which is not always the most productive or efficient sector. Interestingly, stock market capitalization is estimated to have a significantly positive impact on growth where a 10% increase in the stock market capitalization causes GDP per capita to rise by 1.3%, which is what development economists would like to see.

[16] Despite providing coefficients, STATA states the variance matrix is non-symmetric or highly singular, and as such, does not provide any standard errors.

It is worth observing that when I control for country specific effects only, the estimated coefficients of all variables other than private credit have the right signs but lack statistical or economic significance.

In the panel analysis, private credit is estimated to impact Gross Capital Formation positively where a 10% increase in private credit causes a 0.5% increase in capital formation (Table A.15). Moreover, a 10% increase in private credit causes an increase of 2.5% in the Research and Development expenditure, which is supposed to improve efficiency (Table A.16). It may be noted that both the results are economically significant.

Finally, it can be inferred that a well functioning financial sector that offers various modes of financing to the private sector positively affects growth through capital accumulation and productivity enhancements; both of which are the main ingredients of economic growth in the endogenous growth theory.

A very interesting aspect of this study is the strikingly different results obtained when I use various specifications. This questions the reliability of my findings. One possible solution could be accounting for "sampling variability"[17] by first dividing the sample countries into income groups and then carrying out the analysis. I believe that adopting the above discussed approach would be more beneficial in understanding the true relationships between variables and making policies accordingly since "one size does not fit all," and development relationships are non-linear in most cases. The difference in results upon inclusion or exclusion of country and time specific effects reinforce the already well established fact that country specific characteristics affect economic growth so much so that if country specific characteristics are not conducive to economic growth, the factors which are empirically established to contribute positive to growth may not do so in some countries. Time specific effects are also useful in identifying the improvements in technology; however, to come up with effective policies, it is most important to understand country specific effects in my opinion.

17 Sampling variability refers to the different values which a given function of the data takes when it is computed for two or more samples drawn from the same population.

4.3.3: Panel Estimation (Replication of Beck *et al.* (1999))

Beck *et al.* (1999) constructed a panel consisting of 63 countries over the period 1960-1995. They averaged the data over seven non- over lapping periods of five years each. Their econometric model is given as:

$$Y_{i,t} = \alpha' X^1_{i,t-1} + \beta' X^2_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

Where $Y_{i,t-1}$ is the lagged value of all the three dependent variables i.e. growth in GDP per capita, growth in capital formation or productivity. μ_i is the unobserved country- specific effect, λ_t is the time specific effect, $\varepsilon_{i,t}$ is the time varying error term, and *i* and *t* represent countries and 5-year time periods respectively. X^1 represents the set of lagged dependent variables; same variables that they used in the cross sectional analysis, and X^2 is the set of contemporaneous explanatory variables.

A major weakness of instrumenting for private credit only is that it does not control for the potential endogeniety of other regressors. This weakness led Thosten Beck, Ross Levine, and Norman Loayza to carry out dynamic panel estimation (Arellano and Bond (1991)) where they used lagged values (first differences) of all the independent variables as instruments. Precisely, they assumed that the explanatory variables were only "weakly exogenous" meaning that the independent variables could be affected by current and past realization of the dependent variable but they must not be correlated with the future realizations of the error term. In other words, the weak exogeneity assumption implies that the future realizations of the dependent variable have no impact on the current levels of the explanatory variables. After application of Arellano and Bond (1991) method, Equation (3) takes the form;

$$Y_{i,t} - Y_{i,t-1} = \alpha'(X^1{}_{i,t} - X^1{}_{i,t-1}) + \beta'(X^2{}_{i,t} - X^2{}_{i,t}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (4)$$

Assuming that error terms are independent and homoskedastic across countries and over time, they estimated Equation (4) using a two step GMM estimator.

Instead of carrying out the dynamic panel analysis, I used their dataset to carry out static panel analysis with legal origin as the IV for private credit using GMM techniques (Tables 16 - 17). I estimated Equation (4) controlling for; (i) time and country specific effects; and (ii) time effects only.

4.3.4: GDP per Capita and Financial Development

Beck *et al.* (1999), in estimating Equation (4), assumed that the error term is not correlated with any of the explanatory variables. This implied that the unobserved country specific effects, which are part of the error term, are also not correlated to any of the independent variables, meaning thereby that the coefficient estimates are unbiased. My results using static panel analysis are in line with theirs when I control for time specific effects only. This is to say that the estimated coefficients of the explanatory variables are consistent with economic theory; conditional convergence, education's significantly positive impact on GDP per capita, and private credit's significant positive impact on GDP per capita are established. For example, when I control for time specific effects only, a 10% increase in private credit is estimated to yield an economically significant increase of 0.1%. Moreover, a 10% increase in secondary school enrollment rates results in an increase of 0.1% in GDP per capita, which is a significant increase.

The results (static panel analysis with IV/ GMM) are significantly different when both time and country specific effects are controlled for than when they are not, which is interesting and will be the focus of the discussion below (Table 16 - 17).

Private credit is supposed to have a significantly positive impact on GDP per capita, and it does when country specific effects are not controlled for. However, its coefficient is negative and significant when country specific effects are included. Specifically, when I control for both the country and the time specific effects, a 10% increase in private credit leads to a decrease of 1.1%. This result is neither consistent with the economic theory nor with the results obtained when country specific effects are not accounted for (Table 16). It will be helpful to recall that private credit is only a volume indicator and fails to capture the efficiency with which credit is disbursed and utilized. It can be safely assumed that efficiency with which scarce resources are allocated and used varies significantly from one country to another and so does the quality of governance. Moreover, factors like religion, political setup and stability, respect for the rule of law, and attitude towards corruption are all country specific effects, and are known to have an impact on

economic progress of any economy. For example, it is a matter of common knowledge that corruption impedes growth, and that it is rampant in many developing and less developed countries. Simply put, if resources mobilized through the financial sector are knowingly put to an inefficient use either due to corruption or lack of accountability in an autocratic setup, it is bound to hurt the economy.

It is important to mention here that the coefficient of private credit is positive and significant when country specific effects are ignored where Capital Formation growth rate is the dependent variables. For example, when country specific effects are ignored, an increase on 10% in private credit results in an economically significant increase of 0.4% in the Gross Capital Formation (Table A.17 – A.18).

Furthermore, when I control for both country and time specific effects and keep Productivity growth as the dependent variable, private credit has a significantly negative coefficient of -0.116 meaning that a 10% increase in private credit leads to a -1.1% decrease in productivity growth. This result conflicts with the economic theory and also with the results obtained when I control for time specific effects only. As an example, a 10% increase in private credit results in a 0.01% increase in the productivity, when I control for time specific effects only (Table A.19 – A.20).

Previous researches have established that school enrollment rates (a proxy for human capital) have a significantly positive impact on the economic growth of a country. The coefficient of education is negative; however, insignificant when country specific effects are included. The insignificance of negative coefficient means that gains from education are universal. However, the attitudes towards education undermine the potential benefits that could be reaped from it. For example, it is a norm in poor countries that women who have completed their secondary education are not engaged in economic activity, which results in foregone prosperity.

Black market premium is estimated to have a significantly negative relation with growth when country specific effects are unaccounted for, the coefficient however, retains its sign but loses its significance upon inclusion of country specific effects. It would perhaps be safe to say that presence of black markets lead to price distortions, which retards economic growth.

As mentioned before, economists have varying views regarding the impact of trade. Dynamic panel analysis yields a positive and significant coefficient, which is not the case when static panel

analysis is employed. Coefficient of trade is positive but insignificant when I control for both; time and country specific effects, and time specific effects only. Other policy variables like inflation and size of the government, which is measured as the ratio of government expenditure to GDP have negative coefficients and that is consistent with the economic theory.

5: Conclusion

Theoretically, all the functions performed by the financial sector are directly conducive to productive investments and thus to growth. From an empirical perspective, previous researches establish that credit channelized to the private sector has a positive economic impact on economic growth.

This paper analyzed the impact of financial development on GDP per capita, and two sources of growth i.e. Capital Formation and Research & Development expenditure, which is presumed to enhance productivity and efficiency. Impact of the exogenous components of the financial sector is assessed using a cross country sample with data averaged over the 1975- 2005 period. To correct for reverse causality and omitted variable bias, I employ a GMM estimation approach using a legal origin variable as an instrument as done in La Porta *et al.* (1998).

It is important to mention that the included FD indicators capture only the volume of services rendered by various sectors, and fail to gauge the financial sector's ability to ensure that credit is extended to most efficient of the competing investment opportunities. Also, the FD indicators included in the analysis do not account for the financial sector's ability to attract savings, and its ability to mobilize savings as productive investments.

To exploit the time series nature of the data, I use a panel data set and run GMM/ IV estimation controlling for time and country specific effects. Consistent with economic theory and findings of my cross sectional results, private credit extended to the private sector has a significantly positive impact on the sources of growth. However, due to a great deal of missing observations for stock and bond markets and insurance premiums, it is hard to arrive at precise estimates of their impact on the sources of growth.

Panel analysis, although constrained by limited data, brought home the vital importance of country specific effects; characteristics that are particular to any country. Impact of potential economic growth determinants varies with the inclusion of country specific effects. For example, private credit has a significantly positive impact on growth when country specific effects are not controlled for; however, private credit loses its significance when country specific effects are accounted for. This highlights the significance of country specific effects e.g. institutional quality,

attitude towards education, social capital, and respect for the rule of law. For example, a highly stratified economy where access to credit is determined by social connections and not entrepreneurial ability will fail to gain from financial development as chances are high that credit will not be put to its most efficient use. Likewise, an economy may not be able to reap any benefits from education if the quality of education, a country specific factor, is low.

It is highly likely that insurance services and alternative modes of financing made available by equity and debt markets impact growth positively as various segments of the financial sector complement each other, but unfortunately I am unable to empirically establish that due to data limitations.

Finally, in view of my findings and economic theory, I believe that well functioning and accessible financial intermediaries improve resource allocation with positive repercussions for long run growth.

6: Future Research

As intuitive and intriguing as the finance growth nexus might be, there are many issues that need to be addressed.

Improvements need to be made in collection and documentation of financial development indicators. For instance, very limited data is available on size and efficiency of development finance institutions (DFI) like MFIs and SME banks. Initiatives must be taken to devise and document size and efficiency of DFIs and only then economic policies accounting for varying needs of diverse economic systems can be aptly designed to impact growth positively. Reliable data in DFIs will also help us join the links between financial development and poverty alleviation; ideally, the ultimate objective of economic growth. FD efficiency measures like return on assets (ROA), return on equity (ROE), and interest rate spreads etcetera need to be included in analysis. Needless it is to say that an efficient financial sector is as important, if not more as a deep and accessible financial sector.

Moreover, financial innovation has resulted in the emergence of derivatives[18] that offer leverage - a concept that refers to the multiplication that happens when a small amount of money is used to control an asset of much higher value. According to the Bank of International Settlements (BIS), the derivative market size was almost $516 trillion by 2007; a five time increase since 2002, and to the best of my knowledge none of the studies dedicated to understanding the relationship between finance and growth include the role played by derivatives market.

In addition to the above, prudential regulatory framework is assumed to significantly impact FD and thus growth. However, the quality of the regulatory framework was only quantified at the country level in 2008 by the WEF in its 2008-2009 Global Competitiveness Report. It is imperative to isolate regulatory framework to better understand its impact on FD and eventually growth, especially in light of the financial crisis of 2008- 2009 that has caused a world- wide recession.

[18] A derivative is a financial instrument that derives or gets it value from some real good or stock. It is in its most basic form simply a contract between two parties to exchange value based on the action of a real good or service. Typically, the seller receives money in exchange for an agreement to purchase or sell some good or service at some specified future date.

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Results

Table: 1
Correlation Coefficients
GDP per Capita & FD Indicators (1975- 2005)

	GDP per Capita	Private Credit (Banks)	Private Credit (Banks & other Fin. Inst.)	Insurance Premiums	Bond Mkt. Cap.	Stock Mkt. Cap.
GDP per Capita	1.000	-	-	-	-	-
Private Credit (Banks)	0.791*** (0.000)	1.000	-	-	-	-
Private Credit (Banks & other Fin. Inst.)	0.412*** (0.000)	0.903*** (0.000)	1.000	-	-	-
Insurance Premiums	0.634*** (0.000)	0.902*** (0.000)	0.871*** (0.000)	1.000	-	-
Bond Mkt. Capitalization	0.578*** (0.000)	0.880*** (0.000)	0.852*** (0.000)	0.918*** (0.000)	1.000	-
Stock Mkt. Capitalization	0.681*** (0.000)	0.912*** (0.000)	0.861*** (0.000)	0.919*** (0.000)	0.857*** (0.000)	1.000

p- values in parenthesis ()
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)

Table: 2
Correlation Coefficients
Gross Capital Formation & FD Indicators (1975- 2005)

	Gross Capital Formation	Private Credit (Banks)	Private Credit (Banks & other Fin. Inst.)	Insurance Premiums	Bond Mkt. Cap.	Stock Mkt. Cap.
Gross Capital Formation	1.000	-	-	-	-	-
Private Credit (Banks)	0.152*** (0.000)	1.000	-	-	-	-
Private Credit (Banks & other Fin. Inst.)	-0.119 (0.957)	0.902*** (0.000)	1.000	-	-	-
Insurance Premiums	-0.038 (1.000)	0.903*** (0.000)	0.871*** (0.000)	1.000	-	-
Bond Mkt. Capitalization	-0.198*** (0.000)	0.880*** (0.000)	0.852*** (0.000)	0.918*** (0.000)	1.000	-
Stock Mkt. Capitalization	0.051 (1.000)	0.912*** (0.000)	0.861*** (0.000)	0.919*** (0.000)	0.857*** (0.000)	1.000

p- values in parenthesis ()
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)

Table: 3
Correlation Coefficients
Research and Development Exp. & FD Indicators (1975- 2005)

	R&D Expenditure	Private Credit (Banks)	Private Credit (Banks & other Fin. Inst.)	Insurance Premiums	Bond Mkt. Cap.	Stock Mkt. Cap.
R&D Expenditure	1.000	-	-	-	-	-
Private Credit (Banks)	0.674*** (0.000)	1.000	-	-	-	-
Private Credit (Banks & other Fin. Inst.)	0.456*** (0.000)	0.902*** (0.000)	1.000	-	-	-
Insurance Premiums	0.748*** (0.000)	0.903*** (0.000)	0.871*** (0.000)	1.000	-	-
Bond Mkt. Capitalization	0.608*** (0.000)	0.880*** (0.000)	0.852*** (0.000)	0.918*** (0.000)	1.000	-
Stock Mkt. Capitalization	0.734*** (0.000)	0.912*** (0.000)	0.861*** (0.000)	0.919*** (0.000)	0.857*** (0.000)	1.000

p- values in parenthesis ()
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)

Cross Country Replication: Beck *et al.* (1999) Dataset

Table: 4
Cross Country Estimation using OLS and GMM/ IV Approaches
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy OLS (1)	Zubair, A. (2009) Policy GMM (2)	Beck, T., Levine, R., & Loayza, N. (1999) Policy GMM (3)
Initial Income per Capita[1]	-1.845***	-1.982**	-1.967***
	(0.431)	(0.399)	{0.001}
	{0.000}	{0.022}	
Average Years of Schooling [2]	2.256***	1.518	1.548
	(0.679)	(0.961)	{0.078}
	{0.002}	{0.114}	
Openness to Trade[1]	0.569	0.850	0.931*
	(0.381)	(0.488)	{0.042}
	{0.141}	{0.082}	
Inflation[2]	0.253	0.830	4.270
	(0.343)	(0.605)	{0.096}
	{0.463}	{0.170}	
Size of Government[1]	-0.807	-1.098	-1.207
	(0.597)	(0.736)	{0.132}
	{0.182}	{0.136}	
Black Market Premium[2]	-0.115	0.014	-0.139
	(0.191)	(0.211)	{0.914}
	{0.547}	{0.946}	
Private Credit[1]	1.864***	3.364**	3.215**
	(0.515)	(1.467)	{0.012}
	{0.001}	{0.022}	
Constant	5.854***	0.787	2.643
	(3.479)	(6.093)	{0.527}
	{0.098}	{0.897}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Table: 5
Cross Country Estimation using OLS and GMM/ IV Approaches
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009)	Zubair, A. (2009)	Beck, T., Levine, R., & Loayza, N. (1999)
	Simple OLS	Simple GMM/ IV	Simple GMM/ IV
	(1)	(2)	(3)
Initial Income per Capita[1]	-1.528***	-1.688***	-1.971***
	(0.443)	(0.427)	{0.001}
	{0.001}	{0.000}	
Average Years of Schooling[2]	1.802**	1.045	1.936**
	(0.623)	(0.785)	{0.008}
	{0.005}	{0.183}	
Private Credit[1]	1.513***	2.515***	2.215***
	(0.348)	(0.812)	{0.003}
	{0.000}	{0.002}	
Constant	5.911**	4.849	6.571**
	(2.461)	(2.499)	{0.006}
	{0.019}	{0.052}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Cross- Country Estimation

Table: 6
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	1.007***	0.752*	0.531
	(0.311)	(0.280)	(0.307)
	{0.001}	{0.007}	{0.084}
Log(Government Expenditure)	-	0.983***	0.786***
		(0.261)	(0.254)
		{0.000}	{0.002}
Log(Inflation)	-	-0.315	-0.310*
		(0.167)	(0.144)
		{0.060}	{0.032}
Log(Trade)	-	-0.592	-0.790*
		(0.384)	(0.353)
		{0.124}	{0.025}
Log(Life Expectancy)	-	4.171***	4.154***
		(1.238)	(1.124)
		{0.001}	{0.000}
Log(Fertility)	-	-0.804*	-0.023
		(0.385)	(0.304)
		{0.037}	{0.940}
Log(Private Credit)	0.278*	-0.099	-0.170
	(0.101)	(0.144)	(0.124)
	{0.006}	{0.491}	{0.171}
Low Income	-	-	-2.065
			(0.426)
			{0.000}
Low Middle Income	-	-	-1.569***
			(0.251)
			{0.000}
High Middle Income	-	-	-0.721***
			(0.208)
			{0.001}
High Income	-	-	Base Group
Constant	-2.396*	-9.094	-5.189
	(1.171)	(5.319)	(4.364)
	{0.041}	{0.087}	{0.234}
Observations	77	76	76

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 7
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	3.236***	2.650***	3.574**
	(0.261)	(0.482)	(1.536)
	{0.000}	{0.000}	{0.020}
Log(Government Expenditure)	-	0.202	-0.087
		(0.355)	(0.555)
		{0.568}	{0.875}
Log(Inflation)	-	-0.591*	-0.618*
		(0.281)	(0.280)
		{0.035}	{0.027}
Log(Trade)	-	-0.618***	-0.629***
		(0.200)	(0.209)
		{0.002}	{0.003}
Log(Life Expectancy)	-	2.354	2.416
		(2.429)	(2.314)
		{0.332}	{0.296}
Log(Fertility)	-	0.209	0.588
		(0.513)	(0.834)
		{0.684}	{0.481}
Log(Private Credit extended by Deposit Money Banks & Others)	0.023	-0.087	-0.081
	(0.087)	(0.095)	(0.103)
	{0.787}	{0.359}	{0.431}
Low Income	-	-	0.821
			(0.923)
			{0.678}
Low Middle Income	-	-	0.612
			(1.014)
			{0.546}
High Middle Income	-	-	0.043
			(0.407)
			{0.915}
High Income	-	-	Base Group
Constant	-5.780***	-8.017	-11.981
	(1.788)	(13.111)	(15.634)
	{0.001}	{0.541}	{0.443}
Observations	20	20	20

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks & other Financial Institutions (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 8
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	2.457***	0.929**	0.085
	(0.244)	(0.346)	(0.318)
	{0.000}	{0.016}	{0.789}
Log(Government Expenditure)	-	0.872**	0.910**
		(0.361)	(0.348)
		{0.016}	{0.009}
Log(Inflation)	-	-0.171	-0.210
		(0.123)	(0.117)
		{0.165}	{0.073}
Log(Trade)	-	-0.241	-0.708*
		(0.265)	(0.276)
		{0.362}	{0.011}
Log(Life Expectancy)	-	4.557***	2.842*
		(1.345)	(1.318)
		{0.001}	{0.031}
Log(Fertility)	-	-0.076	-0.083
		(0.434)	(0.404)
		{0.861}	{0.837}
Log(Insurance Market Capitalization)	0.069	0.063	-0.160
	(0.0956)	(0.096)	(0.112)
	{0.467}	{0.511}	{0.155}
Low Income	-	-	-2.330***
			(0.542)
			{0.000}
Low Middle Income	-	-	-2.004***
			(0.317)
			{0.000}
High Middle Income	-	-	-0.963***
			(0.192)
			{0.000}
High Income	-	-	Base Group
Constant	-3.429**	17.337**	1.089
	(1.505)	(7.596)	(6.752)
	{0.023}	{0.022}	{0.872}
Observations	61	60	60

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Insurance Market Premium (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 9
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	3.519***	2.089***	-0.790
	(0.424)	(0.589)	(0.777)
	{0.000}	{0.000}	{0.309}
Log(Government Expenditure)	-	0.126	0.623
		(0.343)	(0.418)
		{0.713}	{0.136}
Log(Inflation)	-	-0.337	-0.428*
		(0.191)	(0.207)
		{0.078}	{0.039}
Log(Trade)	-	-0.503*	-0.667*
		(0.250)	(0.309)
		{0.045}	{0.031}
Log(Life Expectancy)	-	8.280***	6.417***
		(2.510)	(1.566)
		{0.001}	{0.000}
Log(Fertility)	-	0.440	0.067
		(0.345)	(0.622)
		{0.203}	{0.914}
Log(Bond Market Capitalization)	-0.010	-0.065	-0.139
	(0.148)	(0.113)	(0.123)
	{0.946}	{0.563}	{0.262}
Low Income	-	-	-1.681
			(0.811)
			{0.053}
Low Middle Income	-	-	-1.253
			(0.695)
			{0.072}
High Middle Income	-	-	-0.037
			(0.545)
			{0.945}
High Income	-	-	Base Group
Constant	-6.327**	-32.471***	-16.858
	(2.743)	(8.096)	(8.859)
	{0.021}	{0.000}	{0.057}
Observations	32	32	32

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Bond Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 10
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	1.682***	0.513**	0.370
	(0.466)	(0.221)	(0.353)
	{0.000}	{0.021}	{0.295}
Log(Government Expenditure)	-	1.339***	1.241***
		(0.391)	(0.343)
		{0.001}	{0.000}
Log(Inflation)	-	-0.038	-0.278
		(0.171)	(0.161)
		{0.821}	{0.084}
Log(Trade)	-	-0.232	-0.838**
		(0.367)	(0.342)
		{0.526}	{0.014}
Log(Life Expectancy)	-	5.903***	5.485***
		(1.180)	(1.380)
		{0.000}	{0.000}
Log(Fertility)	-	-0.065	0.375
		(0.278)	(0.245)
		{0.814}	{0.126}
Log(Stock Market Capitalization)	0.180	0.041	-0.167
	(0.114)	(0.121)	(0.104)
	{0.114}	{0.732}	{0.110}
Low Income	-	-	-2.058***
			(0.539)
			{0.000}
Low Middle Income	-	-	-1.683***
			(0.273)
			{0.000}
High Middle Income	-	-	-0.864***
			(0.218)
			{0.000}
High Income	-	-	Base Group
Constant	-2.874**	-22.553***	-11.745*
	(1.135)	(4.012)	(5.499)
	{0.011}	{0.000}	{0.033}
Observations	62	61	61

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Stock Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Panel Estimation

Table: 11
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1965- 1990

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	3.221***	0.473	0.452
	(0.503)	(60.521)	(38.525)
	{0.000}	{0.994}	{0.991}
Log(Average Years of Schooling)	0.868***	-0.003	-0.120
	(0.139)	(9.792)	(2.105)
	{0.000}	{1.000}	{0.954}
Log(Openness to Trade)	-0.352**	0.256	0.178
	(0.154)	(4.909)	(1.413)
	{0.023}	{0.958}	{0.900}
Log(Size of Government)	0.765***	-0.031	0.004
	(0.106)	(5.170)	(3.925)
	{0.000}	{0.995}	{0.999}
Log(Inflation)	-0.225***	-0.024	-0.007
	(0.046)	(0.365)	(0.518)
	{0.000}	{0.947}	{0.988}
Log(Fertility)	-1.074***	-0.138	0.000
	(0.213)	(7.459)	(12.063)
	{0.000}	{0.985}	{1.000}
Log(Private Credit)	-0.127	-0.210***	0.227***
	(0.077)	(0.037)	(0.039)
	{0.099}	{0.000}	{0.000}
Constant	-4.489	-	-
	(2.545)		
	{0.078}		
Observations	77	77	79
Countries	598	598	598
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 12
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	3.476	1.805	0.683
		(124.643)	
		{0.988}	
Log(Average Years of Schooling)	0.927	0.683	1.483
		(355.967)	
		{0.998}	
Log(Openness to Trade)	-0.601	-0.391	-0.529
		(70.668)	
		{0.996}	
Log(Size of Government)	-0.005	0.748	1.855
		(916.800)	
		{0.999}	
Log(Inflation)	-0.387	-0.020	-0.125
		(47.890)	
		{1.000}	
Log(Fertility)	-0.209	-1.021	0.329
		(20.023)	
		{0.959}	
Log(Private Credit by Banks & Others)	-0.117	-0.036	0.027
		(0.047)	
		{0.439}	
Constant	-2.436	-	-
Observations	107	107	107
Countries	79	79	79
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks and Other Financial Institutions (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 13
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	2.762	3.029***	1.259
		(0.787)	
		{0.000}	
Log(Average Years of Schooling)	0.563	0.406***	0.371
		(0.110)	
		{0.000}	
Log(Openness to Trade)	0.437	-0.446***	0.245
		(0.119)	
		{0.000}	
Log(Size of Government)	-0.371	0.501***	-0.034
		(0.119)	
		{0.000}	
Log(Inflation)	-0.168	-0.163***	-0.059
		(0.033)	
		{0.000}	
Log(Fertility)	-0.394	0.187	-0.079
		(0.152)	
		{0.217}	
Log(Insurance Premium)	-0.315	-0.146*	0.070
		(0.049)	
		{0.003}	
Constant	-	-1.508	-
		(3.752)	
		{0.688}	
Observations	401	401	401
Countries	79	79	79
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Insurance Market Premiums (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 14
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	6.812	6.469***	3.593
		(1.255)	
		{0.000}	
Log(Average Years of Schooling)	1.185	1.431***	0.996
		(0.203)	
		{0.000}	
Log(Openness to Trade)	-0.296	-0.228	-0.328
		(0.120)	
		{0.058}	
Log(Size of Government)	0.632	0.381*	0.298
		(0.169)	
		{0.024}	
Log(Inflation)	-0.107	-0.140*	-0.209
		(0.059)	
		{0.019}	
Log(Fertility)	-0.127	-0.050	-0.238
		(0.154)	
		{0.744}	
Log(Bond Market Capitalization)	-0.103	-0.061	-0.004
		(0.058)	
		{0.296}	
Constant	-	-23.625***	-
		(5.023)	
		{0.000}	
Observations	231	231	231
Countries	79	79	-
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Bond Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 15
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	3.273	3.153***	2.109
		(0.561)	
		{0.000}	
Log(Average Years of Schooling)	0.982	1.080***	0.998
		(0.181)	
		{0.000}	
Log(Openness to Trade)	0.131	0.205	0.189
		(0.128)	
		{0.109}	
Log(Size of Government)	1.009	0.971***	1.087
		(0.145)	
		{0.000}	
Log(Inflation)	0.116	0.096	0.099
		(0.052)	
		{0.065}	
Log(Fertility)	-0.379	-0.295	-0.298
		(0.151)	
		{0.051}	
Log(Stock Market Capitalization)	0.128	0.138*	0.119
		(0.053)	
		{0.009}	
Constant	-	-15.962***	-
		(2.302)	
		{0.000}	
Observations	336	336	
Countries	79	79	
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Stock Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Panel Estimation: Beck *et al.* (1999) Dataset

Table: 16
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Policy Dynamic Panel GMM/ IV
Initial Income per Capita[1]	-0.011***	-0.024	-0.496***
	(0.003)	(0.364)	{0.001}
	{0.001}	{0.946}	
Average Years of Schooling [2]	0.013***	-0.024	0.950***
	(0.003)	(0.646)	{0.001}
	{0.000}	{0.970}	
Openness to Trade[1]	0.002	0.017	1.311***
	(0.002)	(0.457)	{0.001}
	{0.411}	{0.970}	
Inflation[2]	-0.005	-0.043	0.181
	(0.003)	(0.758)	{0.475}
	{0.147}	{0.954}	
Size of Government[1]	-0.002	-0.138	-1.445***
	(0.013)	(2.906)	{0.001}
	{0.832}	{0.962}	
Black Market Premium[2]	-0.009**	-0.007	-1.192***
	(0.003)	(0.106)	{0.001}
	{0.016}	{0.941}	
Private Credit[1]	0.019**	-0.112***	1.443***
	(0.008)	(0.011)	{0.001}
	{0.016}	{0.000}	
Constant	0.123***	-	0.082
	(0.039)		{0.875}
	{0.002}		
Observations	77	77	77
Countries	443	438	365
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: 17
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Real GDP per Capita averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Simple Dynamic Panel GMM/ IV
Initial Income per Capita[1]	-0.013***	-0.015	-1.299***
	(0.003)	(0.040)	{0.001}
	{0.000}	{0.711}	
Average Years of Schooling[2]	0.011***	-0.004	2.671***
	(0.002)	(0.033)	{0.001}
	{0.000}	{0.886}	
Private Credit[1]	0.024***	-0.062***	2.397***
	(0.006)	(0.012)	{0.001}
	{0.000}	{0.000}	
Constant	0.158***	-	1.272
	(0.035)		{0.250}
	{0.000}		
Observations	77	77	77
Countries	471	467	365
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Appendix 1: Countries

1. Algeria
2. Argentina
3. Australia
4. Bahrain
5. Belgium
6. Bhutan
7. Bolivia
8. Botswana
9. Burkina Faso
10. Burundi
11. Cameroon
12. Canada
13. Central African Republic
14. Chad
15. Chile
16. Colombia
17. Costa Rica
18. Cyprus
19. Denmark
20. Ecuador
21. Egypt, Arab Rep.
22. El Salvador
23. Fiji
24. Finland
25. France
26. Gabon
27. Gambia, The
28. Germany
29. Greece
30. Guatemala
31. Honduras
32. Hungary
33. India
34. Indonesia
35. Ireland
36. Israel
37. Italy
38. Jamaica
39. Japan
40. Kenya
41. Korea Rep.
42. Kuwait
43. Lesotho
44. Malawi
45. Malaysia
46. Mauritius
47. Mexico
48. Morocco
49. Myanmar
50. Nepal
51. Netherlands
52. New Zealand
53. Nigeria
54. Norway
55. Panama
56. Papua New Guniea
57. Paraguay
58. Portugal
59. Rwanda
60. Senegal
61. Singapore
62. Solomon Islands
63. South Africa
64. Spain
65. Sri Lanka
66. Sudan
67. Swaziland
68. Sweden
69. Switzerland
70. Syrian Arab Republic
71. Thailand
72. Togo
73. Trinidad
74. Uganda
75. United Kingdom
76. United States
77. Uruguay
78. Venezuela
79. Zimbabwe

Appendix 2: Variable Description

Growth Measures The International Bank for Development and Reconstruction. (2008). *World development indicators 2008*
GDP per capita (constant 2000 US$) GDP per capita is gross domestic product divided by midyear population. Natural log of GDP is used to study the level effect of FD on growth.
GDP growth (annual %) Annual percentage growth rate of GDP at market prices based on constant local currency. Growth effect of FD on growth.
Social Development Indicators/ Barro's Growth Determinants The International Bank for Development and Reconstruction. (2008). *World development indicators 2008*
Fertility rate, total (births per woman) Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.
Life expectancy at birth, total (years) Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
School enrollment, primary (% gross) Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.
School enrollment, secondary (% gross) Calculated in the same way as the primary enrollment rate, secondary education aims at laying the foundations for lifelong learning by offering more subject- or skill-oriented instruction using more specialized teachers.
Inflation, GDP deflator (annual %) Inflation as measured by the annual growth rate of the GDP implicit deflator[19] shows the rate of price change in the economy as a whole.
General government final consumption expenditure (% of GDP) General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees).
Trade (% of GDP) Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. Used as a proxy for "openness to trade." The higher the ratio, the more open the economy is to trade.
Black Market Premium Black Market Premium is measured as the Ratio of black market exchange rate to the official exchange rate.
Financial Development Indicators Beck, T., Demirguc- Kunt, A., & Levine, R. (2000). "A New Database on FD and Structure." Retrieved March 2009 from: [http://go.worldbank.org/X23UD9QUX0]. The International Bank

[19] The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

for Reconstruction and Development.
Private Credit by Deposit Money Banks to GDP Credit allocated to the private sector. A higher ratio implies that private sector has access to funds and government is not interfering in the functions of private banks.
Private Credit by Deposit Banks and other Financial Institutions to GDP Overall measure of credit extended to the Private sector.
Life & Non- Life Insurance Premium Volume / GDP Limited Data Available
Stock Market Capitalization / GDP Size of the stock market relative to the size of the economy. Limited Data Available
Private & Public Bond Market Capitalization / GDP Size of the bond (debt) market relative to the size of the economy. Limited Data Available

Appendix 3: Data Limitations

3.1: Growth Measures: 1975- 2005 (Missing Observations)

GDP (constant 2000 US$) and GDP per capita (constant 2000 US$)

Bahrain: 1970- 1979 & 2006- 2007
Barbados: 2003- 2007
Bhutan: 1970- 1979
Cyprus: 1970- 1974
Germany: 1970
Grenada: 1970- 1976
Kuwait: 1990- 1991, 2007 / 1990- 1994 for GDP per Capita
Mauritius: 1970- 1979
St. Lucia: 1970- 1979
Suriname: 1970- 1974
Tonga: 1970- 1980
Uganda: 1970- 1981
Vanuatu: 1970- 1978
Vietnam: 1970- 1983
Zimbabwe: 2006- 2007

Gross capital formation (% of GDP)

Bahamas: 1970- 1976/ 1988/ 2005- 2007
Bahrain: 1970- 1979/ 2007
Barbados: 2006- 2007
Bhutan: 1970- 1979
Burkina Faso: 2007
Burundi: 2007
Canada: 2007
Chad: 1979- 1981
Cyprus: 1970- 1974/ 2000- 2007
Germany: 1970
Grenada: 1970- 1976/ 2007
Ireland: 1970/ 2007
Jamaica: 2007
Japan: 2007
Malawi: 2002
Mauritius: 1970- 1976
Myanmar : 2002- 2007
Netherlands : 1970
New Zealand : 1970/ 2007
Nigeria : 1970- 2007
Panama : 1970- 1979
Portugal : 1970
Seychelles: 1970- 1975
Sierra Leone: 1970- 1979
Spain: 1970
St. Lucia: 1970- 1979/ 1995/ 2007
St. Vincent: 1970- 1976/ 2006- 2007
Suriname: 2006- 2007
Switzerland: 2007
Togo: 2006- 2007
Tonga: 1970- 1974/ 2007
United States: 2007
Vanuatu: 1970- 1982/ 2007
Vietnam: 1970- 1985
Zimbabwe: 2006- 2007

Research & Development Expenditure (% of GDP)

A significant number of observations is missing for developing and less developed countries.

3.2: FD Indicators

There are serious data limitations for Other Financial Institutions due to which, neither the overall size of the financial sector, nor the relative sizes of different sub- sectors can be determined. Banking sector is the largest in the developing countries and data on its size is mostly available however, measures of accessibility of banking services e.g. proportion of population with bank accounts and number of bank branches is not available. Fragmented data is available for the banking sector efficiency in developing as well as developed countries.

Moreover, the data on the size and efficiency of equity and bond markets, which are included in Other Financial Institutions, is largely unavailable for developing countries.

Appendix 4: Supplementary Regression Results

Cross Country Replication: Beck *et al.* (1999) Dataset

Table: A.1
Cross Country Estimation using OLS and GMM/ IV Approaches
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009)	Zubair, A. (2009)	Beck, T., Levine, R., & Loayza, N. (1999)
	Policy OLS	Policy GMM	Policy GMM
	(1)	(2)	(3)
Initial Income per Capita[1]	-2.047**	-2.348***	-2.225***
	(0.615)	(0.534)	{0.001}
	{0.002}	{0.000}	
Average Years of Schooling[2]	2.180**	0.424	0.628
	(0.788)	(1.259)	{0.559}
	{0.008}	{0.736}	
Openness to Trade[1]	-0.351	0.279	0.245
	(0.480)	(0.647)	{0.663}
	{0.467}	{0.666}	
Inflation[2]	-0.239	1.025	4.196
	(0.545)	(0.951)	{0.236}
	{0.662}	{0.281}	
Size of Government[1]	-1.275	-1.424	-1.169
	(0.704)	(0.935)	{0.082}
	{0.076}	{0.128}	
Black Market Premium[2]	-0.231	0.177	0.304
	(0.271)	(0.277)	{0.826}
	{0.297}	{0.523}	
Private Credit[1]	1.348	4.789**	4.038**
	(0.792)	(1.905)	{0.012}
	{0.095}	{0.012}	
Constant	16.807***	3.824	8.349
	(4.631)	(7.719)	{0.093}
	{0.001}	{0.620}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Table: A.2
Cross Country Estimation using OLS and GMM/IV Approaches
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009)	Zubair, A. (2009)	Beck, T., Levine, R., & Loayza, N. (1999)
	Simple OLS	Simple GMM	Simple GMM
	(1)	(2)	(3)
Initial Income per Capita[1]	-1.686**	-1.841***	-2.075***
	(0.608)	(0.610)	{0.001}
	{0.007}	{0.003}	
Average Years of Schooling[2]	1.684*	0.709	0.663
	(0.792)	(0.933)	{0.427}
	{0.038}	{0.447}	
Private Credit[1]	1.520**	2.609**	2.832**
	(0.514)	(1.059)	{0.006}
	{0.004}	{0.014}	
Constant	8.388*	7.347**	8.448***
	(3.236)	(2.916)	{0.004}
	{0.012}	{0.012}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Table: A.3
Cross Country Estimation using OLS and GMM/IV Approaches
Dependent Variable: Logarithm of Productivity Growth averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009)	Zubair, A. (2009)	Beck, T., Levine, R., & Loayza, N. (1999)
	Policy OLS	Policy GMM	Policy GMM
	(1)	(2)	(3)
Initial Income per Capita[1]	-1.231***	-1.219***	-1.171***
	(0.323)	(0.289)	{0.001}
	{0.000}	{0.000}	
Average Years of Schooling[2]	1.602*	1.258	1.241
	(0.566)	(0.720)	{0.060}
	{0.006}	{0.081}	
Openness to Trade[1]	0.675	0.824*	0.956**
	(0.361)	(0.393)	{0.015}
	{0.067}	{0.036}	
Inflation[2]	0.325	-0.586	3.223
	(0.285)	(-.556)	{0.096}
	{0.260}	{0.292}	
Size of Government[1]	-0.424	-0.586	-0.647
	(0.527)	(0.556)	{0.286}
	{0.424}	{0.292}	
Black Market Premium[2]	-0.046	-0.038	-0.191
	(0.162)	(0.159)	{0.861}
	{0.778}	{0.809}	
Private Credit[1]	1.459***	1.994*	1.986**
	(0.391)	(0.963)	{0.021}
	{0.000}	{0.039}	
Constant	0.811	-1.466	-1.189
	(3.111)	(4.619)	{0.717}
	0.795	{0.751}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Table: A.4
Cross Country Estimation using OLS and GMM/IV Approaches
Dependent Variable: Logarithm of Productivity Growth averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009)	Zubair, A. (2009)	Beck, T., Levine, R., & Loayza, N. (1999)
	Simple OLS	Simple GMM	Simple GMM
	(1)	(2)	(3)
Initial Income per Capita[1]	-1.117*	-1.103***	-1.266***
	(0.363)	(0.338)	{0.001}
	{0.003}	{0.001}	
Average Years of Schooling[2]	1.502**	0.975	1.375*
	(0.583)	(0.638)	{0.028}
	{0.012}	{0.127}	
Private Credit[1]	1.100***	1.614***	1.500***
	(0.293)	(0.534)	{0.004}
	{0.000}	{0.003}	
Constant	3.655	2.571	3.527
	(2.004)	(2.030)	{0.065}
	{0.073}	{0.205}	
Observations	63	63	63

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables in Columns (2) & (3)

Cross Country Estimation

Table: A.5
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	0.059	0.021	-0.048
	(0.109)	(0.117)	(0.147)
	{0.586}	{0.856}	{0.745}
Log(Government Expenditure)	-	-0.164*	-0.078
		(0.081)	(0.108)
		{0.043}	{0.469}
Log(Inflation)	-	0.089	0.077
		(0.066)	(0.066)
		{0.177}	{0.244}
Log(Trade)	-	0.447**	0.421**
		(0.163)	(0.162)
		{0.006}	{0.010}
Log(Life Expectancy)	-	-0.788	-0.794
		(0.502)	{0.517}
		{0.117}	{0.125}
Log(Fertility)	-	0.067	-0.067
		(0.144)	(0.145)
		{0.642}	{0.642}
Log(Private Credit)	0.029	0.104**	0.097**
	(0.034)	(0.064)	(0.064)
	{0.386}	{0.003}	{0.013}
Low Income	-	No	-0.041
			(0.189)
			{0.828}
Low Middle Income	-	No	0.163
			(0.095)
			{0.088}
High Middle Income	-	No	0.081
			(0.076)
			{0.291}
High Income	-	No	Base Group
Constant	2.145***	2.282	2.749
	(0.411)	(1.658)	(1.879)
	{0.000}	{0.169}	{0.143}
Observations		76	76

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.6
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.443***	-0.048	-0.275
	(0.112)	(0.221)	(0.359)
	{0.000}	{0.826}	{0.444}
Log(Government Expenditure)	-	-0.490**	-0.410
		(0.208)	(0.216)
		{0.018}	{0.059}
Log(Inflation)	-	-0.077	-0.035
		(0.102)	(0.093)
		{0.453}	{0.701}
Log(Trade)	-	-0.036	-0.049
		(0.091)	(0.095)
		{0.692}	{0.607}
Log(Life Expectancy)	-	-0.729	0.427
		(0.703)	(1.042)
		(0.300)	{0.682}
Log(Fertility)	-	-0.412**	-0.540***
		(0.155)	(0.182)
		{0.008}	{0.003}
Log(Private Credit Others)	0.054	-0.062**	-0.061
	(0.028)	(0.026)	(0.029)
	{0.053}	{0.017}	{0.307}
Low Income	-	-	-0.006
			(0.861)
			{0.686}
Low Middle Income	-	-	-0.053
			(0.313)
			{0.865}
High Middle Income	-	-	0.291
			(0.171)
			{0.088}
High Income	-	-	Base Group
Constant	3.836***	9.961***	5.774
	(0.553)	(3.391)	(5.833)
	{0.000}	{0.003}	{0.322}
Observations	20	20	20

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks and Other Financial Institutions (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.7
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.015	0.208	0.176
	(0.130)	(0.180)	(0.195)
	{0.906}	{0.248}	{0.367}
Log(Government Expenditure)	-	-0.320***	-0.254*
		(0.098)	(0.115)
		{0.001}	{0.027}
Log(Inflation)	-	-0.014	0.035
		(0.039)	(0.047)
		{0.706}	{0.452}
Log(Trade)	-	0.165**	0.261**
		(0.070)	(0.099)
		{0.019}	{0.009}
Log(Life Expectancy)	-	-0.135	0.192
		(0.418)	(0.520)
		{0.747}	{0.712}
Log(Fertility)	-	0.098	0.174
		(0.152)	(0.187)
		{0.510}	{0.352}
Log(Insurance Market Capitalization)	0.050	0.048	0.101**
	(0.031)	(0.032)	(0.044)
	{0.111}	{0.137}	{0.024}
Low Income	-	-	-0.126
			(0.286)
			{0.660}
Low Middle Income	-	-	0.200
			(0.139)
			{0.152}
High Middle Income	-	-	0.019
			(0.086)
			{0.825}
High Income	-	-	Base Group
Constant	2.093***	1.874	-1.308
	(0.447)	(1.995)	(2.792)
	{0.000}	{0.347}	{0.639}
Observations	60	60	60

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Insurance Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.8
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.318	-0.012	-0.342
	(0.219)	(0.134)	(0.197)
	{0.146}	{0.925}	{0.083}
Log(Government Expenditure)	-	-0.336**	-0.251
		(0.137)	(0.138)
		{0.014}	{0.069}
Log(Inflation)	-	-0.135**	-0.136**
		(0.049)	(0.053)
		{0.006}	{0.011}
Log(Trade)	-	-0.017	-0.039
		(0.049)	(0.057)
		{0.726}	{0.491}
Log(Life Expectancy)	-	-0.016	-0.152
		(0.295)	(0.223)
		{0.955}	{0.494}
Log(Fertility)	-	-0.148	-0.098
		(0.109)	(0.135)
		{0.174}	{0.466}
Log(Bond Market Capitalization)	0.074	-0.038	-0.045
	(0.071)	(0.022)	(0.026)
	0.297	{0.084}	{0.085}
Low Income	-	-	-0.548
			(0.476)
			{0.198}
Low Middle Income	-	-	-0.332*
			(0.151)
			{0.029}
High Middle Income	-	-	-0.151
			(0.098)
			{0.125}
High Income	-	-	Base Group
Constant	2.627**	5.572***	7.710***
	(1.034)	(1.278)	(1.792)
	{0.011}	{0.000}	{0.000}
Observations	32	32	32

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Bond Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.9
Cross Country Estimation using GMM/ IV Estimation
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.348	-0.100	-0.194
	(0.294)	(0.133)	(0.181)
	{0.162}	{0.454}	{0.284}
Log(Government Expenditure)	-	-0.288**	-0.266*
		(0.118)	(0.132)
		{0.015}	{0.044}
Log(Inflation)	-	0.062	0.092
		(0.058)	(0.066)
		{0.282}	{0.161}
Log(Trade)	-	0.327**	0.347**
		(0.121)	(0.132)
		{0.007}	{0.009}
Log(Life Expectancy)	-	-0.686	-0.954
		(0.427)	(0.589)
		{0.108}	{0.105}
Log(Fertility)	-	-0.162	-0.264**
		(0.102)	(0.111)
		{0.114}	{0.018}
Log(Stock Market Capitalization)	0.105	0.077	0.083
	(0.059)	(0.047)	(0.053)
	{0.077}	{0.103}	{0.117}
Low Income	-	-	-0.261
			(0.291)
			{0.369}
Low Middle Income	-	-	0.059
			(0.095)
			{0.535}
High Middle Income	-	-	0.006
			(0.071)
			{0.927}
High Income	-	-	Base Group
Constant	2.111***	4.138***	5.414*
	(0.531)	(1.347)	(2.453)
	{0.000}	{0.002}	{0.027}
Observations	61	61	61

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Stock Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.10
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.333	1.186**	1.466**
	(0.621)	(0.447)	(0.600)
	{0.592}	{0.008}	{0.015}
Log(Government Expenditure)	-	1.391**	0.856
		(0.611)	(0.598)
		{0.023}	{0.153}
Log(Inflation)	-	-0.843*	-0.930*
		(0.377)	(0.441)
		{0.026}	{0.035}
Log(Trade)	-	-2.001***	-1.972***
		(0.526)	(0.636)
		{0.000}	{0.002}
Log(Life Expectancy)	-	-1.265	-2.852
		(2.192)	(1.856)
		{0.564}	{0.125}
Log(Fertility)	-	-1.885**	-1.546
		(0.704)	(0.996)
		{0.007}	{0.121}
Log(Private Credit)	0.543***	-0.394	-0.403
	(0.179)	(0.201)	(0.229)
	{0.002}	{0.050}	{0.079}
Low Income	-	No	-0.272
			(1.202)
			{0.820}
Low Middle Income	-	No	-0.912
			(0.719)
			{0.205}
High Middle Income	-	No	0.020
			(0.691)
			{0.977}
High Income	-	No	Base Group
Constant	-12.211***	16.847	24.158
	(2.096)	(12.267)	(12.574)
	{0.000}	{0.170}	{0.055}
Observations	58	57	57

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.11
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	1.847***	3.849***	4.318***
	(0.345)	(0.565)	(0.933)
	{0.000}	{0.000}	{0.000}
Log(Government Expenditure)	-	-1.102	-0.977
		(0.561)	(0.549)
		{0.049}	{0.075}
Log(Inflation)	-	-0.581	-0.238
		(0.402)	(0.304)
		{0.148}	{0.435}
Log(Trade)	-	-0.655	-0.699
		(0.515)	(0.461)
		{0.204}	{0.129}
Log(Life Expectancy)	-	-8.195*	-0.690
		(3.965)	(4.291)
		{0.039}	{0.872}
Log(Fertility)	-	-1.364	-1.621
		(0.902)	(1.116)
		{0.130}	{0.147}
Log(Private Credit Others)	0.362***	-0.084	-0.071
	(0.090)	(0.204)	(0.189)
	{0.000}	{0.678}	{0.704}
Low Income	-	No	0.849
			(1.694)
			{0.296}
Low Middle Income	-	No	1.260
			(1.094)
			{0.249}
High Middle Income	-	No	1.870**
			(0.740)
			{0.012}
High Income	-	No	Base Group
Constant	-16.925***	28.044	-7.694
	(1.381)	(22.207)	(25.734)
	{0.000}	{0.207}	{0.765}
Observations	20	20	20

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks and Other Financial Institutions (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.12
Cross Country Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	0.942***	0.382	3.548
	(0.185)	(0.373)	(2.423)
	{0.000}	{0.306}	{0.143}
Log(Government Expenditure)	-	1.111*8	0.694
		(0.479)	(0.865)
		{0.021}	{0.422}
Log(Inflation)	-	0.020	-0.189
		(0.234)	(0.443)
		{0.929}	{0.669}
Log(Trade)	-	0.060	0.260
		(0.527)	(1.111)
		{0.908}	{0.815}
Log(Life Expectancy)	-	-0.199	2.785
		(1.919)	(4.595)
		{0.917}	{0.544}
Log(Fertility)	-	-0.404	0.041
		(0.746)	(1.190)
		{0.588}	{0.973}
Log(Insurance Market Capitalization)	0.508***	0.387*	0.420
	(0.089)	(0.188)	(0.408)
	{0.000}	{0.040}	{0.304}
Low Income	-	-	9.863
			(7.106)
			{0.165}
Low Middle Income	-	-	2.492
			(2.288)
			{0.276}
High Middle Income	-	-	1.686
			(1.260)
			{0.181}
High Income	-	-	Base Group
Constant	-15.583***	-12.685	-40.621
	(1.719)	(13.372)	(38.946)
	{0.000}	{0.343}	{0.927}
Observations	52	52	52

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Insurance Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.13
Cross Country Estimation using GMM/ IV Estimation
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	1.873**	2.637***	0.761
	(0.723)	(0.622)	(1.005)
	{0.010}	{0.000}	{0.449}
Log(Government Expenditure)	-	0.080	0.909
		(0.524)	(0.621)
		{0.878}	{0.143}
Log(Inflation)	-	-0.695***	-0.887***
		(0.155)	(0.216)
		{0.000}	{0.000}
Log(Trade)	-	-0.775***	-1.127***
		(0.204)	(0.380)
		{0.000}	{0.003}
Log(Life Expectancy)	-	-1.278	-0.684
		(1.689)	(1.443)
		{0.449}	{0.636}
Log(Fertility)	-	0.264	-0.036
		(0.405)	(0.508)
		{0.514}	{0.943}
Log(Bond Market Capitalization)	0.311	-0.104	-0.236
	(0.195)	(0.092)	(0.137)
	{0.112}	{0.260}	{0.086}
Low Income	-	No	-1.732**
			(0.983)
			{0.013}
Low Middle Income	-	No	-1.509*
			(0.706)
			{0.033}
High Middle Income	-	No	-0.079
			(0.474)
			{0.867}
High Income	-	No	Base Group
Constant	-16.313***	0.419	0.390
	(2.727)	(7.272)	(8.175)
	{0.000}	{0.954}	{0.251}
Observations	32	32	32

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Bond Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.14
Cross Country Estimation using GMM/ IV Estimation
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

	Simple	Policy without Income Group Dummies	Policy with Income Group Dummies
Log(Secondary Education)	-0.281	0.774	1.841
	(1.0254)	(0.674)	(2.347)
	{0.783}	{0.251}	{0.433}
Log(Government Expenditure)	-	1.767***	1.298
		(0.565)	(0.881)
		{0.002}	{0.141}
Log(Inflation)	-	-0.498	-0.834
		(0.364)	(0.643)
		{0.172}	{0.194}
Log(Trade)	-	-1.214*	-1.456
		(0.546)	(1.382)
		{0.026}	{0.292}
Log(Life Expectancy)	-	-2.091	-2.056
		(2.020)	(4.403)
		{0.301}	{0.641}
Log(Fertility)	-	-1.461	-1.036
		(0.671)*	(0.885)
		{0.030}	{0.242}
Log(Stock Market Capitalization)	0.546**	-0.118	-0.203
	(0.193)	(0.176)	(0.419)
	{0.005}	{0.502}	{0.628}
Low Income	-	-	2.688
			(10.761)
			{0.803}
Low Middle Income	-	-	-0.196
			(3.037)
			{0.949}
High Middle Income	-	-	0.456
			(1.592)
			{0.774}
High Income	-	-	Base Group
Constant	-12.310***	10.263	9.964
	(1.715)	(11.755)	(42.750)
	{0.000}	{0.383}	{0.816}
Observations	52	52	52

Standard Errors in parenthesis ()
p- values in parenthesis {}
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Stock Market Capitalization (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Panel Estimation

Table: A.15
Panel Estimation using GMM/ IV Approaches
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	-0.575*	0.253	0.474
	(0.256	(11.274)	(10.457)
	{0.025})	{0.982}	{0.964}
Log(Average Years of Schooling)	-0.112	-0.061	0.094
	(0.066)	(1.874)	(1.134)
	{0.090}	{0.974}	{0.933}
Log(Openness to Trade)	0.366***	0.236	0.255
	(0.061)	(1.431)	(1.362)
	{0.000}	{0.869}	{0.851}
Log(Size of Government)	-0.123**	0.004	-0.038
	(0.043)	(0.391)	(0.119)
	{0.005}	{0.991}	{0.750}
Log(Inflation)	0.050**	0.040	-0.000
	(0.020)	(0.093)	(0.147)
	{0.014}	{0.664}	{1.000}
Log(Fertility)	0.084	0.176	-0.011
	(0.090)	(2.516)	(3.871)
	{0.352}	{0.944}	{0.998}
Log(Private Credit)	0.118***	0.059*	0.017
	(0.032)	(0.026)	(0.021)
	{0.000}	{0.025}	{0.412}
Constant	1.986	-	-
	(1.163)		
	{0.088}		
Observations	597	597	597
Countries	79	79	79
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.16
Panel Estimation using GMM/ IV Approaches
Dependent Variable: Logarithm of R&D Expenditure averaged over 1975- 2005

Conditioning Information Set	Policy GMM/ IV (Time Effects)	Policy GMM/ IV (Country Effects)	Policy GMM/ IV (Country & Time Effects)
Log(Life Expectancy)	-0.074	0.167	1.132
		(0.888)	
		{0.851}	
Log(Average Years of Schooling)	-0.099	0.319	0.459
		(0.286)	
		{0.265}	
Log(Openness to Trade)	-1.295	0.079	-0.679
		(0.139)	
		{0.570}	
Log(Size of Government)	1.120	0.826***	0.825
		(0.265)	
		{0.002}	
Log(Inflation)	-1.109	-0.226*	-0.216
		(0.105)	
		{0.032}	
Log(Fertility)	-0.479	-0.316	0.992
		(0.291)	
		{0.278}	
Log(Private Credit)	-0.074	0.250***	-0.316
		(0.079)	
		{0.002}	
Constant	-	-10.874**	-
		(4.354)	
		{0.013}	
Observations	188	188	188
Countries	79	79	79
Country Specific Effects	No	Yes	Yes
Time Specific Effects	Yes	No	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Panel Estimation Replication: Beck *et al.* (1999) Dataset

Table: A.17
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Policy Dynamic Panel GMM/ IV
	(1)	(2)	(3)
Initial Income per Capita	-0.017***	0.002	-0.070
	(0.005)	(0.251)	{0.701}
	{0.000}	{0.991}	
Average Years of Schooling	-0.000	-0.016	-0.340
	(0.004)	(0.372)	{0.552}
	{0.935}	{0.964}	
Openness to Trade	0.004	-0.004	-0.448
	(0.003)	(0.280)	{0.097}
	{0.214}	{0.988}	
Size of Government	-0.006	-0.014	0.445
	(0.004)	(0.373)	{0.360}
	{0.186}	{0.969}	
Inflation	0.031	0.000	-3.229***
	(0.018)	(1.631)	{0.001}
	{0.084}	{1.000}	
Black Market Premium	-0.004	-0.008	-0.748***
	(0.003)	(0.061)	{0.001}
	{0.200}	{0.890}	
Private Credit	0.043***	0.004	3.005***
	(0.010)	(0.005)	{0.001}
	{0.000}	{0.434}	
Constant	0.230***	-	5.594***
	(0.057)		{0.001}
	{0.000}		
Observations	437	433	365
Countries	77	77	77
Country Specific Effects	No	Yes	No
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.18
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Gross Capital Formation averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Simple Dynamic Panel GMM/ IV
	(1)	(2)	(3)
Initial Income per	-0.017***	0.006	-0.933***
Capita	(0.004)	(0.059)	{0.001}
	{0.000}	{0.907}	
Average Years of	-0.000	-0.001	0.985
Schooling	(0.003)	(0.056)	{0.055}
	{0.857}	{0.972}	
Private Credit	0.040***	0.011	3.435***
	(0.008)	(0.007)	{0.001}
	{0.000}	{0.140}	
Constant	0.239***	-	-1.273
	(0.049)		{0.219}
	{0.000}		
Observations	461	457	365
Countries	77	77	77
Country Specific Effects	No	Yes	No
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.19
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Productivity Growth averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Policy Dynamic Panel GMM/ IV
	(1)	(2)	(3)
Initial Income per	-0.005*	-0.028	-0.353***
Capita	(0.002)	(0.469)	{0.001}
	{0.040}	{0.952}	
Average Years of	0.012***	-0.017	1.174***
Schooling	(0.003)	(0.640)	{0.001}
	{0.000}	{0.979}	
Openness to Trade	0.000	0.014	1.337***
	(0.002)	(0.381)	{0.001}
	{0.861}	{0.970}	
Size of Government	-0.002	-0.042	-0.431
	(0.003)	(0.918)	{0.088}
	{0.545}	{0.963}	
Inflation	-0.013	-0.144	-0.415*
	(0.011)	(3.267)	{0.033}
	{0.272}	{0.965}	
Black Market Premium	-0.007**	-0.005	-1.003***
	(0.003)	(0.130)	{0.001}
	{0.018}	{0.967}	
Private Credit	0.005	-0.116***	0.296***
	(0.006)	(0.010)	{0.001}
	{0.356}	{0.000}	
Constant	0. 054	-	-1.611*
	(0.031)		{0.033}
	{0.085}		
Observations	437	433	365
Countries	77	77	77
Country Specific Effects	No	Yes	No
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach

Table: A.20
Panel Estimation using GMM/ IV Approach
Dependent Variable: Logarithm of Productivity Growth averaged over 1965- 1990

Conditioning Information Set	Zubair, A. (2009) Policy GMM/ IV (Time Effects)	Zubair, A. (2009) Policy GMM/ IV (Country & Time Effects)	Beck, T., Levine, R., & Loayza, N. (1999) Simple Dynamic Panel GMM/ IV
	(1)	(2)	(3)
Initial Income per Capita	-0.007*	-0.018	-1.244***
	(0.002)	(0.077)	{0.001}
	{0.007}	{0.813}	
Average Years of Schooling	0.010***	-0.007	3.043***
	(0.002)	(0.043)	{0.001}
	{0.000}	{0.867}	
Private Credit	0.011*	-0.071***	1.332***
	(0.005)	(0.013)	{0.001}
	{0.034}	{0.000}	
Constant	0.079**	-	2.473***
	(0.027)		{0.001}
	{0.005}		
Observations	461	457	365
Countries	77	77	77
Country Specific Effects	No	Yes	No
Time Specific Effects	Yes	Yes	Yes

Standard Errors in parenthesis ()
p- values in parenthesis {}
[1] In the regression, this variable is included as Log(Variable)
[2] In the regression, this variable is included as Log(1 + Variable)
*Significant at 10% level, ** Significant at 5% level, ***Significant at 1% level (All tests are two- sided)
Logarithm of Private Credit extended by Deposit Money Banks (% of GDP) is instrumented with Legal Origins Variables using GMM/ IV Approach