The Finance-Growth Nexus: A Survey*

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February 1, 2010

Abstract

We critically survey the relevant literature on the relationship between financial development and growth, following both theoretical and empirical work on the subject. We highlight the progress made theoretically and methodologically, and we also point out deficiencies and areas where there continues to be room for improvement. Empirical literature comprises time-series, cross-country and panel analysis. No real consensus has emerged on the debate, and this is based largely in the differing samples and sample sizes selected for studies, the number (and nature) of control variables used, and the quantity (and characteristics) of the measures used to define financial development. An agreement on how the variation of these factors affects the finance-growth relationship should provide insight and assistance to the formulation of government policy in both developed and emerging economies.

Keywords: financial development, economic growth
JEL Classification: O16, G18, G28.

\*Acknowledgements: This paper has greatly benefited from helpful comments and criticisms provided by Hashem Pesaran, Ron Smith, Sean Holly and seminar participants at Cambridge and the Australian National University. The views expressed in this paper are of the authors and not necessarily shared by JP Morgan. Naturally, only the authors are responsible for any remaining errors and omissions.

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1 Introduction

The debate over the relationship between financial development and economic growth was initiated by Schumpeter (1912), and there has since developed a large literature documenting the positive relationship between the development of a country’s financial sector and its rate of growth. Economists hold widely different views regarding the importance of financial development for economic growth, and although it has been established that some relationship between the two variables does hold, the direction and extent of causality, as well as the relationship between long and short-run movements has been a matter of argument.

The positive role financial intermediaries play in promoting innovations has been put forth by numerous economists [for example, Gerschenkron (1962) and Schumpeter (1969)] who argue that economies with more enhanced and efficient forms of financial systems tend to grow at a faster rate than those that do not. Their view is that the services provided by the financial sector (i.e. of reallocating capital to the most efficient activities and highest returns without a high risk of loss through adverse selection, moral hazard or transaction costs) are “an essential catalyst to economic growth” [Rajan and Zingales (1998), p.1]. Others, however, contend that the issue here is one of causality and this may in fact be reversed. For example, Joan Robinson (1952) points out that economies with growth prospects effectively promote supporting institutions to provide external funds to make these systems more efficient. Alternatively, where the economy flourishes, financial intermediaries follow. This conflict is well expounded in Levine (1997a, p. 688) where he states that: “Schumpeter (1912) contends that well functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best chances of successfully implementing innovative products and production processes. In contrast, Robinson (1952, p. 86) declares ‘where enterprise leads finance follows.’”

Some economists, such as Robert Lucas, feel that the role of finance is itself over-emphasized in the literature concerning the determinants of the process of economic growth. Both Robinson and Lucas question whether finance exerts a first-order, causal impact on economic activity. Development economists and the critics of financial development point out the ambiguities surrounding the timing and sequencing of introducing financial intermediaries. The quantitative assessment of the finance-growth nexus is therefore an issue of paramount interest and importance to economists holding widely held opinions and views, as well as agenda to promote economic development. In general, while economists agree that financial development and economic growth are related, they disagree on the direction of causation. Put simply, the mere fact that they are correlated does no necessarily mean that one drives the other.

In this study we put together a survey of all the relevant literature on the relationship between financial development and growth, following both theoretical and empirical work on the subject. We highlight the progress made theoretically and methodologically, and we also point out deficiencies and areas where there continues to be room for improvement. Particular interest lies in panel
studies, which have recently been the most common form of empirical analyses on this subject, and which have been constantly evolving and contributing to the literature. We begin our paper with an overview of some of the fundamental theoretical and empirical issues encountered by the debate.

2 Theoretical and Empirical Issues

The work completed into the interrelationships between financial development and growth involves both theoretical and empirical issues which should be clearly distinguished at the outset. At a theoretical level the link has been made by isolating the channel through which financial development may lead to growth. One such channel is that of allocating savings to productive investment. This perspective underpinned the finance-led growth thesis advanced by Goldsmith (1969), McKinnon (1973), and Shaw (1973). While the empirical evidence provided was helpful to building these relationships, in these works there was little in the way of analytical foundations. In the initial models of growth, financial development was linked to economic growth by illustrating the role of financial intermediaries in the level of productivity of capital stock per worker, or the level of labor productivity. Major contributions to theoretical research in the finance-growth literature have been prominent over the last decade. The seminal contribution, however, dates back to Goldsmith (1969), McKinnon (1973), and Shaw (1973), who demonstrated that countries experiencing high growth rates tended to be associated with well established financial markets. Evidence exposed in these papers, however, had only limited impacts in resolving the finance-growth debate.

Recent theoretical research, however, has identified the channels by which financial systems are inter-linked to economic growth. It is argued that financial intermediaries can influence growth either by affecting the volume of savings available to fund prospective investments or by enhancing the productivity of that particular investment i.e. increasing investment or raising the average productivity of capital. Models emphasizing the former channel have been prosed by Bencivenga and Smith (1991) and Jappelli and Pagano (1993), and those on the latter by King and Levine (1993a) and Greenwood and Jovanovic (1990). All of these models are classified as endogenous growth models and they attempt to jointly determine the two processes of economic growth and financial development. A common factor binding all endogenous growth models to date is that they link steady-state growth to financial intermediation, without addressing the role of finance in the dynamics of growth.

Endogenous growth models, however, fail to address an important issue of what happens when there is an improvement in financial market efficiency, say from an exogenous source, which may act as a catalyst in accelerating economic growth. A deficiency of current literature lies in the fact that although the role of

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1 Financial intermediaries are enterprises in business of buying and selling financial assets, and they are the major participants in organized financial markets.
financial variables in influencing the dynamics has been documented in the literature [see Levine (1997b)], there has been no real attempt to examine whether short-term dynamics of financial development can actually promote long-run growth. Dynamics in this context may reflect cyclical effects or stabilization in economies that have undergone the primary stages of financial deepening. In addition, the functioning of financial institutions may influence business cycles, as well as the level of income per capita. Financial conditions may be deliberately changed, and in this scenario, policy makers would be most interested in whether financial variables themselves provide any guidance as to the transition path or dynamics to long-run growth.

Therefore, it is clear that despite advances in the theoretical literature, the question at the heart of this debate is whether financial development actually plays any causal role in economic growth, and if so, to what extent this is a short-run or long run phenomena. This issue to a large degree remains unresolved. In recent papers by King and Levine (1993a, 1993b), the question of causality is approached empirically. They examine the issue by using cross-country regressions and demonstrate that the predetermined component of financial development is a suitably good predictor of future growth over the next 10 to 30 years. While their observation based on empirical evidence that the size and depth of a country’s financial system is positively correlated with future growth provides additional insight, correlations between rates of economic growth and predetermined measures of financial market depth do not lay to rest all doubts regarding causality. This is because correlations essentially capture the strength of the contemporaneous association between two variables at a point in time. Correlations can not be used to infer a leading of predictive role of one variable to another. Empirical evidence based on cross country regressions is frequently viewed with some scepticism due to the problem of omitted variables, and also since the data have been used so extensively by so many researchers who have found highly sensitive results. The weaknesses of evidence based on cross-country regression is not entirely new in the literature and has been rehearsed a number of times in the literature - see in particular, Levine and Renelt (1992) who show the instability of inference arising from cross-country regressions.

There are at least two impediments to the empirical research regarding the issue of causality between economic growth and financial development which need to be further examined. The first concerns the fact that both financial development and economic growth may be explained by a common set of omitted variables (Rajan and Zingales (1998), for example, propose the propensity of households to save as an example of such a common variable). In several macroeconomic models, savings are treated endogenously which affect long run economic growth, and hence the resulting finding that growth and initial financial development are correlated is hardly surprising. Hence, without a solid theoretical foundation for establishing the dynamic inter-linkages between growth and financial development, a number of omitted variables may proxy some form of financial development, and it would be difficult to select the most appropriate set of variables.
The second problem is also associated with the idea of showing how causality is related to anticipation. Financial markets may anticipate economic growth and react by stimulating their sectors in anticipation of greater economic activity. This anticipation may be reflected in, for example, the stock market which capitalizes present value of growth opportunities, while financial intermediaries prepare to provide more funds if they anticipate accelerated economic activity [Rajan and Zingales (1998)]. Therefore, it is quite possible for financial development to be a leading indicator, rather than an underlying causal factor. This begs the question of whether financial development actually plays a significant causal role leading to economic growth; or whether it is more a case of economic growth led financial development.

Causality between financial development and economic growth has also been addressed using a wide array of possible measures of financial development, including a number of different specifications for the causality tests themselves. Recent examples include Wachtel and Rousseau (1995) and Neusser and Kugler (1996) who find, based on tests for Granger non-causality, that financial development causes economic performance. Apart from theoretical considerations these studies suffer from the problems associated with pre-testing of variables to testing procedures which are themselves subject to bias. These biases arise essentially since the researcher must first test for the characteristics of time series with respect to whether each series is stationary or not, and/or whether the variables may be considered as cointegrated. Tests designed to check for stationarity, often tend to be associated with low power [see Schwert(1988) among others]. Furthermore, a variety of studies employing time series approaches find that “results exhibit substantial variation across countries, even when the same variables and estimation methods are used” [Arestis and Demetriades (1997, p. 796)].

A third deficiency of research based on causality testing is that typically studies tend to involve only the two variables representing financial development and economic growth i.e. bivariate [see Demetriades and Hussein (1997), Thornton (1997), as recent examples]. While bivariate studies provide insight which could be used as a starting point for further analysis, they should be seen more carefully as prerequisites to a multivariate analysis encompassing at least a third or perhaps a fourth variable (data permitting). This variable may be a common driving force for both the primary focus variables which in this case would be financial development and economic growth. In other words, bivariate analysis of the finance-growth debate may be misleading especially if there exist a third variable that cause both of the variables representing financial development and economic growth.

Studies focusing on causality, while an isolated issue, may also identify the determinants of financial development. Clearly the importance of identifying the causal channels through which financial development and growth is ultimately linked becomes crucial in any analysis. Hence, if we can show through

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2Expectations could have real impacts, although at the same time they could also act as leading indicators.
employing appropriate econometric methodology that financial development is causal to the growth process and confidently rely upon the results of causality testing, we could argue that under certain assumptions, causal variables are certainly the contributors of economic growth. This point needs to be emphasized, especially in relation to the diversity of findings based on simply testing for a causal relationship. In addition, studies which utilize cross country regressions typically average the data so we can only infer an average effect of a variable across countries. As Arestis and Demetriades (1997, p. 785) point out: “In the context of causality testing this limitation is particularly severe as the possibility of differences in causality patterns across countries is likely.” These differences over countries should not come as a surprise given the findings of the growth literature, which show that countries have different speeds of adjustment to their steady state growth paths. The domestic or country-specific characteristics are quite different across countries, given the efficiency of financial functions, size and coverage of financial structures and the vastly different legal and regulatory determinants of financial development. The main motivation driving this avenue of research stems from a need to understand the basic evolution of financial development itself, regardless of its relationship with long-run economic growth.

3 Financial Development and Economic Growth: An Overview of the Theoretical Literature

Theoretical work investigating the relationship between financial development and economic growth has been extensive as well as wide-ranging [see an overview of the literature by Pagano (1993) and Levine (1992), a recent survey by Levine (1997), and the well publicized book by Fry (1995)]. Even in a narrow sense, the work completed in this area has already emphasized the importance of this relationship by examining the role of financial development in creating more efficient investment options, methods of channeling investment away from liquid and unproductive assets, and enhancing technological innovation, as well as improving the allocation of risk. The common goal in all these works was to emphasize the importance of the broad role of financial development in the overall growth process.

3.1 Special Features of Financial Markets: Asymmetric Information, Liquidity Risk and Uncertainty

Prior to examining how financial development could lead to increased growth in endogenous growth models, it is important to consider some special features of financial markets that, in part, go a long way in differentiating them from other markets we encounter in economics for goods and services. Another fundamental issue that is worth addressing relates to the presence of liquidity effects and risk in financial transactions and the question of why they are important conceptual elements in associating financial development to economic growth. Fry
(1995) and Levine (1997) take this approach in their respective surveys, prior to their discussions of the endogenous growth literature in the context of financial development. The reason for its importance becomes somewhat clearer when we consider the uncertainty involved in acquiring loanable funds and the conversion of assets into a more liquid form of exchange. This feature of uncertainty becomes more of an issue when we come to realize that financial transactions most often are based assumptions regarding future contingencies. To quote Fry (1995, p. 62): “In principle, financial contracts could be written to deal with all future contingencies. Such a set of state-contingent securities is known as Arrow-Debreu securities... Essentially, these are a set of insurance policies, one for each possible future state of the world. In this case, there is a set of prices for insurance cover against all forms and types of uncertainty. With such insurance possibilities, everyone would be able to borrow and lend unlimited amounts at the market rate of interest. Furthermore, the interest rate would ensure optimal allocation of income between saving and consumption, as well as optimal allocation of investable funds across all potential investment projects.”

However, as it is well known, the Arrow-Debreu scenario can only exist if one presumes to have perfect foresight into all possible future states that are easily accessible as well as costless to monitor. Due to the infeasibility of such a world, financial transactions are prone to risks that are not insurable. Furthermore, the expected returns at the margin across potential investments will not be the same, which implies that there will exist some high-yielding investments still to exploit. This has also been used quite frequently in the literature [see Studart (1996), and Grabel (1995)], as a criticism of the finance-led growth hypothesis in general. The argument runs as follows: one possible source of uncertainty and market imperfection is the prevalence of asymmetric information on the part of lenders and borrowers, i.e. informational mis-matches in the lender-borrower relationship becomes particularly problematic in the presence of high nominal interest rates where lenders are confronted with a deterioration of the average quality of loan applicants. Lack of adequate information to facilitate lenders to identifying the risk profile of borrowers results in adverse selection and credit rationing, since lenders attempt to prevent deterioration in the quality of the borrowing pool. But to increase their lending beyond what is justifiable on grounds of market risk, an incentive exists for commercial banks due to direct or indirect insurance from the Central Bank. In this case, a moral hazard may arise since commercial banks may feel that they are protected from default and consequently a risk free threshold. Stiglitz and Weiss (1981) argue that since lower quality firms associated with riskier projects will be willing to pay higher interest rates, and because high-risk projects cannot be isolated, the supply of loanable funds is likely to decline. One may argue that this is the

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3 Admittedly, this is also true for transactions other than those that are purely financial.

4 This kind of vulnerability of the financial sector in part provides a monitoring role for the government against the possibility of market failure and to ensure that the payment system survives as it is a public good. This type of financial intermediation is regarded by advocates of financial development as not only disturbing market forces but also dampening prospects for growth. It is a problem which is particularly endemic in LDCs where lenders are unable
opposite to what is predicted, by the standard neoclassical model. However, a casual glance at the literature will reveal a variety of models that have attempted to incorporate risk in models of financial intermediation where portfolio choice is emphasized. The seminal study in this branch of the literature was by Diamond and Dybvig (1983, subsequently extended to an overlapping generations model with production and capital accumulation by Bencivenga and Smith (1991, 1992), Levine (1993), and Greenwood and Smith (1997).

An equally important link in the finance-growth nexus relates to the issue of liquidity. In the presence of information asymmetries and monitoring costs, an environment develops where financial intermediaries with prospects for incentives grow to supplement liquidity, especially in cases of high-yielding long-term investments. Levine (1997) notes that if financial intermediaries do not augment liquidity in circumstances of long-term investments, then a reduced level of investment is likely to occur in high-yielding projects. Economic history illustrates this fact. Levine (1997), goes on to argue that the financial revolution was a catalyst for the industrial revolution in Britain, with the introduction of capital market liquidity being required to ignite and then fuel much of the long-term investment projects that needed to be sustained throughout the entirety of the industrial revolution. Once more, the issue that is imperative here underlies the cause-effect of financial development in relation to the pace of economic growth.

The prevalence of monitoring, information and transaction costs, all provide the incentives for financial institutions to evolve and grow. Models have been proposed to deal with portfolio choice under uncertainty, where individuals choose between buying an inventory of consumer goods on the one hand, versus investments in industry on the other. Since returns on investment are a function of time, this option will not be as liquid as currency or an inventory of consumer goods. Thus, under a certain degree of uncertainty a situation may arise where the individual is forced to abandon the investments after a single period. This feature of an individual being forced to choose between allocating portfolios between capital and currency in order to maximize expected utility under uncertainty is captured in endogenous growth models proposed by Bencivenga and Smith (1991, 1992), Levine (1993), and Greenwood and Smith (1997). In these models, financial intermediation is considered in the context of overlapping generations with production and capital accumulation, where young individuals work for the first period (without consuming) but consume for the next two periods, with a utility function of the form:

\[ u(c_1, c_2, c_3, \phi) = -\frac{(c_2 + \phi c_3)^{-\varepsilon}}{\varepsilon} \]

where \( c_j \) denotes consumption at age \( j \) by an agent \( j = 1, 2, 3 \), \( \varepsilon > -1 \) and

to enforce prudent behaviour upon borrowers due to a number of factors described by Stiglitz (1989). I elaborate on such factors in more a more detailed section addressing the issues of market failures and State intervention in financial development.

Diamond and Dybvig (1983) used the idea that the inefficiency arising from less productive investments could be partially eliminated by pooling the liquidity risk of depositors and investing these funds in more productive investments. These liquid assets did not necessarily need to exceed the expected withdrawals by consumers facing a sudden requirement for liquidity.
\( \phi = 1 \) with probability \( \pi \) and \( 0 \) with probability \( 1 - \pi \), and all agents at time \( t \) have identical ex-ante preferences. Individuals are homogenous apart from their age-specific characteristics. In period 1 these individuals chose between allocating their total earnings in period 1 between currency, capital and deposits. Risk also becomes an issue of paramount importance when choosing between investments which could be possibly illiquid for a lengthy duration of time on the one hand, versus goods or currency on the other. In these models, individuals make this choice by allocating total income in period 1 between the two options. Generations are introduced by way of considering two types of individuals: type \( A \) (who live for 3 periods) and type \( B \) (who live for 2 periods). An individual only realizes whether he/she is type \( A \) or type \( B \) at the end of period 2; hence we can ascertain a probability \( \pi \) of being type \( A \), in which case the individual will not necessarily exhaust his/her wealth prior to the end of period 2, unlike type \( B \) individuals who will lose out on any capital investments made for period 3.

The presence of financial intermediaries, be it banks, building societies, or credit unions, makes it possible for individuals to invest in either capital or currency by providing deposit rates which vary depending upon the length to maturity. Since Type \( A \) individuals live for 3 periods, they choose to leave their wealth in the form of savings deposits which is consumed at the beginning of period 2. Type \( B \) individuals, however, withdraw their savings at the start of period 2. Both type \( A \) and \( B \) individuals will of course only invest their savings assuming that the real rate of return is higher than the return from keeping it in a liquid form such as currency.

As all firms are homogenous, the market equilibrium wage is given by:

\[
\omega_t = \bar{k}_t (1 - \theta) \pi^\theta
\]  

(2)

where \( \bar{k} \) is the average capital stock per entrepreneur with a capital and labor production frontier given by:

\[
y_t = \bar{k}_t^\lambda k_t^\theta L_t^{1-\theta}
\]  

(3)

The constrained optimization problem for financial intermediaries is expressed as maximizing:

\[(1 - \pi) \ln r_1 + \pi \ln r_2\]

(4)

subject to:

\[(1 - \pi) \ln r_1 = 1 - q;\]

(5)

and:

\[\pi r_2 = Rq\]

(6)

where \( r_1 \) and \( r_2 \) are deposit rates for 1 and 2-period maturities and determined endogenously, \((1-q)\) is the bank’s reserve ratio; \( R \) is gross returns on investment; and the labour supply to each firm is \((1/\pi)\). This maximization problem has the solution: \( q = \pi \), which means \( r_1 = 1 \) and \( r_2 = R \). Here again, the models above
show that Type B individuals only receive back their initial deposits, whereas type A individuals receive the benefits of investing longer and receive a return equivalent to the rate of return on capital for the financial intermediary. But recall that individuals will not know whether they are type A or B until the end of period 2. If for example, individuals hold all their wealth as capital they would receive nothing if they turn out to be Type B, but receive $r_1$ if they are type A. Hence in these models, “diversification of portfolios yield returns less than $r_1$ for individuals who turn out to be type B, and less than $r_2$ if they turn out to be type A” [Fry (1995), p. 66]. Although individuals are faced with uncertainty as to whether they are type A or type B, banks have knowledge of the proportion of savers who will withdraw at the end of period 2 and hence circumvent this uncertainty. Banks employ the law of large numbers and also the overall proportion of deposit withdrawal and treat it deterministically for the economy as a whole. Banks can guarantee returns of $r_1$ and $r_2$ because they know exactly what proportion of depositors will withdraw deposits after period 1, and after period 2.\footnote{Inherently, this assumes a monopoly bank or competitive banks that freely exchange information regarding individual types.} The endogenous growth models also here identify another channel through which financial development may affect growth: fewer resources are misallocated and in some respects ensure that capital is not wasted. In this respect, financial intermediation leads to higher capital/labour ratios which leads to higher rates of economic growth.

This channeling of liquidity provision to economic growth is formalized by Greenwood and Smith (1997, p. 149-150), who extend the model proposed by Diamond and Dybvig (1983) using an over-lapping generations framework. Greenwood and Smith (1997) consider economic agents producing a quantity of intermediate goods denoted by $i$ at time $t$ denoted by $x_t(i)$ and defined over the interval $[0, 1]$, adopting his/her own labour input, $l_t(i)$, and capital input $k_t(i)$. The technology used for producing the intermediate goods is given by:

$$x_t(i) = Ak_t(i)l_t(i)^{1-\delta}$$  \hspace{1cm} (7)

Capital stock $(k_{t+1})$ is produced using intermediate goods, using the technology which allows for current consumption to be converted to $R$ units of future capital:

$$c_t + \left(\frac{k_{t+1}}{R}\right) = \left[\int_0^1 x_t(i)^{\theta} di\right]^{1-\theta}, \hspace{1cm} t = 1, 2, 3...$$

where $0 < \theta < 1$. The preferences of agents, using the same notation as above, are given by the utility function:

$$u(c_1, c_2, c_3, \phi) = -\frac{[(1-\phi)c_2 + \phi c_3]^{1-\epsilon}}{\epsilon}$$ \hspace{1cm} (8)

The extent to which financial intermediation affects growth is also a function of the degree of risk aversion. In the limit, as $\epsilon \to 1$, the more the individual becomes risk neutral. In this situation, financial intermediaries would tend to
invest all savings in capital. The further \( \varepsilon \) is away from 1, the more risk averse is the individual, which would imply that a greater proportion of savings would be held in the form of currency denoted by \((1 - q^*)\) where \(q^*\) is the capital to wealth ratio held by individuals in the absence of banks. Greenwood and Smith (1997) then show from this that the condition for growth is:

\[
\frac{q}{\pi} > q^*
\]

where \(q\) is defined by the banks’ reserve ratio, \((1 - q)\). Greenwood and Smith (1997) further explore the role of alternative financial intermediaries in the growth process. While banks are one type of financial institution that compete for depositors, stock markets can also provide liquidity to savers, as well as options for longer-term investments. Whether a stock market can result in a higher growth rate than a financial system made up of purely banks depends upon the degree of risk aversion pertaining to each intermediary. In any environment, the coexistence of banks as well as stock markets leads to a more favorable growth scenario than either the absence of both of these intermediaries or the existence of only one. Levine (1991) and Saint-Paul (1992b), and Atje and Jovanovic (1993) also show that by allowing individuals to diversify their risk, stock markets promote a greater proportion of productive investments, and in some cases even have permanent growth effects. In particular, Saint-Paul shows how growth can be related to portfolio diversification through the stock market. Saint-Paul uses the notion that firms specialize and thereby increase their productivity, but at the same time increase their risk from sectoral demand shocks. If these risks can be shared through the stock market, then producers can be encouraged to specialize and increase their productivity. Productivity increases also can be related to an increase in long-run economic growth. It would therefore be interesting to see whether countries with developed stock markets and banking systems grow faster as opposed to just having higher levels of per capita income.

The models which use the Diamond-Dybvig framework and augment them to over-lapping generations, overcome a deficiency of previous models by first providing future generations where individuals may invest for a greater return, and second, by introducing the stock market which allows banks themselves to trade with other banks and hence lower their reserve ratios. Both banks and stock markets provide the means to minimize liquidity and productivity risks. Stock markets do this by means of trading shares rather than physical capital and hence reduce productivity risk. Economic agents also have direct access to the stock market and can use the variety of investment options it provides to diversify risks. In combination, these post-Diamond-Dybvig endogenous growth models reduce the costs associated with transactions and investments and thereby encourage individuals to invest more of their wealth within the system. These investments are in some way related to investments in firms, as entrepreneurs will also invest their own savings in stock markets. Hence, in the absence of external policies designed to increase transaction costs which may discourage the formation and operational functioning of capital markets.
[see Levine (1993)], financial institutions provide an environment for economic growth even in the face of portfolio options and liquidity risk.

Risk is also considered in the model by Greenwood and Jovanovic (1990) where the extent of financial intermediation and economic growth are jointly determined. In this model, risk is itself a function of aggregate and project-specific shocks; and capital can be invested in both low-risk, but low yielding investments as well as more high-yielding and riskier investments. Individuals cannot distinguish between the two types of shocks and their repercussions upon risk. Financial intermediaries though, can engage in a strategy to evaluate the outcome of investing in what seems to be high-yielding and risking projects, since they will only forego to risk a small fraction of their overall portfolio. By investing in research and monitoring of investment strategies, financial intermediaries are also able to ascertain information of the nature of the current shock prevailing in the economy. If the prevailing current shock were say negative, and then financial intermediaries would invest in low-risk projects, given that it would be higher than allocating resources into high-risk projects. Knowledge about the nature of the aggregate shock is an essential advantage that individuals may not possess, at least on such an accurate level, compared to financial intermediaries.

3.2 New Generation Models: Financial Development in Endogenous Growth Models

Over the past decade in particular, a new generation of models has appeared that has incorporated both endogenous growth and endogenous financial institutions. In these models financial intermediaries are able to invest more productively than individuals, by having better access to information and technology. This enables them to invest more efficiently and also allows them access to more profitable investment opportunities. The early inceptions of these models was borne out in the much broader literature surrounding endogenous growth models as prescribed by Boyd and Prescott (1986), Romer (1986), and Lucas (1988). These models used capital externalities or linear production functions to describe how growth takes place over the long-run. Financial intermediaries could influence growth over the long-run by enhancing the rate of capital accumulation by either directly changing the rate of savings, or channeling savings among alternative capital intensive technologies [this point is further elaborated in Levine (1997)]. A second generation of models treated growth as endogenous and focused more on the technological enhancements with respect to modelling new production processes. In this latter set of models prescribed by Romer (1990), Grossman and Helpman (1991), the role of financial intermediaries was directly related to how they could change the rate of technological innovation. However, the key difference in the second generation models compared to those in the first generation was in the way second generation models explicitly models financial intermediation, rather than taking it as exogenously given as in the first generation models. This section reviews some of the more cited models in the second generation literature, as well as potential extensions that could be
accommodated using slightly different theoretical emphasis, and highlights their theoretical underpinnings.

A number of papers in the literature have considered the issue of how financial development could initiate growth. An example of a model that has been used in order to capture this is a simple endogenous growth model where growth and financial development are jointly determined, namely the ‘AK’ model where aggregate output \(Y_t\) is linearly related to aggregate capital stock \(K_t\):

\[ Y_t = AK_t \]  

(10)

and \(A\) is the social marginal product of capital which in turn may influence the rate of private saving. Equivalently, one can express this as the aggregate production function, where \(A\) is the level of technology, and steady-state growth \(\theta\) in a closed economy is expressed as:

\[ \theta = sA - \delta \]  

(11)

where \(s\), and \(\delta\) are the saving ratio and the rate of capital depreciation, respectively\(^7\). Pagano (1993) recognizes that in this model there is no cost to financial intermediation, and introduces this cost explicitly in equation 10 by specifying the proportion of saving lost in the financial intermediation process as \((1 - \mu)\).

The above equation can be re-written now as in Fry (1995) as:

\[ \theta = s\mu A - \delta \]  

(12)

It is clearly seen from this equation that the rate of economic growth can be enhanced by increasing the savings rate \(s\), the level of technology \(A\), and/or part of the cost which is lost in the financial intermediation process.

To study the linkages between finance and growth within an endogenous growth model, King and Levine (1993) construct a basic model which generates demand for four types of financial services: (i) due to large fixed costs involved in the selection of potential investment projects, as in Boyd and Prescott (1986), organizations evolve to conduct these evaluations by providing research, gaining access to costly information, and monitoring; (ii) since projects are on large scales, financial intermediaries are required to pool funds and mobilize resources efficiently in order to make the funds necessary for projects to become operational; (iii) given that financial intermediaries invest a certain amount \(f\) (say) to evaluate potential entrepreneurs, there is no certainty that such projects will

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\(^7\)Note that we are taking the social marginal product \(A\) as fixed. One may assume that \(\ln A\) follows a stationary stochastic process where:

\[ \ln Y_{t+1} = \zeta A + \ln K_{t+1} \]

\[ \Delta K_{t+1} = sY_t - \delta K_t \]

\[ \Delta K_{t+1} = sAK_t - \delta K_t = (sA - \delta)K_t = \Delta Y_{t+1} \]

Note that \(A\) also captures the country-specific endowments or initial states. Clearly \(A\) should vary both over time and across countries.
succeed and hence this needs to be taken into consideration - King and Levine’s
model does this by allowing individuals and entrepreneurs to diversify the risks
associated with investments; (iv) in order to enhance productivity, entrepre-
neurs are encouraged to undertake innovative activities rather than producing
the same goods with existing techniques - here financial intermediaries provide
the finance needed to support these innovative\(^8\) activities and hence financial
intermediaries are also required to “… accurately reveal the expected discounted
value of these profits” [King and Levine (1993b, p. 516)] accruing from innova-
tive activities. Although King and Levine (1993) do not provide the specific
form of these financial intermediaries, the financial sector as a whole, by provid-
ing these four services, contributes to lowering costs of investing in productivity,
making the process of allocating funds to the most prospective of investments,
and thereby accelerating economic growth.

The King-Levine model augments the theory of endogenous technical change
prescribed by Grossman and Helpman (1991), and Romer (1990), and differs
from previous models by, firstly, not requiring that financial intermediaries in
large part promote growth by enhancing the physical rate of capital accumu-
lation; and secondly, by emphasizing that the major channel by which finance
leads to economic development and growth is by influencing productivity growth
itself. Productivity growth is assumed to be a function of innovation. This re-
lationship is used to link productivity with the number of entrepreneurs since
the greater the number of entrepreneurs, the higher is the probability of an
innovation.

Growth may also be impeded in the King-Levine model if we allow for dis-
tortions to the financial system. Financial distortions can take the form of dis-
incentives for savers, entrepreneurs and producers as well as policies designed
to tax the profits from financial intermediation. This is apparent in the gen-
eral equilibrium analysis of the King-Levine model which basically consists of
two separate sub-components. First, they assume an ambiguous relationship
between growth and the level of the real interest rate on the production side.
Second, they characterize the saving behavior of a household by using a time-
separable utility function given by:

\[
U_t = \int_0^\infty u(c_{t+s})e^{-v \cdot s} ds
\]  

(13)

where \(v\) is the rate of time preference; and the one-period utility function given
by:

\[
u(c_t) = \frac{[c_t^{(1-\sigma)}]^{1-\sigma} - 1}{[1 - \sigma]}
\]  

(14)

where \(\sigma\) is the coefficient of relative risk aversion, and its reciprocal, \(1/\sigma\), is the
temporal elasticity of substitution \((\sigma > 0)\) in consumption. The general form

\(^8\)Innovative activity is taken as a sequence of separate activities, which includes, new prod-
ucts, employing imported technology, enhancing present production methods, and of course,
the invention of new products and technologies themselves. King and Levine’s motivation for
entrepreneurs seeking innovations is based on the Schumpeterian philosophy that industrialists
are always in search of monopoly profits.
of the relationship between the rate of growth and real rate of return on the preference side is given by:

$$\gamma = [r - v]/\sigma$$

(15)

where there exists a positive relationship between the growth rate $\gamma$ and the real rate of return $r$. The equilibrium growth rate is derived by solving for the production side relation and the preference side relationship as:

$$\gamma = \left[ \frac{m}{\lambda} (1 - \tau) - v \right]/\left[ \sigma - 1 + \frac{1}{\lambda} + \frac{m}{\lambda} (1 - \tau) \right]$$

(16)

The market clearing equilibrium growth is a function of both preferences and technology and is higher if individuals choose to substitute through time by lowering $\sigma$, or, discount the future by decreasing $v$. Growth is a positive function of the extent of monopoly mark-up (increased $m$), the enhancement of productivity, and increasing human capital stock. However, growth is a negative function of the extent of losses which may be incurred by investors as a result of innovation ($1/\lambda$).

Using this model, one may also evaluate the effects of financial sector distortions on growth via the level of financial sector taxation ($\tau$). Increases in this parameter lead to a rise in the cost of innovation and an increased cost of evaluating and financing entrepreneurs implies that there is, for any given rate of output’s growth, a lower rate of real return. To take this line of reasoning a step further it is easily shown that more severe interventions lead to a decline in the market equilibrium growth rate. King and Levine (1993) also consider other type of distortions, such as changes in the laws governing property rights, corporate profit taxes, etc. The higher these distortions are, the lower, on average, we would expect the mark-up parameter ($m$) to be. All interventions of this type affect the return to innovative activities and also dampen incentives for their future promotion. This then means that financial intermediaries will be less willing to inject funds required for evaluating attractive investments, as well as causing the demand for these services by entrepreneurs to decline. Financial intermediaries succumb to disincentives and limit their growth, which in turn affects steady-state growth. The findings from this model then provide some guidelines which are used to motivate the empirical analysis and econometric evidence provided by King and Levine (1993).

Another model that does not use the Diamond-Dybvig framework of financial intermediation, but uses other ways to show how economic growth and financial intermediation are endogenously determined is, one by Greenwood and Jovanovic (1990). This model demonstrates how financial intermediaries can invest more productively than individuals due to their ability to identify two channels by which the return on investment will be higher in a financially developed economy: (i) more productive investments usually are associated with a greater degree of risk, financial intermediaries insure investors against “idiosyncratic risk” and thereby provide incentives for investors to diversify their portfolios more towards these productive investments; and (ii) a financially developed system establishes and creates access to information regarding investment projects
and direct investors’ assets to more productive uses. Bencivenga and Smith (1991) identify in their model a third channel where financial intermediation actually increases the rate of investment, whereas in Greenwood and Jovanovic (1990), income and substitution effects of a rate of return cancel out and hence leave the savings and investment rate unchanged. The main theme advocated by Greenwood and Jovanovic (1990) is that during the early stages of development, investment opportunities involve a set-up cost. Financial intermediaries may not be readily willing to finance this cost. Over time, the aggregate economy grows in wealth, and income inequalities between individuals who have access to capital through the financial sector and those who do not, tend to narrow. The availability of more and more financial intermediaries provide channels where individuals can invest. This in turn develops a cycle where finance leads to growth via a higher rate of return on capital invested; economic growth also stimulates more expensive financial infrastructure, financial services, and more efficient means of accessing costly information. What is important to distinguish here is exactly how these cycles may lead to changes in growth and how it does this. For example, are links between financial development and economic growth working through changes in the level of per capita income or a change a permanent shift in the level of output growth?

In a related paper, Bencivenga and Smith (1991) show that in the absence of financial intermediaries, individuals hold too much of their savings in liquid form due to uncertainty surrounding the access to liquidity. In their model, Bencivenga and Smith (1991) emphasize the role of financial intermediaries in pooling funds with insurance, while holding less unproductive liquid assets overall. Therefore, financial intermediaries alter the composition of investments by freeing up savings for investment in productive assets, which promotes economic growth. Levine (1991) models the role of stock markets in a similar fashion.

The common theme in all these models is to show how financial development leads to higher investment productivity. Rajan and Zingales (1998, p. 6) point out that this may be “recast to show that financial development reduces the cost of raising funds from sources external to the firm relative to the cost of internally generated cashflows.” In general, funds externally generated are thought to be costlier, since outsiders have less control over borrower’s actions. More efficient financial development via more effective corporate governance and more efficient accounting and banking practices, reduce the gap between the cost of external and internal funding. This makes funding more accessible and less costly for firms dependent upon external funding, and promotes economic growth.

Endogenous growth models link financial intermediation to long-run economic growth, without addressing the role of finance in the dynamics of growth. Although the role of financial variables in influencing growth dynamics has been documented in the literature [see Levine (1997b)], there has been no real attempt to examine whether there does exist a role for changes in the level of financial development to influence economic growth over the long-run. Growth dynamics in under this framework may reflect cyclical effects or stabilization, and may differ across countries and over time. In addition, the functioning of financial institutions may influence business cycles as well as the level of income per
Financial conditions may be deliberately changed by the government. Under such scenarios it would be interesting to examine how significant a role financial variables play in determining the transition path to long-run growth. There is of course no real grounds to assume that these transition paths are the same across all countries. For example, the speed of convergence to sustainable long-run economic growth could be substantially different across countries. Furthermore, one may measure financial development of an economy through various channels ranging from banking sector, stock market to the monetization of the economy through increasing the broad supply of money as a proportion of nominal income. However, the association that financial development does lead to long-run economic growth has been proven to be an assumption worth empirically testing across a spectrum of countries.

3.3 Financial Repression and Financial Development

Financial development is also a function of public policy. In endogenous growth models discussed in the previous section, any form of financial repression or discriminatory policies geared to distort the functioning of financial institutions, will lead to a reduction in long-run per head income (or long-run growth as we defined earlier) and itself be discouraging for financial development. The literature associated with endogenous growth models propose a critique of the financial repression hypothesis in that financial repression impedes economic development and inhibits economic growth, since there exists inadequate incentives for saving and greater expenditure on consumption. Governments are faced with only limited options such as inflationary financing, which leads to further deterioration of the real interest rate.

The effects of discriminatory taxation, interest rate ceilings, credit ceilings, and high reserve requirements for banks can be also analyzed using the King-Levine (1993a) model. Each of these distortions could lead to a decline in the size of the financial sector of the economy which implies that, “with a lower return to innovation, less evaluation of entrepreneurs and external finance of projects is required. Specifically, lower returns to innovation cause entrepreneurs to demand fewer financial services. Thus development in the innovative and productive sectors affect financial development” [King and Levine (1993, p. 527)]. Hence in the same way a more established financial system fosters productivity enhancement by selecting more efficient and superior quality entrepreneurs, mobilizing external finance, and diversifying risk of innovative activities, the consequences of financial repression and financial sector distortion are also prolonged and lead to a decline in long-run growth.

A provocative study which presented both a theoretical and empirical analysis of financial repression on economic growth was by Roubini and Sala-i-Martin (1992). In their model, the government may choose to repress the economy by not allowing totally undisturbed financial operations in order to collect easy revenue. This revenue is modelled as an inflation tax, but they show that such policies have a negative effect on growth, given that financial intermediation plays such a prominent role in the literature. Their model is based on an econ-
omy populated with infinitely lived consumers who derive utility from either
goods to consume and the demand for real money stock. The time separable
utility function used in this study is given by:

\[ U = \int_{0}^{\infty} e^{-\rho t} N(t) u[c(t), m(t)] dt \]  

(17)

where the personal discount rate is \( \rho \), \( N(t) \) denotes the total number of people existing at time \( t \) and also grows as a function of a rate \( n \) which is exogenously
determined. Utility is defined as a function of per capita consumption and per
capita real money balances, \( c(t) \) and \( m(t) \), respecting the aggregate production
function for the economy that is modelled as:

\[ Y_t = \phi(A) K_t \]  

(18)

where \( Y \) is output, \( K \) is capital stock and, as in Greenwood and Jovanovic
(1990), \( \phi'(A) > 0 \). Capital stock, which is assumed to be linear, is defined by a
broad measure and may include physical and human forms of capital, consistent
with Lucas (1988), and may also include publicly provided inputs. The fixed pa-
rameter \( A \) is the degree of financial sophistication of the economy, and assumed
to be related to the level of financial development and has both microeconomic
and macroeconomic features. The financial sector is assumed to improve the
link between savings and investment, contribute to efficiently allocate the cap-
ital stock to its best use, and also help collect and screen information. The
budget constraint for the economy is derived as:

\[ g = \frac{\mu \beta(A) c}{\alpha R} + \tau [\phi(A) - \delta] k \]  

(19)

where: \( \mu \) is the constant level of nominal money growth rate, \( \tau \) is an income
tax rate, \( [r = \phi(A) - \delta] \) is the interest rate minus the rate of depreciation \( \delta \),
\( \pi \) is the inflation rate, \( k \) is the level of real productive capital stock, and

\[ R = r(1 - \tau) + \pi = [\phi(A) - \delta](1 - \tau) + \pi \]  

(20)

which implies that total government spending must be equal to total government
revenue. In this model, seigniorage is also introduced via the first term of the
right-hand side of the budget constraint by making it depend on the extent of
financial development, \( A \), in three ways. Firstly, higher levels of \( A \), lead to a
lower per capita demand for money at a fixed level of interest (this is introduced
by the term \( \beta(A) \)). Secondly, higher levels of financial development also increase
the real rate of interest which reduces money demand. A third channel is that
higher levels of financial development increase the growth rate of the economy,
which leads to a reduction in the steady-state of the economy. However, this
leads to a decrease in the nominal interest rate which would see an increase
in the demand for real money balances. In this model, money is a decreasing
function of the level of financial development, and the government may control
the level of financial development.
Assuming that governments can control the level of financial development, they are faced with a trade-off between increasing tax revenues or decreasing the demand for real money balances and therefore the inflation tax base. Roubini and Sala-i-Martin (1992) show that the derivative of total revenue with respect to the level of financial development is ambiguous in sign, i.e., from:

$$\frac{\partial \eta}{\partial A} = \frac{(A)^c R}{\alpha R^2} + \tau R' (A)$$

(21)

it is unclear that the signs on the second and third term are indeed negative and positive. This has further implications on what governments may do in terms of repressing the economy. Specifically, governments may find it worthwhile to repress the economy if the effects upon income are small (i.e. $\phi' (A)$ is negligible). In such a case, the option of financial repression could be an easy source of revenue by increasing per capita money demand. This however, may provide disincentives for the financial sector to provide financial services to the economy as a whole. Consequently, as Roubini and Sala-i-Martin (1992, p. 17) note: “This will reduce the asymptotic marginal product of the inputs that can be accumulated (such as private physical, private human, or public capital) and, consequently, the steady-state rate of growth....Countries that are financially repressed will have higher inflation rates, lower (before tax) real interest rates, higher base money per capita and lower per capita growth than countries that are financially developed.”

De Gregorio (1992) demonstrates that financial repression reduces growth both in theory and practice. He shows that an increase in the level of inflation raises the real interest rate and therefore reduces the real demand for money. The rise in inflation consequently leads to a reduction in labour demand which eventually results in a lower productivity of capital, even if the rate of investment remains constant. Higher inflation can also be viewed as increasing the costs of financial intermediation. This also leads to a reduction in the growth rate.

The functioning of public policy may also influence financial development on a more particular level. While Roubini and Sala-i-Martin (1992) indicate that governments may choose to repress the financial sector in order to raise the demand for money, and thus increase revenues, this could be done for some sectors of the economy. Jappelli and Pagano (1994), show that this has been done on the markets for consumer credits and housing. These sectors may repressed in order to redirect credit towards industrial investment and project investment where the prospects for increasing productivity for the economy are greater.

On balance, endogenous growth models have argued that financial repression may not necessarily impede growth as long as it is done over a temporary phase of time, or done with a specific agenda of redirecting credit from a depressed sector of the economy to a more prospective one. There is a role for public policy, but it must be geared toward the right market and appropriate intermediaries. If this is not done carefully and not without any time frame, the cost of financial repression could be prolonged so much so that it has detrimental effects upon
prospects for economic growth, the development of financial markets, and the functioning, through inflation, of financial intermediaries.

3.4 Financial Functions, Financial Structures, and Patterns of Financial Development

The substantial theoretical literature on endogenous growth and financial development addresses important issues related to the reasons why financial institutions evolve, grow and finally influence growth. The components of these various rationales have been primarily to do with the need for liquidity, acquiring costly information, liquidity risks, transaction and monitoring costs, as well as providing future generations with more efficient and cheaper means of acquiring funds for productive investment. While these are all important devices to stimulate financial systems, they fail to explain the how the growth of financial intermediaries can contribute to the actual process of economic growth over time; and whether and how economic growth can provide an impetus to more elaborate financial systems. These questions involve both theoretical and empirical considerations and are yet to be explored with any degree of precision in the literature.

Levine (1997) identifies two areas which are worth emphasizing with respect to investigating the conceptual link between the functioning of financial systems and economic growth. The first deals with the economic implications of alternative financial structures, and in particular addresses the question of why alternative financial structures emerge or change as the economy develops. The second considers the effect of the growth of the economy on financial development. In particular, to what extent are economic development and financial intermediation jointly determined, as for example advanced in the model prescribed by Greenwood and Jovanovic (1990)?

3.4.1 Financial Functions

Financial functions refers to the operational practices of a financial institutions. These include the very instruments that financial institutions provide. For example, commercial banks provide credit and interest bearing deposit facilities to the private sector. Commercial banks, corporate as well as individual investors make use of investment banks, mutual and hedge funds who provide opportunities in trading, hedging and long-term portfolio investing. Large investment banks also provide advice and underwriting functions for large corporations in facilitating mergers and acquisitions, manage companies’ initial public offerings (IPOs) on the stock market, and are often support government of emerging markets in issuing bonds. Financial functions, through providing liquidity, provide a link between measures of financial development and economic growth. One such way that banks do this is by issuing demand deposits. Banks can make an estimate of minimum liquidity requirements and channel the savings into investments. Levine (1997) notes that since the liquidity function is difficult to isolate due to data limitations, research has focused on investigating the issue
of asset liquidity and asset price. However, these studies do not provide any evidence of the link between liquidity as a function of financial intermediaries and long-run economic growth.

Another way financial functions may lead to growth is via the stock market. Levine (1991), among others, demonstrates this avenue by showing that a higher proportion of productive investment allows individuals to diversify risk. Atje and Jovanovic (1993) ask the critical question of whether financial intermediation (in particular stock-market development) has growth or level effects. They build on the theoretical model of Greenwood and Jovanovic (1990) in their analysis of growth effects by augmenting it with labour and posit the production function as:

$$ Y = K. \min[L, T]^{\theta} $$  \hspace{1cm} (22)

where $Y$ is output and $K$ and $L$ are capital and labour for each firm, and $T$ is a capacity constraint on labour, with $\theta > 0$. Capital at time $t + 1$, is generated as:

$$ K_{t+1} = (1 - \delta)K_t + R(F_t)I_t $$  \hspace{1cm} (23)

where $I_t$ is the level of investment, and $F_t$ is the level of financial intermediation at time $t$, (measured by either the ratio of credit extended by the private sector and government banks to GDP, or the ratio of the annual value of all stock market trades to GDP) with $R$ being an increasing function of $F_t$. This latter feature is consistent with Greenwood and Jovanovic (1990) who say that financial intermediation increases the rate of return on investment. Atje and Jovanovic (1993) further argue that if $m$, is defined as:

$$ m = T^{\theta} $$  \hspace{1cm} (24)

then it is also the reciprocal of the aggregate capital to output ratio since each firm operates at maximum capacity producing:

$$ Y = mK $$  \hspace{1cm} (25)

In addition, they define the growth rate of per-capita income as:

$$ g_y - g_t = -\delta + R(F_t)\frac{I_t}{K_t} = -\delta + R(F_t)(\frac{Y_t}{K_t})(\frac{I_t}{Y_t}) = -\delta + mR(F_t)i_t $$  \hspace{1cm} (26)

where the investment to output ratio is given by $i_t$. Assuming that $m$ remains constant over all countries and that firms face the same capacity constraint, a first order Taylor expansion leads to a regression of:

$$ g_y - g_t = -\delta + i_t + i_tF_t $$  \hspace{1cm} (27)

In searching for whether there are any level effects of financial intermediation on income, Atje and Jovanovic (1993) use a modified Mankiw, Romer and
Weil (1992) model where both technology and population are assumed to grow exogenously and express output as:

\[ Y_t = F_t^\alpha K_t^\beta H_t^\gamma (A_t L_t)^{1-\alpha-\beta-\gamma} \]  

(28)

where the three forms of capital (financial, physical, and human) are a function of the savings rate and a common rate of depreciation \( \delta \). Extending MRW's model, the following model is derived where financial capital, \( s_f \) takes the form of the value of stock market trading to GDP (stock market trading value is defined as traders' and brokers' commissions):

\[
\ln \frac{Y_t}{L_t} = \ln A + gt - \left[ \frac{\alpha + \beta + \gamma}{1 - \alpha - \beta - \gamma} \right] \ln(n + g + \delta) + \\
\left[ \frac{1}{1 - \alpha - \beta - \gamma} \right] (\alpha \ln s_f + \beta \ln s_k + \gamma \ln s_h) 
\]  

(29)

Based on these models, Atje and Jovanovic (1993) find significant and sizeable level and growth effects from stock market development. These models provide the first basis for examining the role of stock market development as a means of financial intermediation on economic development. The empirical question posed by these models focuses on the important issue of whether financial intermediation is permanent or transitory, and one should not apriori exclude either one.

Levine and Zervos (1998) extend the work of Atje and Jovanovic (1993) by focusing on the question: Do well functioning stock markets promote long-run economic growth? Using a similar theoretical motivation to that provided by King and Levine (1993a), Levine and Zervos (1996) use several other indicators of stock market development and control for a variety of economic and political factors that may have some effect upon the robustness of results. They find that the level of stock market development in particular has a robust and positive correlation with both current and future economic growth. They conclude that their findings are consistent with theories which advocate the view that services provided by the financial system are growth promoting by speeding up capital accumulation, as well as stimulating the rate of productivity. In other words, the successful functioning of financial markets provides impetus to growth as previous endogenous growth models suggested, through both accumulation of capital and a more efficient allocation of resources.

While both these papers suggest a strong and positive association between stock market development and growth, the results cannot demonstrate causality. This is acknowledged, however, by Levine and Zervos (1998) and in part as a defence to this criticism, they point to issues which suggest that results do not simply reflect reverse causality. One of the issues raised is that results remain fairly robust to the inclusion of a lagged dependent variable. Here, the point worth noting is that this, amongst other critical issues, deserves to be focused

\(^9\)Note that a growth effect implies a level effect, but not vice versa.

\(^{10}\)We review all the various empirical evidence in the following chapter (Chapter 3).
on at an empirical level. Indeed, whether or not stock markets have an impact on growth is not the focus of the issue, but rather how stock markets fulfil their role as a function of financial intermediation, and whether improving the financial system itself can lead to a more elaborate financial system, where stock markets could be a primary component of the system. This idea, in relation to financial intermediation in general, is further propagated by Greenwood and Smith (1997).

If one thinks of the stock market as part of a financial system, then this becomes nested within the umbrella of financial intermediaries. Besides stock markets there are other mechanisms, such as banks and bond markets, that provide liquidity. These components of the financial system also perform the important role of reducing productivity and liquidity risks. While much empirical work focuses on the equity market, as Levine (1997) points out, bond markets and other financial intermediaries also contribute to this mechanism for diversifying risk. The costs of providing these services may vary across countries, as could the actual cost of establishing one intermediary over another. A vibrant stock market may not necessarily be the only indicator of existing opportunities for accessing liquidity and diversifying risk. In fact, focusing on any one particular function or indicator of financial intermediation may lead to biased results, particularly when investigating its linkages to economic growth.

3.4.2 Financial Structures

Financial structures is a broad term incorporating the major arms of any financial system: credit unions, commercial and investment banks, and the stock market. The definition does not preclude supporting intermediaries to these institutions and includes all facets of financial corporations such as mortgage brokers, providers of trading facilities on the stock market, providers of issues relating to legal and security issues. The functioning of financial markets through financial structures brings us to the broader issue of how to tackle the question of relating financial structures to economic growth, where growth can be broadly defined to mean short- to medium-term changes in growth or a permanent shift in the level of growth itself. Financial structures grow to augment the financial system at different stages of economic development. Due in part to fixed entry costs discussed earlier in this review, the demand for financial intermediaries will only begin to take shape once the economy reaches some minimum level of per capita income. This is why, in some countries in the infancy of economic development, financial institutions are rare. At the initial stages of economic development, one part of the economy develops a demand for financial services and in turn benefits from its profits. Over the long-run, the financial sector of the economy grows at a much slower pace than other sectors, since a larger proportion of the financial system becomes absorbed into the economy and each and every individual benefits from its services.

Perhaps the seminal study that examined the theoretical relationship between how financial intermediation leads to economic growth and how changes in income levels can influence the structure of the financial system, was by...
Levine (1993). He shows how more elaborate financial systems could emerge and stimulate opportunities for profitable production processes. Furthermore, the saturation point of financial systems could be avoided by the introduction of fixed entry costs which are an increasing function of the complexity or coverage of the financial service.

In his survey Levine (1997, p. 48) still contends that: “There exists considerable debate, with sparse evidence and insufficient theory, about the relationship between financial structure and economic growth”. This situation, however, is not surprising given the problems associated with establishing this link. Levine (1997) identifies some of these analytical problems as: (i) the deficiencies of data on measures of financial structures make comparison of financial structures over countries an unwieldy exercise - quantification of financial structure research also impedes questions such as how well different financial systems functions overall; (ii) in order to isolate whether financial structures contribute to growth, it is necessary to control other factors. For example, several noneconomic variables also exert significant effects on growth rates and ought to be, if possible, accounted for along with financial variables; (iii) different financial structures perform different financial functions, but they also overlap in its scope. The disentangling of individual services performed by specific intermediaries complicate testing for this association even further, not to mention data deficiencies; (iv) another weakness in analyzing the linkage between financial structure and economic growth is the fact that up until now, most work has been limited to OECD countries like the United States, Germany, UK and Japan which have similar structures. What is needed is to look into this issue using countries at alternative stages of development. (v) the stock market itself is linked with the banking system, especially with respect to which intermediary finances more productive investment, but the source of investment is usually made up of a number of components. For example, fixed-income, corporate and debt financing can all contribute to stimulate investment activity. The challenge then becomes to find through which channel financial structure have most impact and how this eventually leads to accelerating economic growth.

To this end, in a recent study, Diamond (1997) provides a theoretical model in which the roles of financial markets and banks are examined where both are assumed to be active as competing mechanisms for potential investors. The paper is based on a simple idea that as banks are suppliers of liquidity, they could easily provide too little when there is restricted or reduced market participation by investors.

3.4.3 Patterns of Financial Development

The importance of financial structure brings us to the equally important issue of whether or not financial structure changes as the process of financial development varies over different regions and countries. Patterns of financial development is a generic term referring to the pace, size, and overall quality of financial development. Included are factors such as the level of inflation, stability of the financial system, coverage of financial intermediaries, the existence of a liquid
stock market, as well as the banking system. For example, a developing country may have a sizable financial system that is plagued with non-performing loans, problems with credibility, or a financial system that is heavily dependent upon commodities such as in oil-exporting countries. Some empirical work exists in this area but is very limited. Demirguc-Kunt and Levine (1996) is one example of such a study, where it is found that structure does differ across countries and regions. The paper finds that some patterns emerge with countries across the course of development. The general trend of financial market development from an economy in its initial stages of development and one in its transitional stage are quite different. For example, financial intermediaries become greater in number as well as larger in size measured by their total assets relative to GDP as countries become more developed. During the initial phases of development, banks tend to grow relative to central banks, followed by growth of other financial intermediaries such as investment banks, mutual funds, insurance and pension funds etc. The stock market and bond markets grow at the later stages of development, but their emergence varies across countries.

This brings Levine (1997a) to analyzing the issue of why countries at similar stages of economic development have different financial systems. In attempting to provide some insights into this broad question, Part I of Levine (1997b) looks at the legal and regulatory determinants of the financial system. The main motivation driving this avenue of research generates from a need to understand the basic evolution of financial development itself, regardless of its relationship with long-run economic growth. In order to do this, the study utilizes a cross-sectional data set also used by Laporta, Lopez-de-Silanes, Schleifer and Vishny (1997) and tries to identify whether countries with more efficient legal systems have more effective financial intermediaries. The important role played by information is also examined by using an index of comprehensiveness of information quality. Theoretical models have shown that information quality with respect to firms and corporations is highly critical in order to assess whether or not they are creditworthy. In Part II of the same study, alternative combinations of these legal and regulatory determinants of financial development, already isolated in Part I, are used as exogenous instruments in an analysis of the determinants of growth.¹¹ In this aspect the study tries to provide empirical evidence on the joint determination of economic growth and financial development by first examining the origins of financial systems through legal and regulatory determinants, and then testing to what extent they are positively correlated with growth.

Hung (2003) illustrates the role played by the prevailing rate of inflation of an economy in determining the relationship between financial development and growth. His study uses the assumption that money is needed for loan transactions and finds that if a government is pursuing an expansionary policy, then financial development actually leads to multiple equilibria of rising inflation.

¹¹The legal and regulatory environment is treated as the exogenous component of financial intermediary development. Levine (1997b) assumes that these ‘legal and regulatory’ variables are exogenous since most countries established their own particular legal system through initial occupation and cultural development.
and falling economic growth for countries with relatively high rates of inflation. Further, only when initial inflation rates are relatively low will financial development actually lead to reduced inflation and encourage economic growth. The paper measures financial development by the reduction of the monitoring or verification costs of lending and assumes that there are informational imperfections in the economy. Policy implications are also emerge, with Hung finding that a government which reduces its spending if it is following an expansionary policy should help to curb inflation and thus improve economic growth. Additionally, if reduced spending is not possible, he also suggest that the government repress its financial system (which raises financial costs) in the case that initial inflation rates are high. This theory would require the backing of empirical data if it is to be accepted in terms of policy implementation, especially in order to validate the chosen measure of financial development (verification costs) and the effects of different initial levels of inflation, which may vary per country and according to the level of financial development in each economy.

The association between patterns of development and financial structure, while very thought-provoking and challenging, requires highly consistent and robust data sets, as well as theoretical models which provide some guides as to identifying what channels structure impacts on growth. This is not very clear from empirical research so far. The problems associated with this approach do not only constitute empirical considerations and quality of data, but remain highly inconclusive about causality. Correlation does not necessarily mean that less developed economies, by changing their structure of financial intermediaries, can necessarily promote steady-state growth. Furthermore, structure constitutes a number of components. It is a challenge in itself to isolate these components through appropriate proxies, but another task altogether to attempt to provide a systematic layout and sequence as to how and when these components should combine to constitute that structure. For example, the timing of implementing a change to a financial structure, which may include rigidities or barriers in the face of macroeconomic instability, may lead to a decline in growth rates. Structural reform of the financial sector in many developing countries also needs appropriate legal and regulatory implementation. This may be highly problematic in countries where organizations designed to support and monitor the financial system are affected by bureaucratic inefficiencies, political instability and corruption.

3.4.4 Conclusions

This section has surveyed the theoretical literature surrounding the relationship between financial development and economic growth. The market for finance and financial institutions is special in that it has features which differentiate it from other markets in economics. Financial intermediaries arise from a world of costs associated with seeking information, making transactions and maintaining some degree of monitoring. Several models that evaluated the role of financial intermediaries in economic development were examined. In particular, the most prominent models in the literature seems to be those which formulate
the process of financial development and economic growth jointly within the context of endogenous growth models. The novelty of these models is that they identify the channels by which the spread and growth of financial intermediaries and services, whether by mobilizing resources to facilitate increased savings or more and better quality investments, takes place. A common feature of endogenous growth models is that it in addition to providing a theoretical framework whereby we may evaluate household portfolio behavior under uncertainty, they also illustrate how this behavior can actually make economies grow faster. Essentially, externalities result from financial intermediaries participating in more productive forms of investment which implies benefits in terms of raised productivities for all firms and entrepreneurs. More efficient financial intermediation prevents capital from experiencing diminished marginal returns, which in the long run may lead to economic growth.

4 Financial Development and Economic Growth: An Overview of the Empirical Literature

There exists a vast empirical literature on the finance-growth inter-relationships that has used a variety of econometric approaches in applications to a number of countries. This section contains a selected review of this literature. While references are made to various papers and models discussed in the previous section, the focus is more on the econometric methodology used to arrive at this evidence. Due to the expansive nature of the literature, we focus on the more recent contributions to the literature and try and isolate their merits and shortcomings.

4.1 Time Series Studies

Even though financial intermediaries may not finance a significantly large proportion of investment, they still may be important and exhort a critical force on economic growth. Given the basis of the financial led growth hypothesis as originally advanced by Goldsmith (1969) and McKinnon (1973), based on positive correlations between finance and growth, there emerge two separate problems as identified in a brief review of the literature by Pagano (1993): (i) the first concerns the empirically elusive nature of causality between financial development and economic growth; and (ii) the second considers the idea that if which channel does financial development lead to growth through. For instance, whether this could this occur through enhancing investment efficiency or by directly raising the rate of investment, or both.

A large literature surrounds a related and important issue of the consequences of financial conditions upon the quantity of savings and the quantity and quality of investment effects, as well as the rate of economic growth in the short and medium terms. Of the sparse literature that has focused on the finance-growth nexus employing time series techniques, a large proportion has
done so with respect to addressing the issue of causality between various measures of financial variables on the one hand, and economic growth on the other.\footnote{Causality is a subject of great controversy among economists. See, for example, Zellner (1988). Interested readers could refer to a supplementary issue of the \textit{Journal of Econometrics}, September-October, 1988, that includes studies discussing this issue. Without stressing this issue even further, the concept used here is in the stochastic or probabilistic sense, rather than in the philosophical or deterministic sense. Also the concept used here is in the Granger temporal sense, rather than in the structural sense.} Tests of causality have often been performed with data describing developing countries’ measures of financial development and real per capita income. Such data is highly aggregated, and is also invariably restricted in terms of time span covered in developing countries. Furthermore, testing procedures to uncover causal patterns are often quite sensitive to the particular measure of financial development used. As a consequence, the literature in this area has not been reviewed very carefully. Nevertheless, it does provide us with valuable insights into the direction of causality, even if it is via lead–lag relationships, in contrast to studies that have formed inferences using a simple correlation based analysis.

After Gupta’s (1984) study examining the causality between financial development and growth in developing countries, there have been a few individual-country studies that have used time series data to examine the finance-growth relationship for alternative definitions of country groupings depending upon their level of development. Among these works, perhaps the most significant is by Jung (1986) who addresses this issue by employing Granger tests of non-causality in a VAR model, including the ratio of M2 to output as his measure of financial deepening. Based on an analysis of 56 countries each taken separately, Jung (1986) finds evidence in favour of the finance led growth hypothesis for most of the high-growth LDCs. Using exactly the same measure of financial development as Jung (1986), Spears (1991), also finds empirical support in favour of financial intermediation in a group of central African LDCs. Similarly, Wood (1993) concludes that the ratio of M2 to GDP significantly influences real GDP for Barbados over part of the post-war period. In a short paper, Thornton (1996), performs Granger non-causality tests for 22 Latin American and Caribbean developing economies and concludes that financial deepening does not significantly explain economic growth. In fact, for 14 out of 22 developing economies Thornton found no evidence of positive or negative unidirectional causality. All of these studies, while contributing empirically to the issue of the inter-linkages between growth and financial deepening, use either M2 or private sector credit as a ratio of GDP to proxy for an index of financial development. However, as Pagano (1993) notes, this ignores one of the important lessons from the theoretical literature, in that the influence of financial development on growth is highly sensitive to the particular market being examined. Furthermore, at least in performing causality tests, given the methodological progress in time series econometrics in the area of testing for Granger non-causality in systems containing unit roots that are possibly cointegrated, it is important that one at least investigates the time series properties of the variables in question.

This investigation to be carried out with respect to tests for possible unit roots
and cointegration, bearing in mind the potential implications of the problems of pre-test bias for inference.\footnote{For example, it could be that statistical power of available tests for cointegration cannot accurately distinguish between cointegrating and nearly cointegrating relationships.}

In an effort to overcome some of the methodological deficiencies of previous studies, Demetriades and Hussein (1996) conduct causality tests using the vector error-correction model (VECM) approach of Toda and Phillips (1994) and level VARs approach advocated by Sims, Stock and Watson (1990). Based on VAR model estimated separately for 16 countries, chosen primarily on theoretical and data availability grounds, they find that causality patterns vary quite substantially across countries. In their study, careful attention is paid to which particular measure of financial development best represents the particular stage of financial development a country may have gone through\footnote{Demetriades and Hussein (1996) use two measures of financial development. Firstly, they argue using a measure that excludes currency in circulation from the broad money stock, namely the ratio of bank deposit liabilities to GDP; and secondly a measure to gauge the level of financial intermediation, namely the ratio of bank claims on the private sector to nominal GDP. They interpret these ratios to represent levels of financial deepening. The indicator used for economic development is that used by Roubini and Sala-i-Martin (1992), namely real GDP per capita.}. Furthermore, methodological strategies are considered carefully as well as complementary evidence being provided from different techniques when results are in conflict. The Demetriades-Hussein (DH) study is valuable in the sense that it is the latest in a series of studies that have employed tests for causality taking account of econometric issues that surround these tests, such as unit roots and cointegration. While this is useful, the evidence generated from these techniques suffer from two shortcomings: (i) the entire analysis is carried out using a bivariate model, and in general no attempt is made to allow for the possible effects of other potential variables on the inter-relationship between financial development and economic growth; (ii) while the Toda-Phillips and Stock-Sims-Watson procedures are potentially useful as frameworks for Granger non-causality tests, both are dependent upon pre-testing for cointegration rank and unit roots. The potential lack of power of inference based on tests for unit roots and Johansen tests for cointegration is now well known in the literature, and this is even more crucial in the case of small samples like the ones adopted in the DH study. There are now readily available procedures for testing Granger non-causality in systems that may be cointegrated of arbitrary orders, with $I(0)$ or $I(1)$ regressors, and also in levels. The scope for application of procedures that are not heavily dependent upon these perquisite testing could provide a more robust set of empirical findings; as well as providing a method for scrutinising the empirically elusive relationship between measures of financial development and growth.

Demetriades and Hussein (1996, p. 406) conclude: “What is also evident from our causality tests is that the results are very much country specific. This highlights the dangers of lumping together in cross-section equations countries with very different experiences in relation to financial development which may reflect different institutional characteristics, different policies and differences in their implementation.” While the Demetriades-Hussein study provides some im-
important insights into using a variety of econometric approaches to unveil causality, a bivariate analysis is only limited in terms of providing adequate prescriptions for policy inference. An approach worth considering would be conduct a multivariate analysis on countries in alternative stages of development (for example, a newly industrializing country (NIC) such as Korea, an emerging NIC such as Malaysia, a large developing economy such as India and perhaps a poor LDC) and provide a comparison of the experiences these countries have had with the impact of financial deepening and liberalization.

Arguing that evidence based upon time series techniques can take into account individual country circumstances, including institutional and policy considerations, Arestis, Demetriades and Luintel (1997) take a fresh look at the relationship between financial development and economic growth. Their paper investigates issues relating to the links between financial development and economic growth for 5 industrialized countries (Germany, U.S.A., Japan, U.K. and France), but by using stock market development as a primary proxy for financial development. For Germany and the United States, using quarterly data from 1979 to 1991, Arestis and Demetriades estimate cointegrated VARs including log of GDP per capita (LY), stock market capitalization ratio (LMC) which is measured by the ratio of stock market value to GDP at a point in time, and an index of stock market volatility (LMSV) which is measured by an eight-quarter moving standard deviation of the end-of-quarter change in stock prices. The fourth variable for Germany is the ratio of M2 to GDP (LM2Y) and in the case of the US the ratio of bank domestic credit to nominal GDP (LBC). The authors test for cointegration using tests based on the Johansen framework and further tests are carried out in order to reduce the system to economically interpretable relationships based on a procedure advocated by Pesaran and Shin (1999). Although tests for causality are not explicitly conducted, the authors report tests for weak exogeneity of each of the variables entering the long-run relationship. Employing cointegrated VARs for the US and UK they provide evidence against financial development promoting growth, while in the case of Germany, Japan and France, they find positive evidence of finance on output. Similar techniques are also used in a study by Arestis and Demetriades (1997) to test for cointegration between real GDP per capita and two measures of financial development, namely, the ratio of bank deposits to GDP (LDEPY) and the ratio of bank credit to the private sector and nominal GDP (LPCY). The set of 12 countries in their sample include both developed and less developed economies.

Luintel and Khan (1999) reexamine the long-run causal relationship between financial development and economic growth for 10 countries separately in a multivariate VAR model including financial depth (measured by the ratio of deposit liabilities of deposit banks to one period lagged nominal GDP), the log of real per-capita output, the real interest rate and real per capita capital stock. An...
annual data is used from a minimum time span of 39 years to a maximum of 41 years. The study differs from previous works due to its multivariate formulation and application of new methodological techniques. First, tests for cointegration are performed using the Johansen (1988) procedure and then two separate cointegrating vectors are identified. These vectors define relationships for long-run financial depth and long-run output, respectively.\textsuperscript{16} Causality tests are then implemented following procedures advocated by Hall and Wickens (1993) and Toda and Phillips (1993). Results show that long-run financial depth is positively and significantly influenced by levels of per capita real income and real interest rates. The main feature of the analysis is the finding of bidirectional causality in all sample countries analyzed. The findings are distinct from Demetriades and Hussein (1996) and Jung (1986) and are attributed to the analysis being conducted in a higher dimensional system as well as new methodological innovations.

Most recently, Rousseau and Vuthipadadorn (2005) take a slightly different angle on the debate by studying the relationship between economic growth and the intensity of financial intermediation promoted investment. They examine 10 Asian economies over a fifty year period (1950-2000) using a VAR and VECM framework. Using a multivariate analysis, they come to the conclusion that finance does, on the whole, drive investment in these economies, whereas the link from finance to output growth is not as robust. Their study supports the work of Gerschenkron (1962) in emphasizing the role of finance and investment during the early stages of a country’s development. The work makes use of two measures of financial development (the difference between broadly defined and narrow money, and credit allocated to the private sector) as well as two measures of economic growth (GDP and gross domestic fixed investment). This helps, to some extent, to compensate for the very small sample used in the study. Further, the authors incorporate the tests of Sims et al. (1990) and Toda and Yamamoto (1995) in addition to the error correction tests which provide both long and short-term relationship results. These results do not directly address the idea of causality between financial development and growth, but do provide an interesting insight on the debate. The time-period covered is substantial, although the breadth of the sample is not sufficient in terms of broad policy implications and justifications; and despite this being a multivariate analysis, there is no allowance made for exogenous variables which could affect the finance-growth relationship.

Individual time series studies provide the most heterogenous evidence primarily because no degree of commonality is imposed on the cross sections. A more richer information set is extracted and dynamics, assuming there is sufficient degrees of freedom, can be adequately captured. However, most studies cited either suffer from one or a combination of the following deficiencies: (i) the measure used to define financial development is too narrow; (ii) tests for Granger non-causality are dependent upon pretests of cointegration which are

\textsuperscript{16}Tests for over-identifying restrictions are conducted as two cointegrating vectors are found in the VAR. In the case of a single cointegrating vector, exact identification of the cointegrating relations does not require over-identifying restrictions.
themselves dependent upon pre-tests for integration; (iii) tests for a long-run relationship are based on only cointegration rank tests without any allowing any significant role for economic theory; (iv) the models used are typically bivariate and even where it contains more variables, models do not take into account the effect of external shocks such as oil prices shocks on the relationship, or the direction of causality.

4.2 Cross-Sectional Studies

While time series studies place emphasis on individual country inference (i.e. in that results of countries could and do vary accordingly), such an approach often seems to be unduly restrictive and presumes that very little can be gained from investigating the growth process across several countries with similar structural characteristics. Data restrictions pose yet another problem to time series studies since most developing countries do not have readily accessible and reliable sources of data. Although one could argue, however, that of all variables, national accounts and financial time series would seem to be the most reliable. There still may remain quite another set of problems associated with overly aggregated measures of financial activity, this being one of the major criticisms made by Stiglitz (1994). However, it is difficult to comprehend a general economy-wide analysis of the effects of financial development upon economic growth without some level of aggregation in the data.

Partly as a response to the shortcomings introduced by a shortage of observations and overly aggregated financial measures, a few studies have addressed this issue by pooling observations across countries. Employing time averaging across 24 countries for a sample covering the 1970s, Khan and Reinhart (1990) find evidence of a positive relationship between the ratio of private to aggregate investment and economic growth and isolate the role played by availability of credit in stimulating private investment. Several studies using average growth rate data sets have focused on the strength of the cross-sectional relationship between the level of interest rate and economic growth. The most prominent amongst these is a study by the World Bank (1989) which groups countries by whether they had highly positive, almost negative and highly negative deposit real rates of interest. The World Bank study finds evidence that, in general, those countries with highly negative real rates of interest, also, in general happened to have the lowest level of growth.

While the issue of interest rate responsiveness of savings and its consequential effects upon economic growth in LDCs has been the subject of a large body of empirical research, there is still a need to provide robust evidence prior to constructing any broad inference with respect to financial development and growth. Apart from the basic methodological issues arising from cross sectional work, Molho (1986) casts doubt upon most of the studies that have intended to test the investment and interest relationships, claiming that there remains confusion and misunderstanding over the interpretation of these tests. For example, a number of studies include only the current rate of interest and current financial savings, whereas a more appropriate specification would conditionally
relate current investment to contemporaneous as well as past rates of the return on financial assets. In econometric analysis, even when not basing the analysis on a purely autoregressive specification, it is important to try and specify the lag structure to be appropriately modelled. Dynamics, with the best of apriori theoretical models, are not easy to implement in practice. There is also a need to examine the quality of the data involved in testing these hypotheses. For example, even if lag structures are appropriately estimated, the quality of data in LDCs relating to aggregate savings and investment would largely restrict the usefulness of the evidence reported.

Most studies based on cross-country regressions involve an implicit assumption regarding, essentially, a strong similarity between each countries structural features. This assumption effectively implies that all countries possess similar institutional, political, economic and social characteristics. Should there be any differences, then these are variates are assumed to be distributed as mean zero random process. The rigidity of this assumption has been an issue of much concern in the literature. For example, should structural differences not be generated by a purely random process and should these differences significantly influence the growth process in different countries, then this in itself is a deficiency of a pure cross section or cross country regression approach. Moreover, the variety of theories, testing procedures and results attempting to explain the growth process point to the general difficulties associated with deriving and interpreting empirical evidence. Since tests of growth models impose such strong assumptions regarding international production functions, specification errors are likely to distort results. It is also doubtful whether cross country regressions which use averages over time to make inferences regarding a dynamic process over time, can actually capture the propagation of the process generating economic growth. The presence of dynamics complicates issues relating to interpretation as cross-section regressions cannot identify dynamics (see Pesaran and Smith (1995)). Pesaran and Smith (1995) show that the neglect of slope heterogeneity is yet more serious in dynamic panel data models.\footnote{Pesaran and Smith (1995) show that neglect of heterogeneity using the fixed-effects estimator in dynamic panels generates a correlation between the regressors and the error term as well as serial correlation in the disturbances, and hence does introduces a bias. This is true for estimation even with large $N$ (the number of groups) and $T$ (the number of time observations).}

In order to deal with this problem, several studies have tried to control these differences by including dummy variables to account for such differences across countries. While this approach deviates from the restrictive approach of treating each and every country separately (i.e. in studies that utilize purely time series regressions), it does not really address the problem in principle of accounting for the dynamics of the growth process in a cross country regression framework.

A number of studies have used this approach in attempts to provide empirical evidence on the determinants of growth. Nested within the growth literature are studies which have addressed essentially financial variables, while others have placed focus more on policy variables, all with the common aim of finding the driving forces behind the growth process. In fact, testing the number of existing
hypotheses relating to growth theories, often based on credible theoretical ideas and striking empirical evidence, has been an important tool of analysis. This is what Levine and Renelt (1992) attempt precisely to examine and question. In their analysis, Levine and Renelt (1992) carry out Leamer’s ‘extreme bound analysis’ and find that when additional explanatory variables are added to the various models, much of the statistical significance of these variables becomes discredited. In Leamer’s terminology, they conclude that most of the initial findings are ‘fragile’ apart from the empirical assertion that real per capita growth is positively related to the investment share. This study is important since it indicates that empirical analysis, under severe scrutiny, is not as impressive as first thought to be the case. The type of cross section regression analysis carried out in the literature is methodologically unsound [see Lee, Pesaran and Smith (1997) and Binder and Pesaran (1999)].

The recent empirical studies in the finance-growth area have started to utilize larger data sets by pooling relatively short spans of data for two or three decades, but over a number of countries. King and Levine (1993a) use disaggregated measures of financial intermediation and other financial ratios, rather than real interest rates or the ratio of a monetary aggregate to GDP, to examine the links between finance and growth in a cross section of 77 developing countries. They follow a procedure devised by Barro (1991) where a comprehensive range of countries are split in to four separate groups over the sample 1960-89. They devise a variety of growth as well as financial indicators and show that each financial measure is positively and significantly correlated with each measure of growth. In each case they find that an average value of financial indicator declines with a move from a higher to a lower wealth group in a cross-section. King and Levine also examine the impact of the value of liquid liabilities divided by GDP in 1960 on average per capita real GDP growth over 1960-69. Separate regressions are estimated including, in turn, such variables as the log of per capita GDP, log of secondary school enrolment, government consumption to GDP, the number of civil liberties, revolutions and assassinations, and country specific dummies for African and Latin American countries. Finally, King and

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18 In a variety of models of economic growth Levine and Renelt (1992) tested the robustness of results using 50 possible explanatory factors over 119 countries. These authors essentially ask the question of which of these factors are, empirically speaking, causal to the growth process. The EBA analysis leads them to the conclusion that confidence should not be placed on most of the very parsimonious models; and that misspecification is a common problem in empirical work. However, two findings are found to be robust: (i) the positive correlation between investment and GDP; and (ii) a positive correlation between the ration of trade to output and investment. Other explanatory variables seem to be fragile.

19 In examining the links between finance and development, King and Levine specifically use four measures of financial development: (i) ratio of liquid assets, mainly proxied by broad money supply, to GDP; (ii) ratio of domestic deposit commercial banking assets to domestic deposit commercial plus central banking assets; (iii) ratio of domestic private sector credit to total domestic credit; and (iv) ratio of domestic private sector credit to GDP. They also use four separate measures of economic development, namely: (i) average rate of real per capita GDP; (ii) average rate of growth in the stock of growth; (iii) the discrepancy between (i) and (ii) in order to capture changes in productivity; and finally (iv) the ratio of gross domestic investment to GDP.
Levine (1993a, 1999b) also regress pooled decade averages of growth indicators on values of financial indicators at the beginning of the decade, initial values of other explanatory variables and dummies for decades. That is they regress indicators of development which are averaged out over one or more decades on initial values of financial indicators. The main conclusion is that initial values of financial indicators help predict average values of growth indicators even after controlling for other initial conditions, education, government spending, inflation, political stability, and various other policy measures.\(^{20}\) They also provide evidence indicating that subsequent growth rates are positively correlated with initial liquidity ratios. Some (erroneously) contend that this can be taken as formal evidence of financial development causing economic growth. However, the evidence can also be interpreted as financial development reflecting a build up in anticipation of future economic stimulus. Regardless, as both economic growth and financial development are endogenous and react to in specific ways to shocks, examining this question may be as important and informative as understanding the sources of shocks that eventually drive the correlations.

However, there still remain some limitations to the King-Levine approach due primarily to the fact that as these indicators of financial development will be contemporaneously correlated across time for a specific country, as Demetriades and Hussein (1996) point out, the initial generated value would be correlated with its contemporaneous level. This implies that any results could not be interpreted in a causal sense, but rather a case of contemporaneous correlation between financial development and economic growth. Also, the King-Levine analysis assumes that the initial financial conditions are given exogenously. Other existing criticisms largely remain unaddressed. These can be summarized as follows: (i) Quah (1993) makes the criticism regarding each economy having a stable growth path, along with omitted variable and sample selection bias. Also, in this methodology, each country receives equal weighting; (ii) causality is very difficult to infer from these methodological approaches as there is no allowance for accounting for the dynamic response of growth to financial development. Even in the hybrid Barro type regressions that King and Levine (1993a, 1993b) estimate, where some attempt is made to introduce dynamics through including initial output, the coefficient estimates from these regressions will still be biased. The magnitude of this bias will be some function of the ratio of the time series variance to the cross section variance.

More recently, several studies have found that correlation between financial development and economic growth depends critically on the selection of countries included in the sample. In fact, the King-Levine analysis is sensitive to sample specification. Splitting the King-Levine data set into OECD and non-OECD countries, Fernandez and Galectovic (1994) show that correlation between growth and financial development fall quite substantially and become statistically insignificant for OECD countries. While including more countries to the King-Levine sample, De Gregorio and Guidotti (1993) show that when they divide the countries into 3 groups based on their per capita income at the

\(^{20}\) Considering that initial financial conditions are a part of the initial conditions.
beginning of the sample period, correlations increase in both size and significance as one moves from high to low income country groups. They also find that Latin American countries had a significantly negative correlation.

In both these studies it is argued that there may be insufficient variation among developed countries (which are typically associated with mature financial intermediaries) to evaluate their impact on growth. Moreover financial variables do not really capture intermediation through non-financial or non-bank intermediaries. What is also possible is that either the measures of financial development are not broad enough or else they are too broad to capture specific efficiency-enhancing roles of financial intermediaries. Alternatively, financial intermediaries may have stronger efficiency-enhancing influences in less developed countries.

In a provocative study that looks at the microeconomic determinants of financial development, Rajan and Zingales (1998), use two measures of the state of financial development, namely, the capitalization ratio measured as domestic credit plus stock market capitalization as a proportion of GDP, and a measure of the development of accounting standards. This is a proxy for the ease with which a firm can raise money, since when accounting standards are low, external finance will be difficult to obtain. They use data covering 41 countries over the 1980s in a variety of cross-sectional regressions to show that industries which are dependent upon external finance (measured by the share of capital expenditures unfinanced with cash flow from operations), tend to grow faster in financially developed countries with high accounting standards. Rajan and Zingales claim this to be the smoking gun in the causality debate, and claim their evidence indirectly suggests that financial development stimulates growth by permitting new business ideas to flourish and develop.

Levine and Zervos take the role of capital accumulation and changes in productivity one step further and find that stock market liquidity and banking development may predict growth. Using data covering 47 countries between 1976 and 1993 these authors use cross sectional regressions to show that indicators such as output growth, capital stock and productivity are driven by banking and stock market development. For example, if in 1976 a country had increased its bank credit as a proportion of GDP from an average of 80% to 130% (the range of the sample being 12 to 227%) and increased its stock market liquidity from an average turnover rate of 30% to 63% (the range being 23-205%), real GDP per capita would have been almost one third higher by 1994.

The theme of stock market capitalization is continued in a study by Garretsen, Lensink and Sterken (2004) who analyze the relationship finance and growth as it is influenced by societal norms and legal institutions. Financial development is measured in terms of stock market capitalization and the availability of bank credit. Using a Hausman test and considering as dummy variables the efficiency of the judicial system, shareholder rights or societal norms. They find that stock market capitalization is not a driver of economic growth, but that bank credit is. This introduction of non-finance related variables (societal norms and legal institutions) does add a new dimension to the analysis of the role of the stock market, and the fact that 50 countries are used for the sample.
adds weight to the generality of the findings. At the same time, this study
does suffer from the basic weakness of cross-sectional studies, as in measuring
cointegration, the issue of causality is not addressed at all.

All these studies using cross-sectional regressions emphasize the potential
problems with post-World War II sample periods. The substantial heterogeneity
in countries cannot be ignored and some allowance has to be made for the
role of temporal dynamics. As our theoretical review indicated, countries at
alternative stages of financial development share different relationships with
growth. Adding further control variables for the specifics of initial policy regimes
and policy switches fails to address the problem of time variation, and this is
exactly what cross-sectional studies, by design, do not incorporate.

4.3 Panel Studies

Panels exploit information from both time-series and cross-sectional dimensions.
In this respect empirical evidence drawn from panel data allows for a more com-
prehensive empirical analysis, and enable the researcher to rigorously address
the issue of causality.

Empirical evidence on the finance-growth debate that explicitly uses panels
has grown since the study on causality by Levine, Loayza and Beck (2000). This
paper sheds considerably light on the issue of causality while also demonstrating
a close empirical relationship between key legal and accounting characteristics
and financial intermediary development. Methodologically the study uses two
techniques: (i) a pure cross sectional regression based on long time averages
(1960-1995) over 71 countries. The dependent variable is average level of real
per capita GDP, with regressors including measure of financial intermediary
development, along with a set of conditioning information. Instrumental vari-
able (IV) estimation is used to extract the exogenous component of financial
intermediary development. Three alternative measures of financial intermedi-
ation is used: the first measures the overall size of the financial sector; the
second measures weather commercial banking institutions, or the central bank,
is conducting the intermediation, and the third measures the extent to which
financial institutions channel credit to the private sector; (ii) the second method
attempts to test for causality in a panel context with data averaged over each
of the 5-year intervals covering the entire 1960-1995 period. The study makes
use of generalized method of moments (GMM) dynamic panel estimators that
assumes homogeneity of slope coefficients. Specifically, these estimators address
the econometric problems introduced by country-specific effects, endogeneity
and the standard use of lagged dependent variables in growth regressions. Us-
using panel system estimation procedures to address the causality issue, Levine,
Loayza and Beck (2000) produce consistent findings in that financial develop-
ment exerts a large, causal impact on economic growth. Despite three alter-
native measures of financial development being used, results indicate that the
close relationship between financial intermediary development is positively cor-
related with economic growth. The impact on growth is economically large and
significant.
The study uses two panels that are estimated using GMM. The first addresses possible omitted variable bias as a result of country-specific effect by differencing the regression equation. They next instrument the explanatory variables which are now differenced values of the original regressors using lagged values of the original regressors measured in levels as instruments. This final step removes inconsistency as a result of simultaneity bias, including biases induced by the differenced lagged dependent variables. This difference dynamic-panel estimator has, increasingly been used in empirical studies attempting to identify the evolution of the growth process. However, differenced estimators usually suffer from weak instruments that quite often result in large biases in finite samples leading to poor accuracy even asymptotically. This comes about since lagged values of the regressors appearing in levels of the original regressors quite often make weak instruments for the differenced values of the regressors used in dynamic panel estimation. Here a system estimation procedure is required. One way to mitigate this problem then is in addition to dynamic panel estimation, where lagged levels of the original regressors are used, one simultaneously estimates the original levels equation where the instruments are lagged values of the differenced regressors. This point is discussed by Arellano and Bover (1995). Essentially, as demonstrated by Blundell and Bond (1998), this strategy mitigates the weak instrument problem through system estimation resulting in quite significant improvements in both efficiency and consistency. The poor finite sample properties of standard GMM estimators based on standard orthogonality conditions also can arise in the case of autoregressive panel models with near unit roots. These problems are addressed by Binder, Hsaio and Pesaran (2000) who show that for panel VARs (PVARs) conventional GMM estimators break down when underlying variables contain unit roots. These authors propose a likelihood based estimation and inference approach that mitigates the problems associated with standard GMM estimation. In fact, the panel ML estimator proposed by these authors are shown to be (under conditions when the cross-sectional dimension of the panel approaches infinity) consistent and asymptotically distributed normally, regardless of whether the variables included are $I(1)$, $I(0)$, or cointegrated.

Using similar techniques, Beck, Levine and Loayza (2000), examine whether the level of banking sector development exerts a causal impact on real per capita GDP growth, capital per capita, growth, productivity per capita growth and private savings rates. To assess the long-run impact of the exogenous component of financial development on economic growth and its sources Beck, Levine and Loayza (2000) use cross-section data with data averaged over the period 1960-95 and use the legal origin of countries as instruments. To exploit time series dimension of the data, the authors create a panel data set and use recent dynamic panel techniques as proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). They extend recent industry- and firm-level research by Rajan and Zingales (1998) and Demirguc-Kunt and Maksimovic (1998) that suggests that the level of banking sector development has a large, causal impact on real per capita growth. In particular, they find that higher levels of banking sector development produces faster rates of economic
growth and total factor productivity. These results are robust to alterations in the conditioning information set and to modifications in the measure of banking sector development. Thus, the data are consistent with the Schumpeterian view that the level of banking sector development significantly influences the rate of economic growth by impacting on the pace of productivity growth and technological change. The evidence with physical capital per capita growth and saving is more ambiguous. While there tends to be a positive relationship between banking sector development and both physical capital accumulation and private savings rates, these results are sensitive to alterations in estimation techniques and measures of banking sector development.

Rousseau and Wachtel (2002) take up another variable which impacts the relationship between finance and growth—the inflation rate. Using rolling panel regressions, they find an inflation threshold above which financial development is unable to positively affect economic growth. Below the inflation threshold (13-25%) the relationship between finance and development holds. High inflation can also repress financial intermediation by reducing the effectiveness of money assets and leading to policy decisions that harm the financial structure of an economy. The tests for this study were conducted over 84 countries from 1960-1995 and the study controls for the log of the initial secondary school enrollment rate (as a proxy for human capital investment) and global business cycle conditions. Three measures of financial depth are used, and include the ratio of either M3, M3-M1 or total credit to GDP. Inflation is found to have a strong role in the finance-growth relationship, but seems unrelated to financial deepening, which can pose a problem with the study. Further, there is no inclusion of any exogenous factors which could affect inflation or its affect on the finance-growth nexus. The use of a rolling regression technique helps in illustrating both short term dynamics and long run trends as well as providing insights into the complexities of the role of inflation and finance on growth and in identifying accurate thresholds.

The most conceptually and theoretically solid study to date is probably by Christopoulos and Tsionas (2003), who focus on the long run relationship between finance and growth using panel unit tests. They also use GMM dynamic panel data estimation techniques, using heterogenous cointegrated panels to bring out the short-run dynamics of the relationship, and thereby providing a deeper insight. Finding unidirectional causality from financial depth to economic growth, the authors make sure that the focus is on causality rather than simply cointegration and their use of a multivariate framework adds weight to their argument. However, the fact that only ten countries (all developing) are included in the sample is a drawback, as it can lead to distorted results and lack of a general applicability; as is the fact that once again no exogenous variables are included in the study.

The countries under study are Colombia, Paraguay, Peru, Mexico, Ecuador, Honduras, Kenya, Thailand, Dominican Republic and Jamaica, over the period 1970-2000. The measurement of financial deepening follows the techniques of Luinset and Khan (1999). Three panel cointegration tests are conducted in order to avoid distortions due to the small sample size with the Levin and Lin
(1993), Harris and Tzavalis (1999) and Maddala and Fisher’s test [Maddala and Kim (1998)] and threshold autoregressive models (TAR) are used to test for unit roots. Time-series cointegration tests are then carried out, and the long and short-run relationship testing is carried out via an Error Correction Model. Both time-series and panel tests have therefore been applied to the data, and results clearly indicate a long-run unidirectional causal relationship from finance to growth. Short-run causality is not found. Results of the study contradict Demetriades and Hussein (1996), Luintel and Khan (1999) and Al-Yousif (2002) who all find bi-directional causality (Al-Yousif uses both time-series and panel regressions in his study). Policy implications of this study are thus that government policies should be aimed at long-run planning rather than short-run changes of financial deepening measures are to improve growth.

Similar results are found in studies by Fase and Abma (2003), who use panel procedures to account for long and short-run dynamics for 9 Asian countries. Calderon and Liu (2003) also employ the panel technique but focus on 109 developing and industrial countries. The breadth of their sample provides for a comparison of the effects financial deepening has on developing as opposed to developed countries, and they find that financial development influences growth in developing countries more than in industrialized ones. Traditional time-series Granger and Sims tests, which are used on smaller samples [see, for example: Wachtel and Rousseau (1995), Neusser and Kugler (1996), and Demetriades and Hussein (1996)] are implemented in the form of panel-based analysis through a Geweke decomposition test [Geweke, 1982]. This test measures dependence between variables and thus the paper tests causality specifically focusing on unidirectional (finance to growth), reverse (growth to finance) and instantaneous causality between finance and growth, or bidirectional causality.

The measures for financial development used are broad money to GDP and credits provided by financial intermediaries to the private sector to GDP. This lacks any reference to deposits made by the private sector, as well as capital markets, but still holds for providing a general analysis of financial development and its relationship with broad economic growth. Furthermore, a set of control variables is included in the analysis: initial human capital, initial income level, a measure of government size, black market exchange rate premium, and regional dummies (Latin America, East Asia, and Africa).

The main findings of the paper are that financial development generally leads to growth in all countries studied; bidirectional causality prevails in 87 of the developing countries and 22 of the industrialized countries; financial deepening has relatively more impact in developing countries; the longer the sampling period, the greater the effects of financial deepening on growth; and financial development enhances growth through a higher rate of capital accumulation and technological development. The lack of emphasis on short-run dynamics and their relationship with long-run trends in addition to causality means that short-run changes and important correlations between these and long-run development and growth are missing from the analysis. Furthermore, although the study is multivariate, there is no inclusion of exogenous factors which could influence the finance-growth relationship in both developing and industrialized economies.
such as foreign variables, for example.

Returning to the impact of the financial environment on the finance-growth correlation, Rioja and Valev (2004) examine the influence of the level of financial development on the relationship, and thereby revisit the idea of threshold effect as proposed by Rousseau and Wachtel (2002). Taking a broad sample size of 74 countries, they use the GMM (generalized method of moments) dynamic panel techniques to find support for different regions. Their findings are broadly that in the regions of low financial development, further financial development has an uncertain effect on growth; in the intermediate region the improvement of financial markets has a large, positive effect; and in regions where financial development is already high, the effect remains positive, but is smaller.

As with all panel regressions, the study combines the time-series effects with cross-country analysis, making the study multivariate and between countries (controlling for country specific effects). Further, the GMM technique incorporates the study of both short and long-run dynamics in the relationship between finance and growth. Financial development is measured according to three indicators: private credit, liquid liabilities and commercial vs. central bank (commercial bank assets/(commercial bank+central bank assets)). All control variables used are endogenous, and include initial income per capita, average years of secondary schooling, government size (government spending/GDP), openness to trade ((export+imports)/GDP), the average inflation rate, and the black market premium. Time-dummies are also included in order to separate the three periods. One of the strongest sections of the paper focuses on stock markets and non-bank financial institutions. This analysis helps to clarify why the development of traditional bank-based financial structures does not affect more highly developed economies as much, because market-based external financing actually rises in prominence with financial development. They find that stock markets effectively replace commercial banks in many areas of an economy as development progresses, thereby adding a previously untapped element to the study.

The most recent panel analysis carried out is by Nader Nazmi (2005), and focuses on the deregulation of financial markets. Like Rioja and Valev (2004), this paper also looks into the level of development of an economy's banking sector, but unlike their study, finds that as levels of deregulation and banking sector development (through investment) rise, economic growth speeds up. A narrow sample consisting of only Latin American countries is drawn up: Argentina, Brazil, Chile, Colombia and Mexico; examined over a four decade period from 1960-1995. Five-year periods are tested, so some evidence of short-run dynamics is produced; and this region has been selected specifically because of the widely applied deregulation and structural reforms over a relatively short span of time.

This study also uses GMM dynamic panel estimators and is based on the finding that investment translates into economic growth, with the inclusion of control variables inflation rate, deregulation and government expenditure. Four measures of financial deepening are used, BANK (ratio of deposit banks credit to total credit), LLY (ratio of liquid liabilities to GDP), CREDIT (ratio of bank claims on the private sector relative to the GDP), or FDI (average of BANK,
LLY and CREDIT variables to form an index of financial development). Again, no reference to stock markets is made; and apart from the selection of the sample itself, not much further contribution to the literature is established in terms of the finance-growth debate and/or testing methods.

The surge of empirical papers on the finance-growth analysis using panel and GMM dynamic panel estimators post-Levine, Loayza and Beck (2000) has provided for a whole new approach to the debate. Few papers after 2000 have employed solely cross-sectional or time-series analysis, and most contributions to the literature (methodological and empirical) have come out of panel analysis. There seems to be a consensus on uni-directional causality from financial development to economic growth, although several authors do find strong cases for bi-directional causality. The importance of the selection of measures of financial development, control variables and sample sizes and specifications is therefore highly relevant.

5 Conclusion

While evidence generated from some empirical studies correlating growth with financial development seems compelling, one should treat the conclusions with caution. First, correlations can capture purely contemporaneous relationships (correlations cannot capture dynamics, causal direction, or the relative role of efficiency or the rate of investment). Although King and Levine (1993a) present what seems quite convincing evidence, a finer disaggregation is needed to distinguish the role of alternative markets under the financial umbrella. Second, even in using time series data, parsimonious and significant relationships which also adequately account for possible omitted variable bias and temporal dynamics in economics are rarely found. If they do appear, the relationship often becomes suspect to being prone to picking up something that may not be directly observable - ignored trends in data is one example, especially in the literature testing various convergence hypothesis. Thirdly, we should consider the question in light of the vulnerability and instability of LDC economies in the face of real exogenous supply side disturbances. This idea is very much borne out in the causes of the Latin American economic crisis, as described by Singh (1993). Finally, different sectors in developing countries may have very different institutional arrangements and this could give rise to a number of distortions which prevent the allocation of resources in such a way so that social marginal products in alternative sectors are equalized. This would necessarily call for a closer investigation of the institutional and structural impediments to movements of resources from one region to another or movements on a sectoral level.

Such an analysis could provide important insights. This idea is very much borne out by a survey of the determinants of growth by Stern (1991) who shows that growth theories have emphasized three major related determinants, namely: (i) capital accumulation; (ii) human capital and research; and (iii) development and innovation. Stern further emphasizes that beyond these aggregate determinants, there exist further crucial issues. He argues that the deficiencies of
infrastructure are likely to account for a substantial proportion of low factor productivity in developing countries. For example, it is very difficult, even with adequate financial sources, to efficiently operate business effectively when utility supplies such as electricity and water and not reliable. Telecommunications and transport facilities play a core role in this issue. Infrastructure may also include what Stern (1991) refers to as social infrastructure where a system in which economic agents behave corruptly or where bureaucracy is obstructive, or property rights are biased towards one sector of the economy, may all constitute serious impediments to growth. These weaknesses of management, organization and infrastructure may explain why countries such as India during the 1960s and 1970s did not experience higher growth rates, despite having increased their savings rate.

Such theoretical ambiguities and the lack of any significant empirical reconciliation, may lead one to question the foundations of the financial development/economic growth debate. Moreover, in the context of LDCs, some issues need to be analyzed prior to any programs for financial development: whether financial systems in LDCs provide the grounds for financially stable growth, and what the necessary institutional changes required for such a role to be played are. These questions may be addressed more clearly if we place more emphasis to the role of foreign variables to the growth process in developing countries in general, and newly industrializing economies in particular. For example, several researchers have noted the dramatic change that has taken place via the progressive implementation of the financial deepening programs in East Asia.\footnote{In reference to the Korean economic growth, for instance, Dornbusch and Park (1987, pp. 390) note that: “Korea’s success raises questions not only about how it might be transported to other countries, but how Korea affects and is affected by the industrialised countries, especially the United States”.}

Given this dynamic environment, there could be little doubt that domestic financial development polices are a function of a more complex set of international economic pressures. More obviously, as discussed in the previous sections, given the lack of any empirical study employing a multivariate framework on the impact of financial deepening on growth, such an investigation in the presence of foreign shocks could provide important and interesting insights.

While data limitations in terms of both temporal disaggregation and frequency will hinder efforts and certainly weaken the empirical validity of the results derived, the use of multi-sectoral disaggregated models which apply methods to assess the long-run validity of hypothesis of financial development and growth, and pay respect to appropriate identification restrictions as proposed in Pesaran (1997) may also provide valuable insights. Among other benefits, such a multivariate analysis may unveil the nature of the adjustment processes and the salient features driving the intrinsic instability in the financial sector, as part of a more comprehensive package of exploring alternative regulatory regimes that are compatible with broader financial development and growth objectives.

On the methodological front, studies testing the impact of financial liberalization, involving developing countries, have often adopted approaches that emphasize statistical convenience rather than appropriateness from the perspective
of economic theory. Cointegration and the associated concept of long-run modelling used in the plethora of research already conducted on developed country data sets is a prime example. This approach may be viewed to be almost atheoretical and leads to grave concerns governing the testing of economic relationships prior to paying adequate attention to the implications that are involved. Such implications include the institutional framework of the particular economy under focus, the set of assumptions imposed by economic theory, and whether this is merely an exercise of the methodology fitting the theoretical relationship, or one of harnessing the relationship to fit a specific methodology.

Although the publication of theoretical literature on the subject has slowed down, empirical work on the finance-growth nexus continues to be produced, with often varying methodology, focus, and results. Panel studies are able to combine the cross-sectional attributes of cross-country studies with the country-specific ones of time-series analyses; but although results have shifted towards a weak overall support of unidirectional causation, there is disagreement and highly contradictory arguments and output. This lack of agreement is based largely in the differing samples and sample sizes selected for studies, the number (and nature) of control variables used, and the quantity (and characteristics) of the measures used to define financial development. Consensus on the finance-growth debate is unlikely, but an agreement on how the variation of these factors affects the relationship should provide insight and assistance to the formulation of government policy in both developed and emerging economies.
References


