The Influence and Effects of Financial Development on Economic Growth

An Empirical Approach

Susanne Rislå Andersen

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1 INTRODUCTION

In terms of gross domestic product (GDP), the world as a whole has experienced enormous economic growth over the last 50 years. This growth has allowed real improvements in living conditions for the poor, as the proportion of people living on less than a dollar a day decreased from 29 per cent in 1990 to almost 23 per cent in 1999. Still, there are important inequalities in the world. In 1997, a fifth of the population living in the richest countries owned 86% of the GDP in the world, as opposed to the 1 % of income belonging to the poorest fifth. The ratio in 1960 was 30 to 1 between the richest and the poorest. Today, the total wealth of the 225 richest people in the world is analogous to the annual income of almost half of the world's population (2.5 billion).

Growth has been unevenly distributed, making the income gap between rich and poor even more apparent. Even so, the poorer are not getting poorer and the rich a little richer; the rich are today much richer, and the differences in income can be classified by region. The rich members of the world's population live mainly in Europe and the United States of America. By 1998, two thirds of the richest people in the world lived in one of the OECD countries. Most African and Asian countries have historically been poor or less developed.

At the end of 2003, eleven years remain to achieve the Millennium Development Goals defined by the United Nations.[1] These goals include targets of reducing poverty by 50%, providing primary education for all and significantly reducing the infant mortality rate. Even though the definition of poverty varies, most economists believe that economic growth, mainly defined as an increased income development, is the best way to help the poorest. Still, the observed differences in growth and the resulting income gap warrant an explanation so that policies can be devised to remedy the problem.

Earlier research has suggested several solutions to the problem of increasing economic growth. This study will focus on one suggested remedy. I shall examine empirically the financial sector's influence on economic growth. It has been suggested that a well-functioning financial sector can spur economic growth (Schumpeter, 1912 and Levine, 1997), and this is the background against which this study is undertaken. The financial sector provides positive externalities in several fields which indirectly decrease the poverty level and increase the standard of living. This study will in particular examine the possible effects of financial sector development on income level, i.e. economic growth. Most studies have concluded that the development of a financial system enhances efficiency in the allocation of resources, thus stimulating the growth process. Merton (1991) argues that a financial system provides: (1) a payments system; (2) a mechanism for pooling funds; (3) a way to transfer resources across time and space; (4) a way to manage uncertainty and control risk; (5) price information to allow the economy to implement a decentralised allocation of resources; (6) a way to deal with the asymmetric information problem that arises when one party to a financial transaction has information that the other party does not.

In focusing on the effects of financial development, there are numerous approaches on which the analysis could be based. I will focus on one, and find Levine's procedure to be a good framework for this analysis. His model allows finance to work as a cause of technological progress and capital accumulation which can accelerate economic growth. A well-developed financial sector may increase investments, which again can promote economic growth. Associated with every investment are the costs of completing a transaction. A developed financial sector may decrease transactions costs, as well as credit constraints, conditions which may retard the economic growth in a country. A financial sector which is

[1] The Millennium Goals are determined in the United Nations Millennium declaration of September 2000. http://www.un.org/millennium/.

not functioning well can by its malfunctioning result in low economic activity and growth. The lack of well-functioning financial markets may constrain credit demanded to investments that spur economic growth. This potential 'loan rationing' can have a negative effect as allocated credit is substantial for technological progress and capital accumulation, namely the channels to stimulate economic growth, according to Levine. Thus, Levine's procedure can investigate the effects I am interested in. By using his methods, I can test the relationship and the causality between financial sector development and economic growth. In addition, I will extend his method to test for country specifications and non-linearities in the income levels of the sample.

In short, the subject of my study can briefly be summarised as *'the influence and effects of financial sector development on economic growth'*, and I use an empirical approach to investigate the problem. By identifying such a link between financial sector development and economic growth, and by identifying the channels through which the effects of the financial sector take place, my results will contribute to identifying whether financial sector development may accelerate economic growth.[2]

In my study I use a broad definition of the financial sector. The definition includes financial intermediaries which involve all institutions that meet the definition of a financial enterprise. This comprises economic development corporations owned by governments, cooperative housing societies and investment companies. The definition also includes enterprises which engage directly in intermediation, including those who work in enterprises which undertake activity closely associated with intermediation, such as fund managers and insurance brokers.

I shall therefore test the hypothesis that a positive relationship exists between financial sector development and economic growth. In addition, I test the hypothesis that causality leads from financial sector development to economic growth. Finally, I test the hypothesis that the influence of financial sector development differs as non-linear effects when the sample is separated into groups based on initial income level.

1.1 The construction of the study

The rest of the study is organised in six sections. The next section starts with a review of earlier literature. This section is an introduction to the theories of growth and the relationship between the financial sector development and economic growth. The chapter presents a brief outline of how the subject has been analysed, and the conclusions other authors have reached. In chapter 3 I present the available data set, and I devote particular attention to the choice and definition of each variable. The descriptive and summary statistics are included in chapter 4. In chapter 5 I specify the econometric methods used in the study. The econometric method implies the specification of a hypothesis, and designs an econometric model to estimate the parameters in the selected model. Thus, I present the model based on the hypothesis that a relationship between the financial sector and economic growth exists. The model is specified in accordance with earlier empirical research. Based on the econometrical implementation, I present the results of the econometric analyses chapter 6. The last section, chapter 7, rounds off with a summary of the results and analyses.

[2] The exact variables to measure financial sector development will be explored in chapter 3.

2 LITERATURE

As briefly explored in the last section, the standard of living diverges enormously among the different parts of the world. The best available estimates suggest that an increased average income level is a valid measure of economic growth. The next section is therefore devoted to economic growth theories, and the investigation of several models of growth. In addition, it is a natural step to find or construct a theoretical model to explain the link between financial sector development and economic growth.

2.1 Theories of Economic Growth

In the modern literature on economic growth, Solow (1956) and Swan (1956) are now the basic point of reference in considering a growing population coupled with a more efficient labour force. This direction has dominated the theories of long-run economic growth, and the model is based on a constant return to scale production function.

The Solow model investigates the effects of the division of output between consumption and investment on capital accumulation growth. The direct consequence of this approach is the strong ties between long-run growth rates and demographic factors, such as the growth rate of the population, the structure of the labour force and productivity growth. These factors are all taken to be exogenously determined and are postulated to explain the steady-state level of income per capita. Technology is also assumed to progress at an exogenous rate. Hence, the only policies that can contribute to long-run growth are those that can increase the growth of the population or the efficiency of the labour force. The Solow model focuses therefore on four variables. In the production function, output (Y) is given by capital (K), labour (L) and 'knowledge' or the 'effectiveness of labour' (A). Thus, the standard Solow Cobb-Douglas production function is given by $Y = Ae^{mt}K^{a}L^{1-a}$, $0 < a < 1$. The exogenous rate at which the technology grows is given by e^{m} (Pack, 1994). The function is combined with a fixed saving rate to give a simple equilibrium of the economy.

One of the main arguments we can derive from this literature is the need for technological progress to accomplish sustained economic growth. However, the theory does not explain what causes this technological progress, and technology is therefore seen as an exogenous condition in the model. If we want to determine the behaviour of the economy, the evolution of two of the three inputs in the production output, namely labour and knowledge, is exogenous. The behaviour must therefore be analysed from the third input, capital. Even though the Solow model is a basic reference point, endogenous growth theory provides a review of the model.. The understanding of the mechanisms which encourage growth is an important condition for promoting economic growth processes. An important condition is the fact that knowledge and technology are not developed in a vacuum, but in interaction with physical capital. This is of importance in understanding how growth processes can be stimulated. Another implication of the Solow model is that it indicates that, regardless of the initial per capita stock, all countries will converge to same steady state rate and a similar standard of living 'in the long run'. This is the hypothesis of convergence.

2.1.1 Convergence

Convergence, or the question of whether poor countries tend to grow faster than rich countries, has attracted considerable attention in the work on growth. Due to the diminishing marginal return to capital, countries with low levels of capital stock will have higher marginal

product of capital, and thereby grow faster than those with already high levels of per capita capital stock, given similar saving rates. The Solow model predicts that countries converge to their balanced growth paths and the model expects that the poorer countries catch up with the richer ones. Solow's assumption is that an economy eventually reaches a steady state where per capita output, capital stock, and consumption grow at a common constant rate that is equal to the rate of technological progress.

The strongest prediction in the convergence debate is called *unconditional convergence*, which expects that in *all* countries, capital per efficiency unit of labour converges to the common steady state level and a similar standard of living 'in the long run'. This will happen irrespective of the initial state of each economy. The model implies that an economy with low capital stock per inhabitant in general would have a higher return of capital: hence, a higher yearly growth rate than economies where the capital stock per inhabitant is high. The presence of convergence is determined by a strong negative relationship between growth rates of per capita income and the initial value of per capita income. In the extended model of Barro (1991), there are incentives for capital to flow from rich to poor countries.

However, there have been objections to the prediction of unconditional convergence. The obvious weak link in the prediction is the assumption that across *all* countries, the level and change of technical knowledge, the rate of savings, the population growth rate, and the rate of depreciation are *all* the same. The opponents of the unconditional convergence theory have argued that countries must converge to *their* steady states. The neoclassical growth theory includes the fact that different countries can reach different steady state rates, and there is no need for two countries to converge to each other. This weaker hypothesis leads to the notion of *conditional convergence*. Mankiw, Romer and Weil (1992) have introduced an extended Solow model and they argue that Solow did not predict that all countries would reach the same level of per capita income, but rather their respective steady state.

Conditional convergence is present if the growth rate of per capita income is negative correlated with the initial value of per capita income, conditional on some fixed variables. Different economies can only converge to the same steady state rate if they have the same rate of savings, depreciation rate, population growth and rate of technology. In the literature, Barro (1991) and Mankiw et al. (1992) find support for the theory of conditional convergence.

2.1.2 Endogenous Growth Theory

The basic Solow model serves as a foundation for more sophisticated models. Even though the Solow model is a good framework, new theories have emerged in response to some of the heroic assumptions of the model. The Solow model shows that technological improvement is the only source of continual growth. Therefore, it is important for understanding economic growth to recognise what drives technological progress. This is the starting point of the 'endogenous growth theory'. The endogenous growth theory emerged in the 1980s, where Romer (1986) and Lucas (1988) have been important contributors. This theory distinguishes itself from the neoclassical theory by emphasising that technological progress is an endogenous outcome of an economic system, not the result of forces that impinge from outside. Romer has specified an equilibrium model of endogenous technological change, arguing that long-run growth primarily is driven by accumulation of knowledge. The new direction does not emphasis the concept of convergence, and is based on either constant or increasing returns to scale in capital, postulating a growth in the gap between poor and rich countries. They do not rely on an unexplained source of technical change as the engine of growth, but focus on the existence of a variety of endogenous variables that spur economic growth. Since technology or knowledge improvements can work as a source of continual

growth, the new growth theory includes knowledge and technology as independent factors in their models.

The essence of many of the endogenous growth theories is reflected in an AK-equation (Pack, 1994). In the equation, output is affected by A, factors that affect technology, and K, which includes both human and physical capital. Another interpretation is that K represents the variety or quality of inputs. For example, by using financial variables as endogenous variables to promote technological progress, it is possible to accelerate economic growth. Besides finding new ways in which endogenous technological changes and endogenous variables, like, for example, the development of the financial sector can affect economic growth, the theory revives interest in long-term economic growth.

2.2 Theoretical Literature Including the Effects of Financial Sector Development

There is a growing body of theoretical and empirical literature linking financial sector development and economic growth. The recognition of a significant and positive relationship between financial development and economic growth dates back to Schumpeter (1912), who states that financial markets play an important part in the growth of the real economy. He specifically stresses the role of the banking sector as an accelerator of economic growth due to its role as a financier of productive investments.

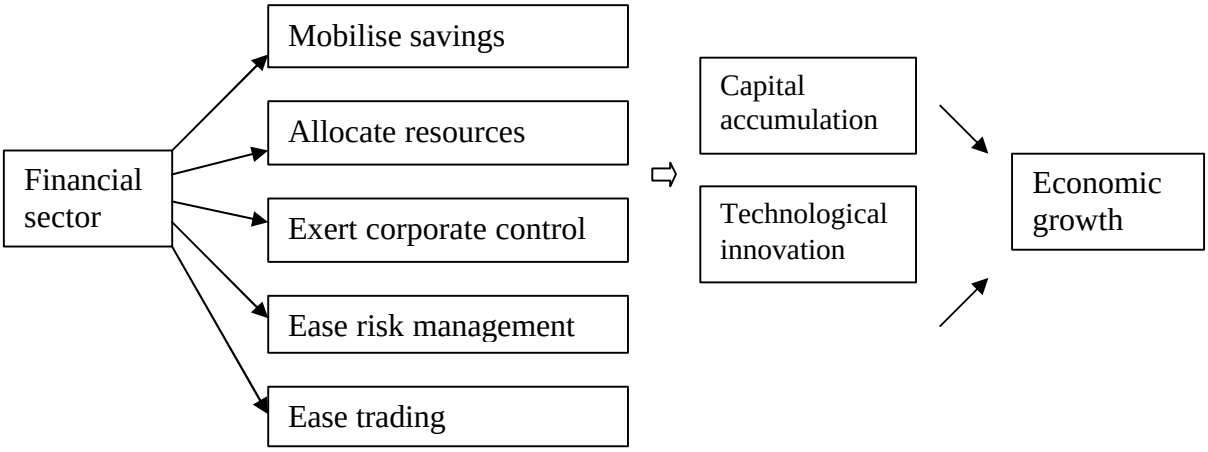
In 1966, Patrick hypothesised two possible relationships between financial development and economic growth: a 'demand-following' approach where financial development arises as the economy develops and a 'supply-leading' phenomenon where the widespread expansion of financial institutions leads to economic growth. However, it was not until the late sixties and early seventies that economists like Goldsmith (1969) and Mckinnon (1973) again turned their attention to the influence of the financial sector, and documented a relationship between financial development and economic growth. Still, most theoretical models concerning this focus have been developed after the introduction of the endogenous growth theory. This theory allows the financial sector to play an important role as it is integral to the provision of funding for capital accumulation, and for the diffusion of new technologies.

Theoretical models have identified a number of channels through which financial integration can promote economic growth, especially in developing countries. A large part of the theoretical literature shows that financial intermediaries can reduce the costs of requiring information about firms and managers, and lower the costs of conducting transactions (see Levine, 1997). Greenwood and Jovanovic (1990) and Levine (1991) have constructed models where efficient financial markets improve the quality of investments to increase the average return and thus accelerate economic growth. Greenwood and Jovanovic have developed a model in which financial intermediation allows agents to diversify risk across a spectrum of risky capital investment. By providing more accurate information about production technologies and exerting corporate control, better financial intermediaries can enhance resource allocation and accelerate growth. The financial intermediaries' prime task is therefore to channel funds to the most profitable investments with the help of collected and analysed information.

Figure 2.1 maps the channels, as argued by Levine (1997), through which the financial sector influences economic growth. The figure illustrates how financial arrangements provide five functions that affect saving and allocation decisions, and how these functions thereby influence economic growth through two channels, namely capital accumulation and technological innovation. Technological progress can also be thought of as just another form

of capital accumulation. In particular, market frictions like information and transaction costs motivate the emergence of a well-developed financial sector.

Figure 2.1: The Channels Financial Sector Influences Economic Growth



The essential argument in Levine is that the financial sector serves one primary function in ameliorating transactions, lowering information costs and alleviating credit constraints. This facilitates the allocation of resources, across space and time, and in an uncertain environment. By effectively mobilising resources for projects and moderate credit constraints, the financial sector may play a crucial role in permitting the adoption of better technologies and thereby encouraging growth. Technology, especially as knowledge, is a common good, a good idea which can be used by many and which will still be as good. Technological improvements can thus enhance economic growth and improve the standard of living in the broad mass.

The meaning of the functions in figure 2.1 can be elaborated on. First of all, without the pooling of individual savings through financial intermediaries, the scale of investment projects is more likely to be constrained below what might be efficient. Investments and thus capital accumulation and technological innovations depend on mobilised savings, which increase with a more developed financial sector. I assume a well-developed financial sector will relax credit constraints in an economy, which may improve the investment rate and accelerate economic development.

The basis for accelerating economic growth is the allocation of resources to new projects. For individual savers, the costs of acquiring and evaluating information on prospective projects can be high, making it more likely that worthy projects will go without funding. Financial intermediaries that specialise in acquiring and evaluating information on potential investment projects enable small investors, for a nominal fee, to locate higher return investments. The improved allocation of savings among investment projects should enhance growth prospects. Innovation relates to the introduction of new products and processes. In addition to allocating resources, an important role of the financial sector in mobilising funds is to evaluate projects and monitor entrepreneurs. The financial sector exerts corporate control and serves in the monitoring of investments to reduce the risk that resources are mismanaged. The establishment of financial institutions that can monitor investments for groups of investors/savers reduces the duplication of monitoring costs that would be incurred if the investors conducted their own monitoring individually. Financial markets and institutions may actually arise to restructure the problems created by the information and transactions frictions.

Diversifying risk occurs when the financial sector provides insurance to individual savers against the individual risk that an investment pays no return. In addition, the liquidity risk is reduced and the possibility if the savers may need to withdraw the investments before return is available. In this way a well-developed financial sector eases risk management by providing the previous services. Households and institutions save and invest independently. The financial sector's role is to intermediate between them and cycle available funds to where they are needed. Savers accumulate claims on financial institutions, which pass these funds to their final users. As an economy develops, this indirect lending by savers to investors becomes more efficient and gradually increases financial assets relative to GDP. This allows increased saving and investment, facilitating and enhancing economic growth. As more specialised savings and financial institutions emerge, more financing instruments become available, spreading risks and reducing costs to liability holders. As securities markets mature, savers can invest their resources directly in financial assets issued by firms.

Meier (1991) suggests that regardless of the developing level of an economy, there will be a need for financial institutions, allowing savings to be invested conveniently and safely, and ensuring that the savings are channelled into the most useful purposes. The poorer a country is, the greater the need is for agencies to collect and invest the savings of the broad mass of people and institutions within its borders. Such agencies will permit small amounts of savings to be handled and invested efficiently, as well as allowing the owners of savings to retain liquidity individually, while long-term investment is financed collectively.

Blackburn and Hung (1996) look especially at the monitoring part of financial intermediaries. Without the intermediates every single investor should individually monitor their projects and the cost increases. If the financial sector is developed, the monitoring task can be delegated to an intermediary. The delegation accelerates economic growth by reducing transition costs and a bigger share of saving can be allocated to investments that create technological innovations. Thus, according to their assumptions a developed financial sector decreases transactions costs, which can retard economic growth.

It is a strong argument that a well-built financial sector exerts a strong impact on economic growth, and financial sector development accelerates economic growth. Since the financial sector serves one primary function, to ameliorate transaction and information costs, and to facilitate the allocation of resources and lower credit constraints, this encourages economic growth. If, for example, the government in a country arranges and encourages development of the financial sector this may more easily influence economic growth. The financial sector can develop by making it easier to establish financial institutions, for example to allow foreign actors to enter and establish financial institutions. Thus, this will be a form of financial sector reform which implements the privatisation and restructuring of banks and an increased entrance of new domestic and foreign participants to the financial sector. There are several advantages and positive externalities of such a liberalisation of the financial system:

- A well-developed financial sector can be seen as well-offered financial services, which may offer more competition, with all the positive externalities increased competition brings along. More competition tends to be more efficient and offers advantages such as lower prices, higher quality services and higher productivity (Eschenbach and Francois, 2002). When foreign banks are permitted in the domestic market, interest rates and bank taxes can be lowered and credit constraints decreased, which opens the market for several actors.
- An increased financial services sector can result in higher employment, and thereby have a positive growth influence. As well as more openness and predictability, it offers higher stability, and it is easier to forecast and plan the future.

The theories mentioned above cover the main views in the theoretical finance-growth debate. Financial sector development exerts a positive influence on economic growth, by suggesting a link where financial development can affect economic growth. Several theoretical papers support Levine (1997), so I find the link illustrated in figure 2.1 to be a representative framework to test my hypotheses, in addition to the preceding analyses.

2.3 Empirical Background

Since the early 1990s, there has been a growing amount of empirical evidence to support the view that financial sector development can reduce income inequality: directly through widening access for the poor to financial services, and indirectly through the impact of financial development-led growth. Most empirical studies on finance-growth lean towards the supply-leading relationship hypothesised by Patrick (1966), as prior savings are seen to help the accumulation process. Appendix 1 gives an index over some of the earlier empirical works, specified by authors, data sets, variables, methods and results. In the next section, I discuss some of the most important empirical results.

Levine (1997) has been central to most of the recent literature on the finance-growth link, so to discuss Levine's article is therefore a natural starting-point. This article is an extension of King and Levine's (1993) article, where they test the financial development predicted of long-run growth over the 1960-1989 period for a selection of 80 countries. Levine (1997) includes in his article 77 countries over the same time period.

Growth in Gross Domestic Product (GDP) per capita is the most commonly used measure of economic growth. Yet, Levine (1997) uses three different indicators for growth: 1) the average rate of real per capita GDP growth; 2) the average rate of growth in the capital stock per person and 3) total productivity growth. However, he finds GDP per capita growth to be the most useful for investigating economic growth. The measures for financial development differ more from study to study. Levine introduces four main indicators of financial development. These variables are liquid liabilities, claims on the non-financial sector, claims on the private sector and deposit bank domestic credit compared to central bank domestic credit. These are supposed to represent the size and the activity of the financial sector. Levine also runs regressions including other explanatory variables like log of initial income, school enrolment rate, inflation, and ratio of exports and imports to GDP.

Levine's findings indicate a substantial role for the financial sector in economic growth. His major contribution is the framework of the functions through which financial development can be channelled into economic growth. He states that evidence indirectly suggests that countries with financial institutions which are effective at relieving information barriers will promote faster economic growth through more investment than countries with less effective financial systems.

The significant relationship is also stated by Levine et al. (2002) and the positive influence of the financial sector is supported by Choe and Moose (1999) in the country specific study of South Korea. They conclude that, by using GDP to measure economic growth and the household sector's and the business sector's holdings of securities and the growth of the business sector's loans as financial variables, that financial development leads to real growth. They also find, despite the measures of capital market liberalisation, financial intermediaries to be more important than the capital markets in this cause and effect relationship.

Allen and Ndikumana (2000) investigate the role of financial development in stimulating economic growth in the Southern Africa Development Community (SADC), including roughly half of the Sub-Saharan countries. They investigate the financial sector's role in explaining disparities in economic outcomes in the region. They find some evidence

for a positive correlation between financial development and the growth of real GDP per capita. The size of the financial sector, in particular liquid liabilities, seems to be a vital financial indicator of positive influence on economic growth. Even though their findings are interesting, the study only includes a narrow selection of countries. It is therefore worthwhile extending their sample, to see if the positive correlations are valid in a broader selection of countries.

As appendix 1 shows, the methods and variables in the different empirical studies vary. Still, the findings of the numerous empirical studies provide useful information on indicators expressing the link between financial sector development and economic growth. In most of the earlier work, GDP per capita has been used to measured economic growth, while the measures of the financial development sector vary. I find Levine's (1997) choice of variables useful as these variables express both size and activity of financial sector development. The motivation for the choice of variables will, however, be extended in the next section. Still, the main conclusion is that most empirical findings support the theories, and financial sector development has been found to be a good accelerator of growth.

2.4 Causality

Former research has found a positive correlation between development of the financial sector and economic growth, but there have been discussions about the *causality* of the finance-growth link. Does economic growth arise as a consequence of an improved financial sector, or does the financial sector ameliorate and develop because of economic growth?

Figure 2.2 Causality

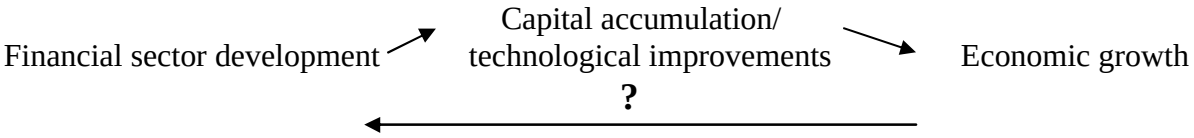


Figure 2.2 illustrates the link between finance and growth, and asks whether the causality runs from financial development to economic growth by capital accumulation or technological improvements, or whether financial development is caused by economic growth.

Research utilising cross-sectional data tends to find a causal relationship from financial sector development to economic growth. King and Levine (1993) conclude that higher levels of financial development are significantly and robustly correlated with faster current and future rates of economic growth, physical capital accumulation and economic efficiency improvements. They state that the relationship between economic growth and financial development is not just a contemporaneous correlation, but also that finance seems important to economic growth. However, if the answer to the latter question, whether economic growth develops the financial sector, is assumed to be yes, the vehicles of growth must be sought elsewhere. Although King and Levine (1993) and Rousseau and Wachtel (1998) show that the level of financial development is a good predictor of economic growth, these results do not settle the issue of causality, since they only study 'simultaneous' growth by using average levels of financial development.

Jung (1986) has investigated the causality problem and he finds that financial sector development have a bi-directional relationship. In his study of 56 countries he finds that the causal direction running from financial development to economic growth is more frequently

observed than the reverse when he runs regressions between GDP per capita and the proxies of financial development. Interestingly, Jung finds that less developed countries are characterised by a causal direction running from financial to economic development, while developed countries are often characterised by a reverse causal direction. Demetriades and Hussain (1996), however, find from their causality tests that the results were more country specific and do not therefore fully accept the view that 'finance leads growth' or that 'finance follows growth'. Note that they include only 16 countries, and they use two quite similar variables, bank claims and bank liabilities, as financial indicators.

The causality issue was included in the second hypothesis introduced in chapter 1. This hypothesis is important, as a possible causal direction going from financial development will also support a possible link between finance and growth. Causality has been investigated earlier, but most empirical studies only include a small sample of countries. I intend to include a broader sample so as to explore the differences between developed and developing countries. Thus, I will in this study examine the causality problem and test whether financial development accelerates growth by applying initial values of the explanatory variables.

2.5 Concluding Remarks

An important condition required to promote economic growth processes is an understanding of the mechanisms which encourage growth. These mechanisms are the core of economic growth theory. This study will account for some of these mechanisms and the aim is to see if financial sector development can be one of the instruments.

The theoretical view of a positive influence from the financial sector on economic growth has found broad support in empirical literature. However, substantial changes have taken place in the world economy over the last fifteen years. In particular, many of the less developed countries have moved directly from dependence on a primary economy to depending on the service sector. This adjustment requires, among other things, a more developed financial sector allocating resources. To assess the impact of financial development on growth, my research has the advantage of having access to more recent data, in longer time intervals and using a larger selection of countries, compared to previous studies.

I use Levine (1997) as a framework for my study. Figure 2.1 is essential in my approach to identifying a possible relationship between financial sector development and economic growth, as the figure emphasises the functions of the financial sectors' ability to accelerate growth. In contrast to Levine's paper, the dataset includes as mentioned a larger number of developing countries, observed for a longer and more recent time period. My paper is an update of Levine, in addition to extending his article to explore how financial development may have different effects in developing versus industrialised countries, and to checking for non-linearities between the economies.

I also use the fact that most empirical studies seem to have found a positive relation between finance and growth. Thus, the hypotheses are formed on expectations based on a positive correlation between finance and growth. My database is also used by Allen and Ndikumana (2000). However, they include only a small sample of countries in their regressions. A more diverse selection of countries, such as mine, may help to identify patterns between financial sector development and economic growth in different countries. A diverse sample is an important advantage in the ability to compare different regions and explore inequalities. The differences between countries are of special interest, so including only a small sample would not illustrate whether the financial sector can influence growth differently in rich countries compared to poor countries.

Neoclassical theory can be viewed as implying convergence across countries in either growth rates or income levels. In contrast, endogenous growth theory implies the possibility

of sustained differences in both levels and rates of growth of national income. I have also emphasised the issue of convergence, both the conditional and unconditional. The theory of conditional convergence has emerged as a 'compromise' between the neoclassical tradition and the new endogenous growth theories. Despite the absence of specific empirical confirmation, endogenous growth theory has the advantage of attempting to explain the forces that give rise to technological changes, rather than the assumption of neoclassical theory that such change is exogenous. With a production function of the form $Y = k^a (A_i e^{gt} L)^{1-a}$, where the steady state of capital intensity, k, can be expressed as: $k^* = (\frac{A_i^* s}{n+g+d})^{\frac{1}{1-a}}$, I can in my study explore the effects the financial sector may have on A as an explanatory variable for driving economic growth. The steady state rate will depend on A, which is knowledge and the efficiency of the labour force. There is in steady state no growth in GDP per capita, unless, as extended earlier, we have technological progress which may lead to a permanent growth in output per capita. This study expects financial sector variables to work as endogenous explanations for technological progress and capital accumulation, thus as sources of economic growth. Hence, the study will be in line with endogenous growth theory.

3. DATA

In this chapter I describe the data set employed in the empirical analyses. I also provide the rationale for the selection of variables. These variables are the ones I find useful to present financial sector development and economic growth.

3.1 Data Set

This study is based on a data set collected from the 'World Development Indicators' (WDI) 2001, World Bank. My data set consists of a cross-section of countries observed in a series of years, so the data set refers to an unbalanced panel of 60 countries observed from 1965 to 1999. A detailed list of countries is presented in table 3.1, and the variables I work with are summarised in appendix 2. All countries from the WDI database for which data is reliable and there are a sufficient number of observations over the years have been included. I want to see the finance-growth link in a global perspective, so I prefer a broad selection of countries. By including countries from all regions and income groups, I am able to address a representative random selection for all the countries in the world.

3.1.1 Time Span

The time span in the sample covers all the years from 1965 through to 1999. I have chosen 1965 to be the initial year, as this is the first year with a sufficient number of observations. I will later in the analysis, use the variables measured in the initial year to test the causality. Due to these causality problems, countries with missing observations in the initial year 1965 are not included. Thus, every country in the remaining sample has initial observations of all included variables.

3.1.2 Selection of Countries

The considerable amount of unregistered data moderates the sample, although to a random sample for the diversity and inequality in the world economy. Excluded countries are those with a population of less than 1.5 million and with a variation in annual GDP of more than 20 percent, as a very high variation in annual GDP could result in unreliable data. A large variance can be a sign of inconsistency in statistical methods applied over years, or it can depict a real situation due to war etc. Additionally, countries with few observations and short time series, such as the newly established states of the former Soviet Union, are excluded. As I prefer to analyse the possible influence from financial development on economic growth over a longer period, the newly established countries are not qualified to remain in the sample. Data for some variables are very defective for all the countries in the sample. Despite the lack of some observations, these countries are included, as an examination of the total sample can explore whether the relationship between the variables has changed over the years. 60 countries were found to meet the listed criteria, and I have in addition by using the criteria, achieved a sample where the countries have a certain size, have a fairly stable annual GDP growth and a long time series of observed variables.

3.2 Grouping by Income

The 60 countries included in the sample are presented in table 3.1. Similar to the WDI database, this table groups the countries by Gross National Income (GNI) per capita in 1999. The countries are representative for the world as all income groups and regions are included.

Table 3.1 Countries included in the regressions, by regions and income[3]

Income group	Subgroup	Sub-Saharan East and Southern Africa	Sub-Saharan West Africa	Australia & East Asia and Pacific	Asia South Asia	Middle East & America Middle East	America North Africa	America North & South America
Low Income		Burundi Congo, Dem. Madagascar Malawi Rwanda Zambia	Benin Burkina Faso Cameroon Chad Congo, Rep. Côte d'Ivoire Ghana Mauritania Niger Nigeria Senegal Togo	Indonesia	Pakistan			Haiti Nicaragua
Middle Income	Lower			Philippines Thailand	Sri Lanka		Egypt Tunisia	Bolivia Colombia Costa Rica Dominican Ecuador Guatemala Honduras Jamaica Paraguay Peru El Salvador
	Upper	South Africa		Malaysia				Argentina Chile Mexico Uruguay
High Income	OECD			Australia Japan New Zealand		Austria Denmark Finland France Greece Italy Netherlands Norway Sweden Switzerland		Canada
	Non-OECD						Israel	
Total	**60**	7	12	7	2	10	1	2	18

[3] According to the definitions and grouping applied in WDI (2001).

Dividing the country selection into respective income groups can reveal systematic differences between groups, especially in relation to the location and initial wealth link. Thus, income can represent an individual heterogeneity in the data set.

Table 3.1 illustrates how some regions are over- or in other cases under-represented by a specific income group. For example, most low income countries are located in Sub-Saharan Africa, and the European countries included are all high income countries. Africa, Southern America and Western Europe are the regions with the highest frequency in the sample. Compared to earlier research, this study includes a larger number of low income countries and a broader representation of the world.

However, I find it more useful to split the sample by initial income, i.e. Gross Domestic Product (GDP) per capita in 1965 and to use GDP per capita as a measure of economic growth, compared to GNI per capita. The latter approach provided a classification where the observed number of countries was unequal in each category. When I use initial income I find quartiles more appropriate to employ, rather than using an unequal distribution of countries. One reason for the different method of grouping countries is to avoid selection problems and sample bias. By using the initial year, it is difficult to find the appropriate income limits to split the sample into. To avoid the problem of using the wrong income limits for the different groups, quartiles are more fitting to use, where each group contains 25 % of the countries in the sample. Thus, the grouping applied will be:

Table 3.2 Quartiles

Group	Countries with a GDP per capita level	Number of countries in each group
Very Poor group	< US$ 453	15
Poor group	US$ 453 - US$ 900	15
Rich group	US$ 900 - US$ 6000	15
Very Rich group	> US$ 6000	15

GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant U.S. dollars.

Table 3.3 Countries included in the regressions, by quartiles

Quartiles	Countries					Obs
Very Poor	Benin	Chad	Haiti	Niger	Togo	15
	Burkina Faso	Congo, D.R	Madagascar	Nigeria	Zambia	
25 % poorest	Burundi	Ghana	Malawi	Rwanda	Nicaragua	
Poor	Algeria	Congo, Rep	Guatemala	Mauritania	Philippines	15
	Bolivia	Cote d'Ivoire	Honduras	Egypt	Senegal	
	Cameroon	Ecuador	Indonesia	Pakistan	Sri Lanka	
Rich	Argentina	Costa Rica	Jamaica	Paraguay	Thailand	
	Chile	Dominican Rep.	Malaysia	Peru	Tunisia	15
	Colombia	El Salvador	Mexico	South Africa	Uruguay	
Very Rich	Australia	Finland	Israel	Netherlands	Sweden	
	Austria	France	Italy	New Zealand	Switzerland15	15
25 % richest	Denmark	Greece	Japan	Norway	Canada	
Total						60

Thus, the quartiles may be used as an indicator of homogeneity. I will in the further analysis be able to refer to 4 groups with a more or less homogenous sample in each. These groups can than be compared to each other, to explore the inequalities and non-linearities among the countries, and how financial sector development may influence differently in the sample. An initial sample split is also advantageous to avoid possible endogenous problems. By 1999, there is a possibility that the financial indicators may have already influenced the income level, and the groupings are affected by financial development. As my aim is to see whether financial variables may affect economic growth, it is therefore more convenient to split the sample before the indicators may have become endogenous variables. The following analyses will refer to the groups of countries listed in table 3.3, by using the descriptions Very Poor, Poor, Rich and Very Rich group.

3.3 Measures of Economic Growth and Financial Development

Economists have attempted to explain economic growth in terms of a number of economic and institutional variables. In this study, the selection of variables to be tested is based on previous work referred to in chapter 2. I assume the variables representing financial sector development may be explanatory variables for economic growth. A financial sector development involves a progress in the variables representing the financial sector. The selected variables measure the activity and the size of the financial sector. In the finance-growth link, the growth rate of GDP per capita is applied to measure economic growth. Control variables have also been included to control for the effect of financial development indicators to accelerate economic growth, and as a robustness test of the influence of the financial variables. The set of controls variables includes proxies for initial conditions, measures of macroeconomic stability and indicators of trade openness. Previous studies have shown that these variables correlate significantly with GDP growth.

3.3.1 Indicators to Denominate Economic Growth

I am ultimately interested in economic growth and in assessing the relationship between economic growth and financial sector development, so the growth indicator in this study reflects the income level. Thus, the indicator for economic development is the annual average growth rate for GDP per capita over the period 1965-1999.

By following earlier empirical studies (see Levine, 1997), the *GDP per capita* variable has been found to be a valid measure to reflect economic growth and changes in the standard of living. GDP per capita is gross domestic product divided by midyear population. It is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Later in the analysis, I construct the constant GDP per capita variable from the WDI database to measure annual average growth rate in GDP per capita, and I use this indicator to obtain a general picture of economic growth. The indicator is a measure of output, as well as income level and the average standard of living, and an increased income level can reflect a reduced poverty level. It is also one of the best measures to estimate inequality and it is a measure to see the effects of financial development. This study equals a higher level of GDP per capita with a higher income level and an improved standard of living.

3.3.2 Financial Development Indicators

I apply indicators of financial sector development previously suggested to influence economic growth. I have chosen three indicators which I find useful to represent and to investigate financial sector development as determinants of growth. These three financial variables measure the size and activity of the financial sector, as well as the development of the banking sector. They can, as illustrated in figure 2.1, improve the conditions for investment, capital accumulation and technological innovation by channelling resources and providing insurance against risk, and thereby increase economic growth. Thus, the financial indicators represent endogenous variables influencing growth.

The first financial indicator, *liquid liabilities*, is included to measure the size of the financial sector (Levine, 1997). The hypothesis is that the size of the financial sector is positively related to the provision of financial services. The financial sector evolves to channel savings into long-term assets that are more productive than short-term assets, as the financial sector facilitates portfolio diversification for savers and investors. Development of the financial sector offers more choices to the investors, allowing them to allocate resources to more productive activities. An increase in the size of the financial sector would, according to these arguments, provide a better framework for the channelling from financial development leading to economic growth. The variable liquid liabilities equals M3, which is measured in the WDI database as the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers' cheques, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents. I will define the variable as a share of GDP.

The variable *credit to private sector* includes financial resources provided to the private sector, such as loans, purchases of non-equity securities, and trade credits and other accounts receivable that establish a claim for repayment. The volume of credit to the private sector serves as an indicator of the functioning of the financial intermediaries or sector, and a rise in credit to private interests can be an indicator of financial sector development (Levine et al., 2000). With a more developed financial sector, it has been argued that the intermediaries will mobilise savings and allocate resources, and higher provided credit will state the reason for this. Thus, an increase in private credit is expected to exert a positive influence on economic growth. Credit to the private sector will increase the money supply in the market. An increased money supply may enlarge domestic inflation and money demand, but it will almost certainly influence real output as well. The increased money supply will most likely have the strongest effect in poor countries, as decreased credit constraints will increase the total money supply more relative to the supply in rich countries.

As with the previous variables, the volume of *credit provided by banks* can be an indicator of financial sector development. Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available. Domestic credit provided by the banking sector is also a measure of the development level of the banking system since it reflects the extent to which savings are liquid. This type of credit has the advantage of easing risk management in contrast to the informal financial system that has dominated in low income countries (Allen and Ndikumana, 2002). A high level of credit provided by banks helps to distribute funds to new projects and increase the level of technological innovation, and the possibility of expansion and technological innovation would increase real output.

Both the credit indicators can be regarded as *measures of the activity of the financial sector*, and are measured as share of GDP. The assumption underlying these measures is that financial systems that allocate more credit to private firms are more engaged in research, exerting corporate control, providing risk management services, mobilising savings and facilitating transactions than financial systems that simply funnel credit to the government or state-owned enterprises.

3.3.3 Control Variables

To assess the strength of an independent link between financial development and the growth variables, I use various conditioning information to control for other factors associated with economic development. These control variables are included to capture convergence effects, schooling (human capital investment) and effects of trade as the degree of openness of an economy, inflation and government consumption. Initial conditions are proxy by the level of real GDP per capita and secondary school enrolment. Indicator of external openness is the ratio of export plus import over GDP and measures of macroeconomic stability are the ratio of government consumption to GDP and the level of inflation rate. The control variables are meant to exclude conditions that might influence the results and to control for the effect of financial development on economic growth. In addition, the control variables are included due to misspecification due to omitted variables biases. I want to test the separate influence from financial sector development, and the control variables below are the variables most likely to increase or decrease the pure effects of financial development. There are many more control variables one can think of; however, the selected variables measure some of the indicators most likely to influence the effects of financial sector development on economic growth.

Secondary school enrolment is a measure of human capital investment. Secondary education completes the provision of basic education that began at primary level. Growth theory suggests a positive relationship between education and economic growth (see Barro, 1991). Human capital investment is the framework for lifelong learning and human development, by offering more subject or skill oriented instruction, using more specialized teachers. A more skilled population can make a foundation for economic growth, since higher educational standards can promote technological innovation. Nelson and Phelps (1966) argue that education increases the ability of individuals to deal with rapid changes in knowledge, and the improvement in technology is a channel to growth. Secondary school enrolment can therefore be used as a control variable for economic growth. A growth in the financial sector raises demands for skilled labour. Thus growth may be delayed by a low educational level.

Trade is often used as a measure of the openness of a country; it is the sum of imports and exports of all goods and market services. This openness variable has been found to have a positive effect on economic growth in the study of Allen and Ndikumana (2000). Exports may positively affect growth if they increase the market for domestic products. Imports can affect growth if the imports are associated with capital goods. More open economies are thought to have better access to technology developed worldwide. In sum, GDP growth is favoured by external openness. Endogenous growth models emphasising the role of international trade suggest that high productivity growth is possible in initially poor countries as a result of the diffusion of knowledge already available in industrial countries (Pack, 1994). However, it can also affect growth adversely. A country which is highly trade dependent on another country may be negatively influenced by diminishing growth in the other country. The net effects can only be determined empirically. Thus, without including this variable the financial coefficient might give a wrong picture of the finance-growth link, taking the influence of trade into account.

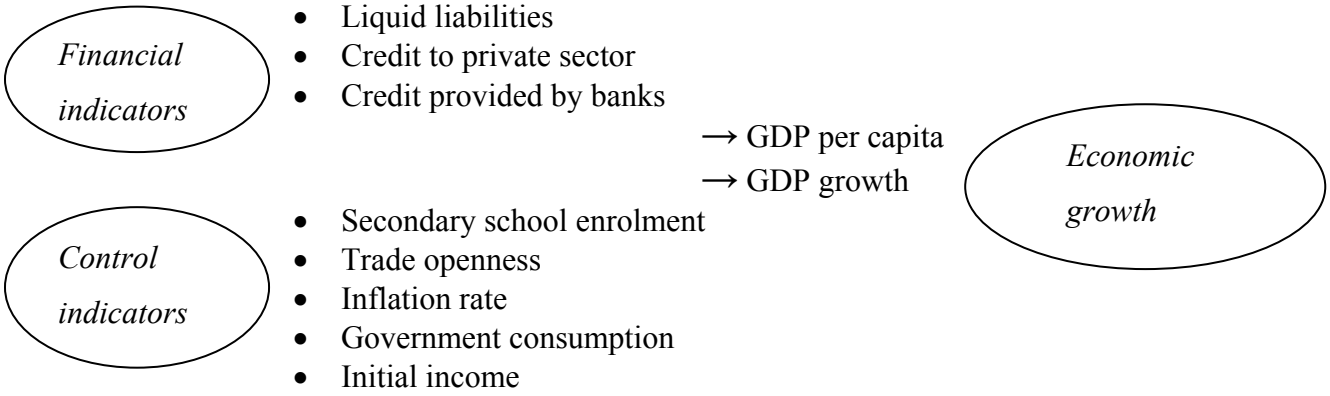
Previous studies have shown that the selected measures of macroeconomic instability correlate significantly with GDP growth (Barro and Sala-i-Martin, 1992). Earlier research has found the *inflation rate* to be detrimental to long run economic growth. Even though there is no consistent relationship between the level of output and inflation, there are indications of a connection between high inflation rates and low economic growth rates. High inflation is associated with uncertainty and thereby low investment, low savings and thus low GDP per capita growth. It is useful to include the inflation rate as a control variable, as the financial coefficient might have a lower influence on economic growth if the inflation effect is not separately measured in the regressions.

High *government consumption* can reduce and increase economic growth in various ways, as it includes expenditure for the purchase of goods and services. It may crowd out private investment and inflationary pressures due to monetary financing of fiscal deficits. However, I assume the effect of government consumption to be positive since it can increase domestic demand and improve investments. Thus, without separately including government consumption, financial indicators may incorporate this effect and exert a higher influence on economic growth.

I include a variable to control for initial income and thereby capture the convergence effect highlighted by Barro and Sala-i-Martin (1992*). Initial income* is represented by the log of GDP per capita in the first year of the respective time period; the start of my period. It is included to check whether the countries converge to their balanced growth paths. There has been some tendency for initially rich countries to grow more slowly than countries that are initially poor. Previous growth regressions have shown that this convergence effect appears only after controlling for other effects, in what is referred to as the conditional convergence.

Thus, growth results based on a regression without control variables may include the financial indicator effects, giving an incorrect picture of the actual influence of the financial sector development.

Figure 3.1 Illustration of the Link between the Selected Variables



4 DESCRIPTIVE ANALYSIS

The following descriptive analysis provides an outline of the relationship between growth indicators and financial variables. The information gives us a general idea of the development in the economy and an impression of how variations by income identify and affect the development of countries.

4.1 Summary Statistics

In table 4.1, each variable in the summary statistic includes one observation for each of the 60 countries in the selected sample. The variables are either measured as an average over the period from 1965 to 1999, or in the initial year 1965. Table 4.1 includes summary statistics of annual GDP per capita growth, the financial variables, liquid liabilities, credit provided to the private sector and credit provided by banks and the control variables. Table 4.2 provides summary statistics of the same variables, but they are specified for each of the countries.

Table 4.1 Summary Statistics

Variable	Min	25 %	Mean	75 %	Max	St. dev	obs
Annual GDP growth	-0.031	0.004	0.013	0.025	0.048	0.017	60
Log GDP in 1965	4.684	5.998	6.79	8.364	10.338	1.505	60
Liquid liabilities	0.117	0.220	0.384	0.509	1.445	0.257	60
Liquid liabilities in 1965	0.041	0.122	0.262	0.345	1.01	0.2	60
Credit to private	0.024	0.163	0.347	0.439	1.465	0.285	60
Credit to private in 1965	0.011	0.068	0.215	0.241	1.005	0.203	60
Credit by banks	0.097	0.244	0.481	0.602	1.960	0.352	60
Credit by banks in 1965	-0.061	0.117	0.292	0.412	1.16	0.259	60
Log school in 1965	0	1.701	2.673	3.748	4.418	1.257	60
Inflation	3.545	6.339	62.70	19.928	1093.84	186.36	60
Inflation in 1965	-2.324	1.074	9.915	6.039	229.24	30.761	60
Trade	0.120	0.404	0.605	0.784	1.198	0.276	60
Trade in 1965	0.078	0.284	0.532	0.743	1.868	0.359	60
Government consumption	0.069	0.106	0.143	0.167	0.329	0.054	60
Government consumption 65	0.04	0.081	0.133	0.177	0.331	0.065	60

The number of observations, the mean and standard deviation are depicted in table 4.1. In addition, each variable specified is with its lowest rate '*min*', the highest rate '*max*', as well as the ratio to the 25 % poorest countries and the ratio to the 25 % richest countries; '75%'.

The table shows some dispersion in the sample. There is a difference in annual GDP growth of 0.048 - (-0.031) = 0.079 between the fastest and slowest growing group. There is also a substantial spread between the slowest and the fastest growing groups in the financial variables. The largest gap in the financial indicators is the level of credit provided by banks.

Some variables have considerable cross-country variations (see table 4.2), and the variations seem to increase with income. It is of interest to characterise the dispersion of the values that occur in the simple. The averages of all the financial variables are higher in the Very Rich group compared to the other groups, and table 4.2 indicates that countries in the Very Poor group are falling behind. Japan has the highest average ratio of private credit and bank credit, with a level at 1.48 and 1.99 respectively. The Democratic Republic of Congo has the lowest rate of private credit at a 0.02 level. Burkina Faso has only a share of GDP at 0.09 % of bank credit.

Table 4.2 Summary Statistics of the Financial Variables for Each Country in the Sample

Countries	Average of Private	Initial Private	Average of M3	Initial M3	Average of Bank	Initial Bank	GDP per cap 65	GDP per cap 99	Annual GDP growth
Argentina	0.19	0.1	0.21	0.16	0.31	0.16	6048	8100	0.01
Australia	0.38	0.22	0.46	0.48	0.52	0.45	11286	23554	0.02
Austria	0.69	0.39	0.62	0.5	0.89	0.45	12695	31550	0.03
Canada	0.62	0.23	0.64	0.35	0.71	0.32	10826	19733	0.02
Denmark	0.45	0.47	0.51	0.46	0.53	0.48	20266	37308	0.02
Finland	0.56	0.39	0.47	0.4	0.55	0.41	12172	30355	0.03
France	0.82	0.52	0.68	0.55	0.94	0.66	13156	28959	0.03
Israel	0.52	0.2	0.69	0.35	0.97	0.23	6916	16438	0.03
Italy	0.61	0.56	0.81	0.73	0.93	0.71	8249	20174	0.03
Japan	1.48	0.81	1.46	0.77	1.99	0.88	12226	42318	0.04
Netherlands	0.74	0.44	0.68	0.54	1.08	0.86	14187	30135	0.02
New Zealand	0.39	0.14	0.61	0.55	0.44	0.18	12153	17210	0.01
Norway	0.62	0.51	0.53	0.48	0.77	0.64	13574	37142	0.03
Sweden	0.87	0.59	0.54	0.54	1.06	0.74	16668	29866	0.02
Switzerland	1.26	1.01	1.27	1.01	1.39	1.16	30902	45496	0.01
Average Very Rich	0.69	0.44	0.68	0.52	0.87	0.55	13421	27889	0.03
Algeria	0.36	0.18	0.62	0.34	0.62	0.32	1087	1569	0.01
Bolivia	0.21	0.05	0.23	0.1	0.28	0.13	938	956	0.01
Chile	0.38	0.1	0.3	0.11	0.58	0.21	2092	5121	0.03
Colombia	0.27	0.21	0.25	0.22	0.32	0.32	1192	2261	0.02
Costa Rica	0.18	0.24	0.28	0.16	0.27	0.26	2030	3994	0.02
El Salvador	0.27	0.2	0.31	0.2	0.36	0.21	1562	1752	0.02
Greece	0.36	0.24	0.54	0.3	0.76	0.37	4829	12652	0.03
Guatemala	0.15	0.13	0.23	0.17	0.2	0.15	1041	1545	0.01
Jamaica	0.28	0.18	0.43	0.24	0.43	0.2	1613	1691	0.01
Malaysia	0.59	0.11	0.74	0.27	0.74	0.12	1165	4526	0.05
Mexico	0.23	0.24	0.28	0.26	0.44	0.32	1988	3613	0.02
Paraguay	0.19	0.11	0.22	0.13	0.22	0.16	971	1727	0.02
Peru	0.15	0.16	0.22	0.21	0.23	0.21	2189	2346	0.02
South Africa	0.76	0.69	0.51	0.6	0.98	0.9	3450	3904	0.01
Uruguay	0.3	0.33	0.38	0.34	0.4	0.4	3818	6208	0.02
Average Rich	0.31	0.21	0.37	0.24	0.45	0.28	1998	3591	0.02
Cameroon	0.2	0.14	0.18	0.12	0.21	0.1	533	656	0.01
Congo, Rep	0.17	0.2	0.17	0.16	0.23	0.17	584	840	0.02
Cote d'Ivoire	0.31	0.2	0.28	0.22	0.34	0.17	711	787	0.02
Dominican Rep.	0.25	0.08	0.25	0.22	0.35	0.24	659	1916	0.03
Ecuador	0.23	0.2	0.24	0.16	0.27	0.24	822	1419	0.02
Egypt, A.R	0.25	0.18	0.66	0.36	0.81	0.5	456	1190	0.02
Ghana	0.05	0.09	0.19	0.2	0.25	0.24	453	410	-0.03
Haiti	0.12	0.04	0.25	0.1	0.29	0.13	510	371	-0.01
Honduras	0.28	0.13	0.27	0.17	0.34	0.2	555	689	0.01
Nicaragua	0.3	0.18	0.32	0.17	0.78	0.18	893	472	-0.02
Philippines	0.33	0.24	0.33	0.23	0.44	0.33	790	1138	0.01
Senegal	0.26	0.17	0.23	0.15	0.31	0.14	650	591	-0.02
Thailand	0.57	0.14	0.53	0.25	0.67	0.13	568	2717	0.05
Tunisia	0.5	0.29	0.45	0.32	0.59	0.43	886	2390	0.03
Zambia	0.13	0.06	0.29	0.2	0.44	-0.06	752	389	-0.01
Average Poor	0.26	0.16	0.31	0.20	0.42	0.21	655	1065	0.01
Benin	0.17	0,06	0.2	0.09	0.17	0.07	361	402	0.03
Burkina Faso	0.11	0.04	0.16	0.08	0.1	0.05	178	267	0.01
Burundi	0.09	0.03	0.15	0.11	0.17	0.04	127	143	0.01
Chad	0.1	0.06	0.12	0.07	0.13	0.06	274	218	-0.04
Congo, D.R	0.02	0.01	0.12	0.1	0.11	0.12	230	112	-0.03
Indonesia	0.23	0.04	0.23	0.11	0.25	0.71	247	962	0.05
Madagascar	0.16	0.15	0.2	0.16	0.25	0.1	360	242	-0.01
Malawi	0.13	0.07	0.23	0.18	0.25	0.07	108	156	0.02
Mauritania	0.25	0.04	0.19	0.05	0.28	0	449	483	0.01
Niger	0.11	0.05	0.12	0.04	0.12	0.05	453	209	-0.02
Nigeria	0.1	0.07	0.21	0.11	0.22	0.09	245	250	0.01
Pakistan	0.26	0.25	0.44	0.45	0.49	0.48	225	508	0.03
Rwanda	0.05	0.01	0.14	0.18	0.11	0.1	214	235	0.01
Sri Lanka	0.18	0.09	0.34	0.27	0.35	0.28	288	814	0.03
Togo	0.2	0.07	0.29	0.13	0.2	0.03	345	327	0.01
Average Very Poor	0.14	0.07	0.21	0.14	0.21	0.15	281	378	0.007

4.1.1 GDP per Capita and Income Level

There are huge differences in annual average GDP per capita growth from 1965 to 1999 in the sample. I use equation 4.1.1 to calculate the variations in growth rates between the countries.

$$s_o(1+r)^t = s_t \qquad 4.1.1)$$

where s_t equals the amount the initial variable s_0 would grow to, if the annual growth rate in s is r. t denotes years, while s_t denotes the outcome of s after t periods. All countries experience a certain growth. The summary statistic in table 4.1 implies a mean of the annual average growth in GDP per capita at 0.013. By using equation 4.1.1, an average country would over the period 1965-1999 have a GDP per capita growth rate, affected by all possible observed and unobserved conditions, at 57 % over 35 years:

$$(1+0.013)^{35} = 1.57 \qquad (4.1.2)$$

Table 4.2 shows the ranking of the sample into four income groups and the associated GDP per capita level in 1965 and 1999 respectively. The ranking and the specified income levels provide a picture of the income differences in the world. With reference to table 4.2, the average annual growth rate in the Very Rich group (0.03) is higher compared to average annual growth rates in the other groups. The table shows that some of the countries in the Poor and Very Poor group actually appear with negative annual average growth rates in GDP.

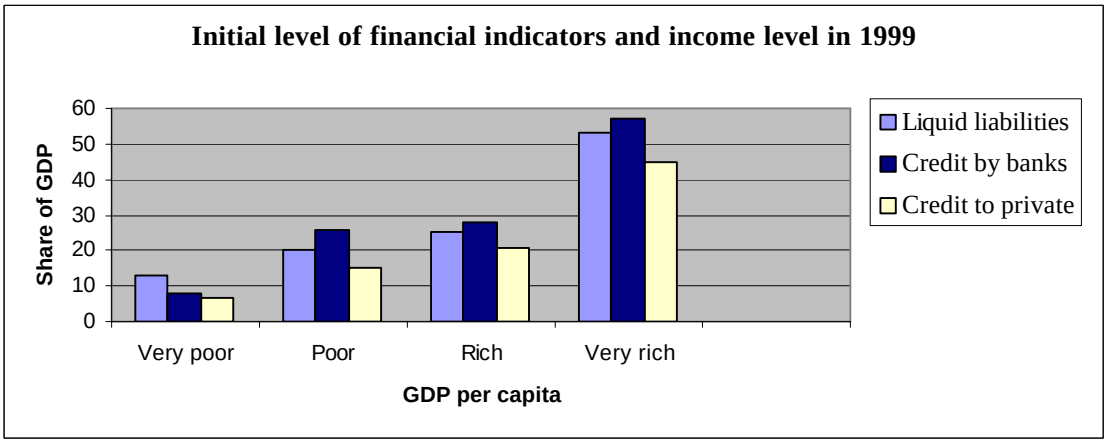
Thus, there are significant inequalities between the countries. Some countries separate from the sample by converging to a high steady state income, while some are found well below the average. Temple (1999) characterises some countries as 'growth disasters', where the GDP per capita has fallen since 1965, and others as 'growth miracles', where it has risen rapidly. Examples of the disaster countries are Zambia and Ghana, while Japan is a so-called 'miracle growth' country, increasing its income level from US$ 12,226 to the extremely high US$ 42,318 per capita over 35 years.

4.1.2 Income Level and Other Financial Variables

Comparing the income levels to the levels of the financial variables (table 4.2) can illustrate how financial development may lead to economic growth. These cross-country variations can be illustrated graphically. The bar graph in figure 4.1 represents the cross-sectional relationship between the initial levels of financial variables and income level. 1965 is still selected as the initial year. I have chosen GDP per capita in 1999 to represent the income level, to see whether there is a link between high initial levels of financial variables and wealth today. Three bars represent each income group, where the first bar measures liquid liabilities, the second credit by banks and the last bar illustrates a group's level of credit to the private sector. By moving to the right of the bottom axis, income per capita increases, and the bar graph reveals substantial differences between the countries.

The figure shows a tendency towards a relationship between high initial levels of the financial variables and a high income level today. The bars are significantly higher for the Very Rich group. The significant variation between this group and the other groups prevails for all the variables. The Very Rich group had a ratio in the level of bank credit to GDP of almost 90 %, while the Very Poor group had a ratio of under 10 %. For example, Burundi increased its GDP per capita level with only a marginal change from 1965 to 1999. Burundi had low initial levels and low average levels of the financial variables. Italy had, on the other hand, high initial levels of all the financial indicators, in addition to a high annual GDP per capita growth. A glance at the cross-country variations gives the impression that countries with substantial economic growth are countries with a large initial size of the financial sector.

Figure 4.1



Thus, it can be tempting to suggest a link between economic growth and financial sector development and it is easy to believe that a development in financial indicators could have a positive influence on economic growth. Accordingly, I suggest that the initial level of the financial sector is relevant to subsequent economic growth.

4.2 Correlations

Correlation is used to measure a possible relationship between two variables. The method can tell whether the variables vary together, and it is appropriate to explore the trends from figure 4.1. Table 4.3 shows the correlations between financial indicators and economic growth, when the three financial indicators are measured in average values over the period from 1965 to 1999, and economic growth is measured by GDP per capita in 1985 and 1999 respectively. The correlations utilise GDP in two different years, with a ten year time span, to see whether the correlation can give an impression of potential development over the years. Table 4.3 summarises the values of the financial measures relative to real GDP per capita in the total sample and in each of the four income groups.

The t-test checks the validity of the models by finding whether each variable influences the dependent variable. High t-values represent significance and give the model a high explanation rate. The covariance between the growth indicators and the financial variables is significant between all the variables in the total sample. This means that I have identified a possible link between financial development and economic growth. The correlation results indicate that the variables are most likely to vary together and financial sector development to correspond positively with GDP per capita

The link between economic growth and financial development in poor countries is of particular interest. I use the quartiles in table 3.2 as dummies to allow for qualitative effects. The dummies can illustrate whether changes in long run development depend on initial income level. The interaction variables for the four income groups are integrated in table 4.3, displaying the matching covariance for each group. This means that an interaction variable for the Very Poor group assigns a country with a value equal to 1 if it is a country in the specified group, 0 if not. The correlation between the average of liquid liabilities and GDP per capita in 1985 has a positive, significant *t* value in the total sample. However, this is not the case in each income quartile and the correlations are no longer significant between all the variables. The table illustrates that the size of the financial sector influences the economy more in Very Rich and Very Poor countries. This holds for GDP measured in both 1985 and 1999.

The differences between the two periods are not substantial, but the correlation has strengthened within all the groups over the 12 years. The Very Rich group had 0.64 of GDP per capita in liquid liabilities in 1985 rising to 0.66 in 1999, and the covariance in the Poor group strengthened from 0.27 up to 0.54. These results indicate that the Very Rich and Rich groups possess the highest percentage of liquid liabilities. Apart from this, the strength of the correlations does not increase with income. Table 4.3 displays a statistically significant and positive relationship in credit to the private sector, and the covariance is positive in all the income groups. The variable ranges from 0.31 up to 0.76 in 1985 and strengthen in 1999. The last indicator, credit by banks, shows the highest correlation within the Very Rich group, yet the Poor group increased its covariance more. The correlation in the Poor group increased from about 0.11 up to 0.36, while the Very Poor group experienced a strong correlation, going from a fraction of bank credit at 0.48 to 0.51.

Table 4.3 Correlations Dependent on Initial Income

Variables	All countries	Very Rich	Rich	Poor	Very Poor
		GDP per capita in 1985			
Liquid liabilities	0.696	0.641	0.379	0.266	0.496
	[7.22]	[3.01]	[1.99]	[0.99]	[2.06]
Credit by banks	0.776	0.599	0.553	0.107	0.479
	[8.85]	[2.70]	[2.40]	[1.59]	[2.16]
Credit to private	0.663	0.76	0.311	0.603	0.687
	[6.42]	[4.21]	[1.18]	[3.26]	[3.41]
GDP per capita in 85		22147	2602	916	325
		GDP per capita in 1999			
Liquid liabilities	0.731	0.658	0.402	0.543	0.498
	[6.74]	[3.15]	[1.58]	[2.90]	[2.07]
Credit by banks	0.811	0.664	0.325	0.361	0.508
	[6.95]	[3.20]	[1.24]	[2.03]	[2.13]
Credit to private	0.699	0.78	0.535	0.809	0.681
	[6.83]	[4.30]	[2.29]	[5.63]	[3.25]
GDP per capita in 97		27285	3492	947	275
Observations	60	15	15	15	15

t-values in brackets

Levine (1997) presents correlation coefficients, but he finds somewhat higher correlations according to increased income per capita. Note, however, that my sample is more diverse than Levine's and measured over a longer time span. My results state that all three financial variables had a stronger correlation in 1999 than in 1985, yet the increase in correlations did not follow an increase in GDP per capita. There is a strong correlation in the total sample between each of the financial indicators and economic growth. However, the fact that two variables have a significant covariance tells us nothing about the *direction of causation* from one variable to another. Neither does the fact that two variables vary together state anything about the degree of influence from one variable to another.

4.3 Concluding Remarks

I have identified a possible link between financial development and economic growth. Even though the correlations give a general idea of the relation between the variables, it should be possible to state formally whether financial sector development can cause economic growth, by stipulating from the further analyses which variable is likely to be exogenous and which is likely to be endogenous. For example, providing credit to the private sector can increase investments, which again can accelerate economic growth. However, it is also possible to

argue for the fact that it can be hard to develop a financial sector without any economic resources already existing. Even though the correlations are not capable of identifying a causal direction, the construction of the variables has pointed out a path. By measuring the financial variables with average values and correlating these indicators with GDP in certain years, potential improvements can be expressed. The aim is to test whether the hypothesis that financial development leads to economic growth is valid, which can be tested by regressions.

5. ECONOMETRIC SPECIFICATION

This chapter elaborates the specification of the models to test the hypotheses established in chapter 1. The specifications attempt to present adequate models that are appropriate for achieving suitable estimates for further analyses.

5.1 Econometric Methods

Econometric methods involve a specification of the hypothesis to be tested, and an econometric model to test this hypothesis. A regression model can draw conclusions which are valid above the given material. There are several methods applicable to a given hypothesis. The Ordinary Least Square (OLS) is a good approach to estimating changes, and to test the effects of financial sector development on econometric growth. An OLS model provides understandable results, with the best fitted regression line, in which the line minimizes the sum of squared deviations. To test the hypotheses raised in chapter 1, I use financial variables measured in average values to test for the finance-growth link and variables measured in the initial year to test for causality.

5.1.1 Ordinary Least Square Method vs. Fixed Effect Method

I have tested for several methods, even though the OLS method has been found to be the best approach to test the specified hypotheses about the empirical relationship between financial sector development and economic growth. The OLS method estimates changes in economic growth attributable to financial indicators. This approach can identify, in addition to the relationship between the variables, significance, causality and non-linearities between countries. It also ensures that the estimates have some optimal qualities: they are unbiased and have the least variance. Cross-sectional estimates with data averaged over the entire sample period are meant to uncover low-frequency properties of the data, and provide information about the long-run effects of financial development on economic growth, just as the cross-sectional estimates with data measured in the initial year set the causal direction between finance and growth. Using the initial values of the financial indicators is a way to address the causality problem. This approach is also taken by Levine (1997) to check if the predetermined components of financial development are good predictors of long-run growth.

My study includes a broad selection of countries, so investigating the differences between countries will be more interesting than analysing only the individual effects. If the study included only a few countries, say five or six, and the sole interest lay in these units, then individual effects would more appropriately be fixed, not random. However, I have a sample of 60 countries, so I prefer to analyse the differences *between* these countries, not within, as the individual effects are more likely to be random.

If I include fixed effects I have to allow the variables to vary over individual and time. My sample includes a given group of countries fixed over the period, so the attempt to include the fixed effect method is not very useful. Thus, I find it more interesting to compare the differences between developing and industrialised countries. In addition, my sample is not a homogeneous group, and I do not have a balanced panel including an equal number of observations for each country. The unbalanced panel is caused by missing data and measure errors. Missing data can be a considerable problem when using time series, especially in developing countries. Pooling the panel to include one observation per country can avoid this problem. By using a cross-section with variables either measured in average over the period or in the initial year, the variation and differences between the developing and industrialised

countries can be explored. I also find the between-country differences in the financial ratios to be more important than the differences over time. Thus, it is of interest to see whether the effect of the financial sector has been different in well-developed countries compared to that in less-developed ones.

Since my major interest is in the variations between countries, I use a between approach, by employing the OLS method, instead of the within, fixed effect approach. In addition to looking at the between and not the within effects in the sample, I find OLS more appropriate than other methods as I prefer to include longer periods, rather than looking at year-to-year periods. The strong relationship in regressions using averaged cross-sections could suggest that the finance-growth nexus is a long-run phenomenon. Caused by the large variation from year to year, regressions with annual results are more unreliable than regressions including longer periods. Wachtel (2001) has also criticised the use of country fixed effects when researching causality between financial sector development and economic growth. In his view, the fixed effects dominate the equation, as the variations between countries in finance ratios are more important than time variations. Consequently, I have not commented on the result from the fixed effect regressions any further.

5.2 The Econometric Model

The choice of model is based on the assumption that there is a relationship between financial development and economic growth, in order to detect existing differences between the countries. The empirical implementation involves questioning whether the independent indicator can explain variations in the dependent variable. In reference to earlier literature, the dependent variable in my econometric model is the annual growth rate of GDP per capita, y. The independent variables are the three financial indicators for expressing and measuring financial sector development are liquid liabilities, credit to the private sector and credit provided by banks. In addition, a vector of various variables is included to control for other factors that might affect economic growth.

The regressions estimate the same dependent variable, i.e. average annual growth in GDP per capita over the period 1965-1999, while the financial variables are measured in two different ways to obtain as much information as possible. The regressions apply either average values over the period 1965-1999 or the influence from initial financial variables on subsequent growth. By applying averaged aggregates I avoid the problem of missing observations, and I can test the finance-growth relationship. Each of the three financial indicators is used in separate regressions, isolated to see the possible effect from each indicator. Thereafter, I use the financial variables exclusively in 1965 to analyse causality problems. The initial variables can detect whether there exists a causal relationship between financial development and economic growth, to see whether economic growth actually follows financial development. This model can indicate whether the financial variables in 1965 predict the rate of economic growth over the next 35 years. I also include control variables in each of the regressions to control systematically for other factors influencing economic growth. To achieve the best comparison between the regressions, I prefer to include the same countries. The regressions are based on panel data that consists of 60 countries (cross-country units) and 35 years (time series), thus i=1,2..,60 and t=1965, 1966, ..1999.

$$y_{i,t} = b_0 + b_1' X_{1,i} + b_2' X_{2,i} + e_{i,t} \qquad i = 1,..,\ n \quad t = 1,...T \qquad (5.2.1)$$

where

$X_{1,i} = \{M3_i, P_i, B_i\}$ includes the financial variables assumed to influence growth, and

$X_{2,i} = \{S_{i,o}, y_{i,0}, GC_i, I_i, T_i\}$ represents a matrix of conditioning information to control for other factors associated with economic growth.

$X_{1,i}$ and $X_{2,i}$ are either measured as average variables over the period from 1965 to 1999 or as initial variables measured in 1965. Thus, the equation can be specified as:

$y_{i,t} = b_0 + b_1^{\downarrow} X_1 + b_2^{\downarrow} X_2 + e_{i,t}$, including averaged indicators, and (5.2.2)

$y_{i,t} = b_0 + b_1^{\downarrow} X_{1,0} + b_{2,0}^{\downarrow} X_{2,0} + e_{i,0}$, including initial variables (5.2.3)

Equation (5.2.1) describes the relationship between the growth indicator and financial variables. The left hand side variable symbolises economic growth. $y_{i,t}$ is the annual averaged growth in GDP per capita for a country *i* at time *t*, and equals in the equation above $\frac{\Sigma \frac{Yt - Y_{t-1}}{Y_{t-1}}}{T}$. The variable represents the ratio of income level, the main object to check for economic growth. The value of $y_{i,t}$ differs from $b_0 + b_1^{\downarrow} X_{1,i} + b_2^{\downarrow} X_{2,i}$ by a margin e_{it}, which captures measurement errors and left-out variables. The (as yet unspecified) constant states that $y_{i,t}$ assumes a value of b_o when the independent variables equal zero.

The explanatory variables to the right are included in either the $X_{1,i}$ vector, consisting of financial variables, or in the $x_{2,i}$ term consisting of other control variables. $X_{1,i}$ is a vector of *L* explanatory observed variables and the vector estimates the coefficients which can illustrate the influence of financial development. $b_1^{\downarrow}$ is a vector of the *K* coefficients that are being estimated. The coefficient $b_1^{\downarrow}$ shows how strong $X_{1,i}$ influences the dependent variable. Believing that $X_{1,i}$ has some causal effect, the marginal impact of $X_{1,i}$ can be explored to see how much a possible increase in the financial indicator appears to affect GDP per capita growth. Thus, the coefficient $b_1^{\downarrow}$ symbolises the effect of a change in the financial indicators.[4] High coefficients signal an important influence from explanatory variables on the dependent variable. The main function of the financial sector is to channel funds from savers to investors. High coefficients belonging to the credit variables can therefore indicate that the financial sector fulfils its function by channelling funds to investments.

The regression equation includes variables to control the influence of other indicators apart from the financial variables. X_{it} is a vector of *M* control variables with the belonging $b_2^{\downarrow}$ as a coefficient. The regression equation includes the initial value of income, $\ln y_0$, where the subscript 0 indicates the initial year and $b_2^{y_o}$ is the associated coefficient. With reference to chapter 3, this variable has been included to check for convergence. If convergence occurs, $b_2^{y_o}$ will be negative and the countries with higher initial income will have a lower growth. A coefficient value of –1 corresponds to perfect convergence. If the coefficient is 0, growth is uncorrelated with initial income and there is no convergence at all.

I run each regression twice, where I model the financial term differently in each regression equation. First, I use the regression with average values to investigate whether there is a relationship between financial development and economic growth. The second regression determines the financial terms in initial values to control for potential causality problems in the finance-growth link. Even with two different angles on the financial variable's influence on economic growth, either in a simultaneous or in a subsequent approach, the optimum is still to analyse the influence in the same selection of countries. By using an identical sample in the two models, differences and influences of financial

[4] Since the coefficient equals: $b_1^{\downarrow} = \frac{\partial \Sigma_{i,t} \left(\frac{y_{i,t} - y_{i,t-1}}{y_{i,t-1}} \right) \frac{1}{T}}{\partial X_{1,i}}$

development can be explored and compared. Due to data availability, I focus exclusively on the same countries for which there are associated observations in 1965. The total number of observations in each regression summarises to 60.

5.3 Financial Sector's Influence on Economic Growth conditioned on Initial Income

The sample is characterised by a wide diversity in income levels, so it is suitable to remodel the next regression equations. An interaction variable can be added to capture significant differences between the groups. An interaction variable combined with the financial variables allows the financial variable to vary among the income groups. The aim is to see whether the inequality between countries makes a difference in the regressions. It is of interest to check whether this inequality predestines the relationship between finance and growth. This approach allows identification of central parameters. The hypothesis aims to check whether the financial variables influence differently among the income groups and test whether financial development can be an explanation for convergence. Thus, it will be possible to analyse the influence of the coefficients on a more individual level and to obtain a more precise picture. The econometric model may now be specified as follows:

$$y_{it} = b_0 + b_1^{|} X_{1,i} * D_{VR} + b_1^{|} X_{1,i} * D_R + b_1^{|} X_{1,i} * D_P + b_1^{|} X_{1,i} * D_{VP} + b_2^{|} X_{2,i} + e \qquad (5.3.1)$$

where the variable denotations are similar to the ones in model 5.2.1. Variations between groups are now easily computed if there are statistical differences in the influence of financial indicators dependent on initial income level. The interaction variable takes the value 0 or 1 depending on a country's initial income:

D_{VR} = 1 if a country has a GDP per capita level of more than US$ 6000,
= 0 otherwise.

D_R = 1 if a country has a GDP per capita level of more than US$ 935 or less than US$ 6000,
= 0 otherwise.

D_P = 1 if a country has a GDP per capita level of more than US$ 435 or less than US$ 935,
= 0 otherwise.

D_{VP} = 1 if a country has a GDP per capita level less than US$ 435,
= 0 otherwise.

Table 5.1 Variable description

Variable	Variable notation	Coefficient	Expected sign
y_{it}	The averaged annual GDP per capita growth.	Dependent	
	A constant term for the cross-section.	b_o	
$X_{1,i}$	A vector of the coefficients belonging to the financial indicators.	$b_1^{\|}$	
$X_{2,i}$	A vector of the coefficients belonging to the control indicators.	$b_2^{\|}$	
$y_{i,0}$	The log of initial income, measured by GDP per capita in initial year 1965.	$b_2^{y_o}$	<0
$M3_i$	The size of the economy in country *i*, measured in average or initial value.	$b_1^{\|}$	>0
P_i	Credit to private sector in country *i*, measured in average or initial value.	$b_1^{\|}$	>0
B_i	Credit provided by banks in country *i*, measured in average or initial value.	$b_1^{\|}$	>0
$S_{i,0}$	A log of initial secondary school enrolment in country *i* and year 0	b_2^S	>0
GC_i	Government consumption in country *i*, measured in average or initial value.	b_2^{GC}	>0
I_i	The inflation rate in country *i* , measured in an average or initial value.	b_2^I	<0
$T_{i,t}$	Trade in country *i*, a control variable measured in average or initial value.	b_2^T	<or>0

6 ECONOMETRIC RESULTS

Based on the empirical implementation in chapter 5, the link and causality between financial sector development and economic growth will be analysed.

6.1 Average Financial Variables' Influence on Economic Growth

Table 6.1 tabulates the OLS regressions based on equation 5.2.2. The table expresses the influence of average financial sector variables on annual average growth in GDP per capita, carried out for 60 countries over the period 1965 to 1999. All the independent variables are period averages, except for lagged GDP per capita and educational attainment measured at the beginning of the period. The regressions include one observation per country, summarising to the total number of 60 observations per regression.

Table 6.1 Average Financial Development and Simultaneous per Capita GDP Growth

	Average Annual Growth in GDP per Capita 1965-99					
Liquid liabilities	0.023	[2.97]				
Credit to private			0.025	[3.48]		
Credit by banks					0.015	[2.61]
Log GDP in 1965	-0.008	[-3.62]	-0.009	[-4.06]	-0.008	[-3.41]
Log school in 1965	0.010	[4.74]	0.010	[5.20]	0.010	[4.45]
Government Consumption	0.007	[1.94]	0.007	[1.93]	0.006	[1.58]
Inflation	-0.004	[-4.74]	-0.004	[-4.79]	-0.004	[-5.13]
Trade Openness	-0.018	[-2.70]	-0.017	[-2.75]	-0.017	[-2.55]
Constant	0.041	[3.45]	0.047	[3.95]	0.041	[3.35]
Adjusted R2	0.551		0.573		0.536	
Observations 60						

t-values in brackets

The results are strongly supportive of my hypothesis, both in signs and statistical significance. The influences from the financial variables are estimated separately in 3 different regressions. According to the discussion in table 3, and quoting the theory in chapter 2, I have included 3 variables to measure the size of the financial sector, the activity of the financial sector and the growth of the banking sector. All three variables, that is, liquid liabilities, credit to the private sector and by the banking sector, have a positive and statistically significant influence on economic growth. Most of the t-values valid the model and verify that the model is very precisely determined. The three financial indicators enter with high *t*-values at a 0.01 significance level. The results support the findings reported in chapter 4, which identified a possible link between financial development and economic growth, and they are consistent with the theory in chapter 2. The empirical findings support the positive relationship stated by, among others, Levine (1997).

In chapter 4, I calculated a growth in GDP per capita determined by all possible conditions at 57 % over 35 years. This is the natural average growth all average countries will experience. However, I will isolate the effects of each financial variable on economic growth to assess the importance of financial sector development. The calculation of the finance-

growth relationship can be explored by combining the summary statistics with the regressions results, which will be used as a framework for the analyses and further conclusions.
The first column in table 6.1 shows the results of *liquid liabilities*, as an explanatory variable on economic growth. My main interest in using OLS regressions is to detect variations between countries. The summary statistics for liquid liabilities (table 4.1) show the difference between the Very Poor group (0.22) and the mean within the sample (0.38):

0.38 - 0.22 = 0.16 (6.1.1)

The difference implies that if a Very Poor country increased its level of liquid liabilities similar to the average level, the expansion would result in an increase of the variable at approximately 80 %. I include all the results in the following equation to achieve the value of a 'changed' GDP growth and to explore the separate financial effect:

$$(1 + \overline{Y} + b * [? X])^t = ? Y \quad (6.1.2)$$

where the symbols denote:

$\overline{Y}$ = annual average growth in GDP per capita
b = financial regression coefficients
? X = absolute change in the financial variable
? Y = changed GDP per capita growth over the period
t = Years with growth

By inserting the regression coefficient (0.025) and the different liquid liabilities values into equation 6.1.2, we see that a poor country experiences a growth in GDP per capita of 78 % over 35 years after an increase in the financial variable:

$$(1+0.013+0.023*[0.38-0.22])^{35} = 1.78 \quad (6.1.3)$$

This means that an enlarged level of liquid liabilities would result in an increased GDP per capita growth of 14 % over 35 years compared to the average GDP per capita growth all countries will experience:

$$\frac{'Changed'GDPgrowth}{GDPgrowth} - 1 = \frac{1.78}{1.57} - 1 = 0.14 \quad (6.1.4)$$

A rise in an exogenous stimulus, similar to an increase in liquid liabilities, has a positive effect and accelerates the annual GDP per capita growth. The annual growth in GDP per capita if a poor country increased its level of liquid liabilities would be $[(1.78)^{1/35} = 1{,}017]$ nearly 2%, and the annual difference in GDP per capita growth after an increase would be approximately 0.4% each year:

$$\frac{Annual'Changed'GDPgrowth}{AnnualAverageGDPgrowth} - 1 = \frac{1.017}{1.013} - 1 = 0.0039, \quad (6.1.5)$$

The annual growth difference a poor country experiences if it increases its level of liquid liabilities supports the theory of the ability of financial sector development to result in increased economic growth. Thus, a change in behaviour would probably raise the income level for the poorest countries, and reduce existing inequalities.

The results of the further calculations are listed in table 6.2. These results are all based on the same procedure and framework as the one used above. Later in the analysis I shall refer only to table 6.2, rather than calculate the separate results each time.

Table 6.2 Framework for Calculations

	Liquid liabilities	Credit to private sector	Credit by banks
Average GDP growth	0.013	0.013	0.013
GDP growth over 35 years	57 %	57 %	57 %
Averaged financial variables:			
Coefficients	0.023	0.025	0.015
Additional GDP growth due to financial development	14 %	18 %	13 %
Annual additional growth due to financial development	0.4 %	0.5 %	0.4 %
Initial financial variables:			
Coefficients	0.029	0.023	0.018
Additional GDP growth due to initial financial development	15 %	13 %	11 %
Annual additional growth due to initial financial development	0.4 %	0.3 %	0.3 %

The coefficient of *credit provided to the private sector* is statistically significant and displays the expected positive sign. Credit to the private sector influences economic growth most strongly by a coefficient at 0.025. An increase in credit to the private sector explains economic growth through mobilised savings or the allocation of resources to a higher number of investors. Capital floods and reduced credit constraints, from augmented private credit, can lead to both capital accumulation and technological innovation. Savers can invest in research and production equipment to improve productivity, hence improving earning possibilities. If the poorest quartile raised the level of credit to the private sector (0.16) equal to the level of the sample mean (0.35), they would increase private sector credit by more than 100 %. I use expression 6.1.2 to achieve the results of an increased level of credit to the private sector:

$$(1+0.013+0.025*[0.35-0.16])^{35}=1.85 \qquad (6.1.6)$$

With such an expansion in credit to the private sector, poor countries could have increased their GDP growth by 18 % over 35 years or nearly 0.5 percentage points each year. Guatemala may illustrate the influence of an increased level of private credit on economic growth. Guatemala's average value of private credit over the period 1965-1999 is 0.15 (see table 4.2). Based on the GDP per capita level in 1965, Guatemala is classified in the Rich group. However, as a result of low growth, many of the countries in the Poor group had in 1999 a GDP per capita growth exceeding that of Guatemala. If Guatemala had experienced a hypothetical exogenous increase in private sector credit equalising the level to the sample

mean (0.35), this could have resulted in a nearly 17 % higher GDP per capita growth over 35 years. An increased financial sector could have stimulated the economic activities in Guatemala at such a level, so the country would have accelerated the economic growth rate. A higher level of credit to the private sector can reduce income inequality as the poor may have a widening access to the financial sector, and the increase in credit can increase the possibility of starting new projects, leading to higher economic activity.

The last indicator to symbolise the development of the financial sector's influence on economic growth is the variable expressing *credit provided by banking sector*. Quoting the discussion in chapter 3, this variable can quantify the growth of the banking sector since it reflects the level of financial savings, as well as measuring the activity of financial sector development. If the variable implies a demonstration of the activity in the financial sector, and if the regression states a positive link between the variable and GDP per capita, this means that financial sector development has a positive relationship with economic growth. Countries associated with a high level of the bank credit variable would in that way have a better chance of escalating economic growth. According to earlier discussion, a well-developed banking sector can reduce transaction costs by transferring savings more efficiently. The variable coefficient (0.015) is statistically significant. This would result in an annual growth in GDP per capita of nearly 0.4 percentage points each year or 13 % over 35 years if the poorest countries moved from their low level of credit by banks at 0.24 to an average level at 0.48. Development of the banking sector would probably increase the level of the credit provided by banks. An improvement of the amount of credit by banks can ease trading, mobilise savings and allocate resources to expand capital accumulation or technological innovation to establish economic growth.

Thus, all the results show a positive and significant relationship between simultaneous financial development and economic growth. The increased income level a country will experience by an improvement of the financial sector will be important for poverty reduction. Financial sector development drives the technological progress, which according to endogenous growth theory is fundamental to economic growth. Calculating the separate effects of financial sector development indicates positive effects, and an expansion in private credit seems to increase the income level most strongly.

6.2 Initial Financial Influence on Long-run Economic Growth

The issue of causality is addressed by including initial financial variables in the regressions. In order to test whether financial development simply follows growth, or whether there is a positive causal effect of financial sector development on economic growth, the first regression equation is remodelled. If, on the basis of the available data, financial and growth indicators seem to follow a close linear relationship and if we are prepared to believe that they will continue to do so in the future, than the new regressions can be useful for forecasting purposes.

I run regressions based on equation 5.2.3 (see table 6.3), and I detect a causal direction. The dependent variable is still annual growth of GDP per capita averaged over the 1965-1999 period, but the financial variables are measured in the initial year 1965 to indicate directly the possible influence on subsequent economic growth. The initial variables are included to avoid endogeneity in the variables, as well as the simultaneous problems. The results in table 6.3 suggest that the initial level of financial development is a good predictor of economic growth over the next 35 years. The results reveal that initial values have approximately the same influence on economic growth as the average financial indicators reported in table 6.1, so the further arguments are similar to those in section 6.1.

Most of the *t*-values in table 6.3 are significant, but not on the same significance level as the *t*-values in table 6.1. The significance level of liquid liabilities is considerably better than the explanation rate of the two other financial indicators, entering at the 0.03 level. Credit to the private sector and credit by banks enter significantly at respectively a 0.08 and 0.07 level. Still, the initial levels of the financial variables have a stronger influence on subsequent economic growth than the average level had on contemporaneous growth. Credit to private sector influences, however, more on an average level than in a subsequent growth rate.

Table 6.3 Initial Financial Development and Subsequent per Capita GDP Growth, 65–99

	GDP per capita annual growth		
Liquid liabilities in 1965	0.029 [2.24]		
Credit to private sector in 1965		0.023 [1.99]	
Credit by banks in 1965			0.018 [1.98]
Log GDP in 1965	-0.009 [3.53]	-0.009 [3.26]	-0.009 [3.26]
Log school in 1965	0.011 [4.34]	0.012 [4.42]	0.011 [4.46]
Government Consumption in 1965	0.083 [3.02]	0.089 [2.96]	0.087 [2.92]
Inflation in 1965	0.008 [1.56]	0.008 [1.42]	0.004 [0.66]
Trade in 1965	-0.012 [-2.44]	-0.011 [-2.09]	-0.012 [-2.02]
Constant	0.042 [2.74]	0.041 [2.58]	0.037 [2.50]
Adjusted R2	0.4099	0.3638	0.4080
Observations 60			

t-values in brackets.

The coefficient of the initial *liquid liabilities* variable has a value of 0.029 and is statistically significant. If poor countries had already in 1965 increased the size of the financial sector to the same level as the richest groups, the poorest group would have experienced a growth of nearly 0.7% each year. This implies that they had to increase the level of liquid liabilities in 1965 from 0.12 to 0.35. On the other hand, if poor countries 'only' increased their level equal to the average (0.26), they would still have a yearly increase at 0.4 percentage points. This implies an income increase of approximately 15 % in 1999.

A low level of financial development or distortions in the financial sector can increase the cost of investment and thus retard economic growth. The initial values can be an approach to determining this cost. By comparing cross-country variations in liquid liabilities in the initial year, the differences present a relationship between those countries with the largest financial sector in 1965 and those countries which are the richest today. Rich countries can explain substantial economic growth by capital accumulation and technological innovation, while these channels to growth can be explained by the initial priority on financial sector development. Countries with an initially large financial sector were more likely to mobilise savings and allocate resources, resulting in increased GDP per capita levels.

Levine (1997) uses Bolivia to exemplify the influence of an increase in the financial sector. He concludes that Bolivia would have grown about 0.4 % faster per annum if it had raised the financial level in 1960 to the mean value of developing countries. Using the same method to calculate the effects, we can compare our results with Levine's. In 1965 Bolivia

had an initial level of liquid liabilities at 0.1. If Bolivia had increased the initial level of liquid liabilities equal to the mean sample level, which was 26 % of GDP, the country would have grown approximately 0.4 % faster per annum. The result of an increase in liquid liabilities is just in line with Levine's results, even though there was a time span of five years between the initial years. The growth would have been about 14 % larger in 1994 than it actually was.

Concerning *credit to private sector*, the outcome in the Poor group would result in an annual growth rise of more than 0.3% by equalising the credit level to the average. Burundi was one of the poorest countries in 1965, and the country still ranks among the world's least developed countries. If Burundi had increased its credit to the private sector from 0.03 to the mean 0.21 in 1965, Burundi would have grown 0.4 % faster per year, and achieved a nearly 15 % higher growth rate in GDP per capita in 1999, another result which supports the hypothesis of a positive relationship between finance and growth. As mentioned in the introduction, the lack of a well-functioning financial sector may constrain credit demanded to investments. A reduction of this 'loan rationing' can spur economic development, as allocated credit is substantial for the channels to stimulate economic growth.

The initial level of *credit provided by banks* has a stronger influence on subsequent economic growth (0.018) than the average level had on simultaneous growth (0.016). Referring to the so-called 'disaster' and 'miracle' countries, Japan is a so-called miracle country with an enormous growth in GDP per capita over the last 30 years. Japan had an initial level of credit provided by the banking sector far above the mean level. Ghana, on the other hand, was one of the disaster countries, with an annual GDP per capita growth that was negative over the same period. Compared to the initial influence of financial development on economic growth, Ghana had both a credit level provided by the banks and a credit level to the private sector below the average. An increased credit flow in this country would, referring to former calculations, cause an increase in economic growth.

6.3 Financial Development and Economic Growth Conditioned on Initial Income Level

Regression equation 5.3.1 captures whether there are significant differences between the countries. This regression includes an interaction variable combining the financial indicators with the initial income level. The aim is to explore country variations and to see whether the inequality between countries makes a difference in the regressions.

Table 6.4 Influence of Financial Development on Economic Growth Conditioned on Initial Income

Annual growth in GDP per capita	Very Poor group	Poor group	Rich group	Very Rich group	Adj. R-squared
	0.037	0.032	0.029	0.020	0.539
Liquid Liabilities	[1.68]	[2.14]	[2.81]	[2.59]	
	0.056	0.035	0.028	0.020	0.567
Credit to Private	[2.05]	[2.85]	[2.61]	[2.44]	
	0.047	0.017	0.018	0.015	0.604
Credit by banks	[1.71]	[1.80]	[2.26]	[2.35]	
Observation	15	15	15	15	60

t-values in brackets

Table 6.4 is equivalent to table 6.1, but the countries are now sorted into 4 groups, and the interaction variable allows the financial variable to vary among the four income groups.

Except for the interaction with credit by banks, the results seem to follow a path. It seems as though the coefficients systematically change with income differences. The Very Poor group is more influenced by an increase in one of the financial variables, and the economic growth will be higher because of a financial increase in one of these countries. In the Very Rich group, economic growth seems to change only slightly with an increase in one of the financial variables compared to the poorer countries.

Not all the group specific results are significant, but it is still possible to say something about the differences. The liquid liabilities and the private credit coefficients are strongest when one of the variables interacts with the Very Poor group, with an influence of 0.037 and 0.056. The weakest coefficients are in the Very Rich group, with an influence of 0.020. As the size of the financial sector is more substantial in the Very Rich group, a possible economic growth effect is perhaps saturated by an increase in liquid liabilities, so an increase will not have the same effect as in the poor countries.

The most important financial variable in the case of the Very Poor group is credit to the private sector (0.056). This interaction coefficient is also statistically significant. There are different sources of demand for private credit. The demand varies between fixed capital; capital required for new start-ups or a substantial expansion of existing production, working capital; credit required for ongoing production activity; and consumption credit. The last type is typically demanded by poor individuals who are strapped for cash. The need for the three different groups will differ among the countries. Inhabitants of poor countries are probably in need of all types of credit. Inhabitants of rich countries demand credit for already existent production. This emphasises how credit constraints may be detrimental on economic development. If poor countries have a broader access to all types of credit, this type of financial sector development influence more on economic growth in developed countries, than countries without strict credit constraints.

The coefficients show that the poorer a country is the stronger is the influence of an increase in credit to the private sector. This may be caused by the poor countries' needs of all types of credit, and their demand for credit to fixed capital, working capital and consumption capital. There is a higher existing level of trade and business activities in the Very Rich group, so that increased credit to the private sector may have a more significant effect in the poorer countries. A possible increase in credit to the private sector generates a larger effect in the poorer groups since the credit may help to allocate resources and mobilise savings, and thus increase economic growth. In table 6.4, the three poorest groups have a positive influence stronger than that in table 6.1 (0.025), while the Very Rich group is less affected (0.020).

The influence of credit provided by banks on economic growth is quite similar between the groups, with the exception of the Very Poor group, and does not follow any specific income-dependent path. Some of the results are insignificant in general, especially the results attached to bank credit. A reason for this could be unreliable data or missing observations. Still, the results may display some of the variations between the different income groups. Since not all the group specific results were significant, I only stress the relation between financial sector development and economic growth, and the positive influence of financial sector development regardless of the group specification.

6.4 Results for Other Factors of Growth

The average level and the initial level of financial sector development are good predictors for contemporary and subsequent rates of long-run economic growth, even after controlling for convergence (initial income), human capital investments (education), inflation, government consumption and trade. I have used the control variables as a robustness test, to see if the results of the financial indicators still enter significant after including these variables. By

including the additional variables the results of the financial variables were not significantly changed, so I will briefly explore the discussion of other factors in growth. The variable initial secondary school enrolment has a positive and empirical importance on growth rates, and higher enrolment rates are associated with faster subsequent growth. This control variable is measured as an initial value, to imply how large the 'stock' was in the first year of the sample, and to see whether economic growth can be a consequence of the education level. All the tables display a positive effect of human capital, so a marginal change in the education variable will tend to influence the GDP growth rate positively. Intuitionally, it is obvious that a more highly educated population would have a positive influence on income. A higher education level and an increasing share of skilled labour could contribute to technological progress and innovation, which is encouraging for economic growth.

There is also a statistically positive and significant relationship between government consumption and economic growth, in accordance with my assumption about the coefficient. Government expenditure exerts a positive effect on economic growth since higher government expenses result in higher aggregate demand for domestic output. Thus, it can result in an accelerator effect by improving both investment and consumption. The existing theories suggest rather contradict the hypothesis on the effects of inflation, though. Empirically, the average inflation rate has a negative influence on economic growth.

All the previous variables have behaved in accordance with previous arguments. However, imports and exports as a share of GDP, representing a trade or openness variable, did not give an accurate sign. The variable was included to account for the effects of international trade and there were arguments for both positive and negative effect. In this study, the net effect is very small, but negative and statistically significant at a 5 % level. Spill-over effects can explain the negative influence of trade on economic growth. A country which is highly dependent upon other countries as trading partners can be affected by macroeconomic changes in those countries.

Concerning the question as to whether poor countries tend to grow faster than richer countries, Romer (1996) has summarised the discussion in empirical works on growth. He states that one might expect such convergence on the basis of the Solow model. According to this model, countries converge to their balanced growth paths, and poor countries are expected to catch up with the richer. It is also implied that the rate of return on capital is lower in countries with more capital per worker, so there are incentives for capital to flow from rich to poor countries. The value of the regression coefficient shows how the level of initial income affects a country's growth rate. If there is convergence, $b_2^{y_0}$, the coefficient belonging to initial income, will take a negative sign, and countries with high initial incomes will have lower growth. According to table 6.1, the coefficient is –0.009 and the *t*-values are significant in all three regressions. This means that there is some convergence in my sample and poor countries will grow faster than the richer ones. The negative coefficient implies that, if we take two countries with the same rates of investment and the same level of efficiency, the poorer will tend to grow more quickly for a transitional period. The reason for these 'transitional dynamics' is that a poor economy must have lower stocks of physical and human capital. Hence, the marginal product of extra capital is higher in this economy, and its growth will be faster for a given rate of investment. It is the middle income countries in particular that would tend to grow faster, and Levine and King (1993) found that initially rich countries tend to grow more slowly than initially poor countries. The results in table 6.1 and 6.4 are consistent with these patterns of convergence among the countries.

6.5 Concluding Remarks

As I have stated earlier, financial sector development is not only positively correlated with an increased GDP level, but it seems actually to accelerate economic growth. The main theoretical explanation is, as argued in chapter 2, that a developed financial sector encourages the mobilisation of savings, ameliorates asymmetric information, and provides greater opportunity for risk spreading and risk pooling. This translates into higher savings and more efficient allocation of resources, which leads to positive economic growth effects. An efficient and stable financial system is important for economic growth and poverty reduction, and my results are in line with earlier empirical research that supports the theoretical predictions of the positive effects of the financial sector.

The general conclusion is that financial sector development seems to have a positive effect on economic growth, both in the simultaneous relationship and when looking at long-run effects on economic growth.

I have chosen the variables I feel represent financial sector development, and the methods that turned out to be most reliable in establishing the finance-growth link. I have used average financial indicators over the period 1965-99 to determine whether there exists a link between financial development and simultaneous economic growth. The initial financial variables took into account the long run growth effects, additionally to support the link between finance and growth. Comparing the 60 countries showed that the initial level of financial sector development was the most crucial influence on output. I use OLS regressions, and by using this method, I have been able to test if there is a relationship, as well as a causal direction, between financial development and economic growth.

I have briefly mentioned how my results are consistent with Levine (1997). I have found that the influence points in the same direction, but my results are valid for a more current situation, since I use a longer time span. Financial sector development is eased by technological progress especially experienced in the last ten years. The substantial innovation has been in the telecommunication sector, which can reduce financial transaction costs and develop the financial sector. Thus, it is of interest to study the current situation. Even though technological progress eases financial sector development, technological expansion has relied on mobilised funding from the financial sector. Technological innovation is still a channel for financial development to influence economic growth.

King and Levine (1993) state that Schumpeter might have been right about the importance of financial development on economic growth. My results also support Schumpeter's theory. He suggested that a higher financial sector level would have a positive influence on economic growth, in accordance with the results I have elaborated above. If I bring the conclusions of Allen and Ndikumana (2000) into the comparison, I can conclude that financial development has a positive effect on economic growth in a sample representing all regions of the world, not only in the limited region of SADC countries. A more liquid financial system implies more resources, and it is the fundamental engine for growth. In accordance with my results, financial development increases economic growth by approximately 0.4 to 0.5 % on a yearly basis, so the financial improvements are crucial for an increased income level and poverty reduction in poor countries.

7. CONCLUSION

The aim of this paper was to find an empirical relationship between financial sector development and economic growth, and I explored in section 2 the reasons for including the financial sector in a growth theory perspective. In general, the theoretical literature and empirical research show that countries with a more developed financial sector will grow faster than countries with a less developed financial sector. The financial sector plays an important role in economic growth as it can reduce the cost of acquiring information, conducting transactions, and facilitate savings mobilisation. By providing these services, the financial sector can enhance resource allocation. Financial development actively increases aggregate savings, one of the channels through which the financial sector may accelerate growth.

The study is based on two hypotheses according to the major part of earlier research on the subject. The first hypothesis suggests the existence of a relationship between financial development and economic growth, and the second suggests that financial development will lead to economic growth. However, in contrast to previous studies, I have a sample based on more recent data, which is essential to reaching conclusions based on the current situation. Most countries have experienced significant technological development in recent years, so new data is vital for contributions and research in the finance-growth discussion. In addition to earlier research, I have also tested a third hypothesis to explore any possible non-linearities between developing and industrialised countries.

I have tested the hypotheses using econometric models based on data from the World Development Indicators database. The choice of the countries and the sample period are dictated by data availability. However, the WDI database contains variables for analysing the issues I wanted to explore, and has long time series for a broad selection of countries. I end up with a sample which is representative for the inequality in the world, including all regions and income groups. Ordinary Least Squares regressions have been performed using three different methods, and are used to investigate financial sector development as a determinant of growth. I have tested for other methods, even though the results are, for several reasons, not reported in the study. The results from the fixed effect (FE) regressions are not reported, first of all since the method did not give any sufficient or significant results. Second, FE results have not been used as it was more suitable to compare the variations between, instead of the differences within the countries. The OLS regressions capture also the effects I am interested in, with positive, significant estimates, so I have not reported the result of the FE regressions. However, further analyses could incorporate, as an extension of the study, pooled data of 5-year averages to get more period-specific effects.

First, I state from the OLS regressions a possible relationship between financial development and economic growth and then I check the direction of causality, before I include the interaction variables to explore significant group differences. To assess the hypotheses that financial improvements influence economic growth, I have assembled a diverse set of measures on financial sector development. I focus on three indicators to measure the financial sector by size (liquid liabilities) and activity (credit provided to the private sector and credit by banks). The last indicator additionally expresses the development of the banking sector. Economic growth is the dependent variable, expressed by annual average growth in GDP per capita. It could also be possible to incorporate in further analyses financial institutions as a dependent factor, to check for functional mis-specification.

The regressions include a number of control variables that have been found to be important determinants of growth by previous studies. I can conclude after controlling for initial conditions and various economic factors that the measures of financial development are robustly correlated with current and future rates of economic growth. Regarding the results, the financial variables averaged over the 1965-99 period established an obvious link between

financial development and simultaneous economic growth, while initial financial variables measured in 1965 supported the relationship and took into account the long-run growth effects. With an increased financial development most countries would have accelerated their annual economic growth by approximately 0.4 – 0.5 %, and between 13 - 18 % after 35 years.

According to Temple (1993), one of the most frequently expressed concerns about work in the growth literature is the probable endogeneity of some regressors. To avoid simultaneity concerns, researchers often make use of initial values. I was particularly interested in exploring the causal relationship, and have therefore used the initial financial variables to test whether the financial sector exerts a causal influence on economic growth. My empirical findings support the argument that the level of the initial financial sector emphasises the causality, and that these results are statistically significant. This means, in addition to a strong, significant relationship between financial development and economic growth, that the initial values seem to support the fact that growth follows finance. The direction of causality is established, showing the financial sector's influence on subsequent GDP per capita growth. Actually, the regression results show an even stronger influence of financial sector development on long-term economic growth than on simultaneous growth.

By comparing initial priority to average financial indicators' influence on economic growth, it appears that a country's initial emphasis on liquid liabilities and credit provided by banks are essential for additional economic growth. However, in the overall conclusion it seems that credit provided to the private sector and liquid liabilities are more substantial components of growth. This result corresponds with earlier research, which states that financial development can generate economic growth, especially by increasing funds channelled to investment, i.e. credit provided to the private sector.

To complement existing research, I have also tested whether inequality among countries makes a difference in the regressions. The test supports the results that financial development has a positive effect on economic growth, and the results from the OLS regressions are reliable estimates. However, not all the country-specific results caused by non-linearities between the countries obtained strong, reliable results. Still, the results show that financial sector development would exert more influence in the poor countries, and the relationship is less substantial in the rich group (mainly including the West European countries). In the poorest developing countries, credit provided to the private sector has the largest impact. An increase in private credit would be the basis for relaxation of credit constraints by mobilising savings and allocating resources, which, for instance, can be used for research. Research in its turn may lead to technological innovation which, in the longer term, can lead to economic growth. The relationship between economic growth and bank credit is less important than the size of the financial sector and private credit; nevertheless, all the financial indicators can be concluded to be important in increasing income levels and reducing poverty.

I believe, from analysing descriptive data and the results obtained by econometric methods, that the development of the financial sector has a positive effect on economic growth. Economic development is a long-run phenomenon. My results prove that a country's major initial priority regarding financial sector development is increased economic growth and accelerating economic growth is important in decreasing the enormous inequality in the world. I have earlier mentioned the Millennium Development Goals defined by UN. If the low income countries are to be able to reach these goals by 2015, the richer countries must provide more assistance so that the poor economies can develop, and this assistance must be better coordinated. Thus, it is a fair conclusion that a more developed financial sector is connected with and will improve economic growth and that facilitating extension and making arrangements for the financial sector to develop, especially by relaxing credit constraints, will exert a large impact on economic growth.

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APPENDIX 1 Empirical overview

AUTHOR/ DATA	VARIABLES		METHODS	RESULTS
Selection	**Economic growth**	**Finance**		
Jung (1986) 56 countries, 19 industrialized 1951-1980 / Data from IMF	Real GDP per capita in 75 prices	M1 - the sum of currency and demand deposit M2 - monetization	Granger Simple causality using 2 years' lag	A bi-directional relationship, but a positive causality from finance to growth
Demetriades & Hussein (1996) 16 countries 1960-1990 / Data from IMF	Real GDP per capita measured in domestic currency	Bank deposit liabilities/ GDP Bank claims on private sector/ GDP	Dickey-Fuller procedure to check for unit root Co-integration tests	Little support for finance leading to growth A bi-directional relationship between financial development and economic growth The results are very country-specific
Levine (1997) International Financial Statistics (IMF) 80 countries 1960 –1989	Real per capita GDP growth Per cap capital stock growth Total productivity growth	DEPTH: the amount of liquid liabilities / GDP BANK : the importance of commercial banks in relation to central bank when allocating credit PRIVY: credit allocated to private/total domestic credit. PRIVATE : credit to private sector / GDP	Correlation with income dummies and average rates. OLS between growth indicators as dependant variables and financial development indicators Other explanatory variables included	Strong, positive relation between each of the financial development indicators and economic growth
Choe & Moosa (1999) 1 country (Korea) 1970-92	Real GDP Gross fixed capital formation	Household sectors holdings of securities & equities Households holdings of various deposits in finance Business sector's securities & stocks in total fin. liab. Growth of business sector's loans	Testing causality - VAR1 analysis Tested by: Cox, Wald, J-test, JA and the encompassing test	Financial development leads to real growth and financial intermediaries are more important than the capital markets
Levine, Loayza & Beck (2000) Data from IMF 74 countries 1960 – 1995	Real per capita GDP growth Per cap capital stock growth Factor productivity growth Private savings rate	Private credit = credit/GDP Liquid liabilities = the size of financial system Commercial - central bank How commercial vs. central bank allocate saving	1. Employs a cross-sectional instrumental variable estimator The regressors include a measure of fin. Intermediaries + conditioning info. 2. (GMM) panel estimator.	Significant relation between financial intermediary development and GDP growth and factor productivity An ambiguous relation between physical capital and private saving
Allen & Ndikumana (2000) World Development Indic. 8 countries, SADC 1970-1996	Real GDP per capita. Per capita GNP, curr. & growth	Liquid Liabilities, M3 % of GDP The volume of credit provided by banks Credit to private sector Openness = the lag of the sum of imports and export Debt Service = lag of the ratio of debt service to GNP Government Consumption as a % of GDP	1. OLS with common intercept 2. Fixed effect regression 3. Regressions with high Income dummy.	A positive and significant relation between economic growth and the size of financial institutions Less conclusive results with the other financial indicators

APPENDIX 2 Variable description

Variable	Definition	Construction
Annual GDP growth	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant US dollars.	Average of annual GDP per capita growth rate, 1965-1999
Log GDP in 1965		Logarithm of initial income in 1965
Liquid liabilities	Liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travellers' checks, foreign currency time deposits, commercial paper, and shares of mutual funds or market funds held by residents.	Average of liquid liabilities as a share of GDP, 1965-1999
Liquid liabilities in 1965		Liquid liabilities in initial year 1965
Credit to private sector	Credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises.	Average of credit to private sector as a share of GDP, 1965-1997
Credit to private sector in 1965		Credit to private sector in initial year 1965
Credit by banks	Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (including institutions that do not accept transferable deposits).	Average of domestic credit provided by banking sector as a share of GDP, 1965-99
Credit by banks In 1965		Domestic credit provided by banking sector in initial year 1965
Log school in 1965	Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	Log of secondary school enrolment rate in 1965, the ratio of total enrolment
Inflation	Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	Initial inflation rate measured by the annual % growth rate of the GDP deflator.
Inflation in 1965		Initial inflation rate in 1965, measured by the annual % growth rate of the GDP deflator.
Trade	Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communications, construction, financial, information, business, personal, and government services. They exclude labour and property income as well as transfer payments.	Import + export as share of GDP, averaged over the period 1965-1999
Trade in 1965		Import + export as share of GDP in initial year 1965
Government consumption	General government final consumption expenditure (general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defence and security, but excludes government military expenditures that are part of government capital formation.	Government consumption as a share of GDP, averaged over the period 1965-1999
Government consumption in 1965		Government consumption as a share of GDP in the initial year 1965

Summary

The financial sector plays an important part in economic growth as it can reduce the cost of acquiring information, conducting transactions and facilitating saving mobilisation. By providing these services, the financial sector can enhance resource allocation and increase aggregate savings. This report examines the empirical relationship between financial development and economic growth and to what extent this relationship differs across group of countries.

The analyses are based on three indicators which measure the financial sector by size (liquid liabilities) and activity (credit provided to private sector and credit by banks). The employed data set includes a representative selection of 60 countries over the period 1965-1997.

The analysis concludes that i) a positive statistical relationship exists between financial development and economic growth; and ii) developing countries grow faster than industrialised countries (some evidence of convergence). Financial sector developments therefore seem to have at least the same importance in developing countries as in industrialised countries.

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