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Research Department

Financial Development and Economic Growth

Prepared by José De Gregorio and Pablo E. Guidotti*

Authorized for Distribution by Malcolm Knight

December 1992

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Abstract

This paper examines the empirical relationship between long-run growth and the degree of financial development, proxied by the ratio of bank credit to the private sector as a fraction of GDP. We find that this proxy enters significantly and with a positive sign in growth regressions on a large cross-country sample, but with a negative sign using panel data for Latin America. Our findings suggest that the main channel of transmission from financial development to growth is the efficiency of investment, rather than its volume. We also present a model where the negative correlation between financial intermediation and growth results from financial liberalization in a poor regulatory environment.

JEL Classification Numbers:

O16, O40, O50

*We have greatly benefitted from comments by Michael Bruno, Malcolm Knight and Delano Villanueva. Any remaining errors are our own responsibility.

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<u>Contents</u>	<u>Page</u>
I. Introduction	1
II. Financial Intermediation and Economic Growth	3
1. An analytical overview	3
2. Measurement of financial intermediation	7
a. Interest rates, financial intermediation and growth	7
b. Monetary aggregates and financial intermediation	10
III. Empirical Evidence	12
IV. Over-lending and Financial Crises: An Example	21
V. Conclusions	23
Text Tables:	
1. Financial Intermediation and Growth Full sample and high-income countries	13
2. Financial Intermediation and Growth Middle- and low-income countries	14
3. Financial Intermediation and Growth in Latin America	18
Figure 1: Screening Costs	22a
Appendix A:	
Table 1. Financial Intermediation, Growth and Equipment Investment, 1960-85	24
Table 2. Financial Intermediation, Growth and Equipment Investment, Sub-periods	25
Appendix B:	
Table 1. Classification of Countries by Income per Capita in 1960	26
References	27

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I. Introduction

Ever since the pioneering contributions of Goldsmith (1969), McKinnon (1973), and Shaw (1973), the relationship between financial development and economic growth has remained an important issue of debate. ^{1/} Numerous studies have dealt with different aspects of this relationship at both the theoretical and empirical levels. At a basic level, several studies have attempted to establish whether financial deepening leads to improved growth performance, and have endeavoured to analyze the strength of this relationship. Other studies have focused on identifying the channels of transmission from financial intermediation to growth.

The original contributions to this literature all coincide in suggesting that there is a strong positive correlation between the extent of financial development and economic growth. However, they emphasize different channels of transmission. While the main focus in Goldsmith (1969) is on the relationship between financial development and the efficiency of investment, McKinnon (1973) and Shaw (1973), influenced to a large extent by the success stories of South East Asia, emphasize the role played by financial liberalization in increasing savings and, hence, investment.

Research on the relationship between financial development and growth has received a new source of inspiration from the rapidly expanding "endogenous growth" literature. By focusing on cases where the marginal product of capital always remains positive, this literature provides a natural framework in which financial markets affect long-run, and not just transitional, growth. Models in this spirit by Bencivenga and Smith (1991), and Greenwood and Jovanovic (1990) for instance, emphasize how the creation and growth of financial institutions lead to a positive relationship between financial intermediation and economic growth. Most of these studies tend to emphasize the role of financial intermediation in improving the efficiency of investment, rather than its volume. That is, financial intermediaries play a central role in allocating capital to its best possible use. Section II provides a brief overview of these theoretical developments.

While empirical studies often find a positive relationship between indicators of financial development and growth, much controversy remains about how these results should be interpreted. There are two main sources of controversy. First, there is debate over the issue of how to measure empirically the extent of financial intermediation. Typically, financial

^{1/} The terms "financial development" and "financial intermediation" are used interchangeably for the purpose of this paper. Financial development, however, should be thought of as a broader concept that also includes financial innovations that occur outside the banking system. Because of the lack of data regarding non-bank financial innovation in developing countries, the degree of financial development is effectively measured by the level of financial intermediation by the banking system.

intermediation has been proxied largely by the level of the real interest rate and by various monetary aggregates, all of which pose significant problems of interpretation. A brief review of these issues is provided in Section II. The second area of controversy concerns the channel of transmission from financial development to growth. While some studies find support for the McKinnon-Shaw hypothesis, others conclude that there is no clear relationship between measures of financial development and savings or investment rates.

The purpose of this paper is to re-examine the empirical relationship between financial development and long-run growth by using the ratio of bank credit to the private sector to GDP as the indicator of financial development. This indicator, as we argue in more detail later, has a clear advantage over measures of real interest rates or monetary aggregates such as M1, M2, or M3, in that it more accurately represents the actual volume of funds channelled to the private sector. Therefore, the ratio of bank credit to the private sector to GDP is more directly linked to investment and economic growth.

Our empirical investigation is carried out in Section III using two different data sets. First, we extend Barro's (1991) cross-country growth regressions for a sample of 98 countries during the period 1960-85, by including our proxy for financial development as an additional explanatory variable. 1/ 2/ Second, using De Gregorio's (1992a) panel data set for 12 Latin American countries during 1950-85 we explore the relationship between financial intermediation and growth in Latin America.

The following are the main results we obtain. First, using Barro's (1991) data set we find a significantly positive effect of our measure of financial development on long-run growth of real per capita GDP. This positive effect appears to be particularly strong in middle- and low-income countries. We also find that the relationship is stronger in the 1960's than in the 1970's and 1980's.

Second, our findings suggest that the effect of financial intermediation on growth is due mainly to its impact on the productivity of investment, rather than its volume. When investment is excluded as an explanatory variable in the growth regressions, the estimated coefficient of our proxy

1/ Like other recent studies (for instance, Jappelli and Pagano (1992), and Roubini and Sala-i-Martin (1992)), this paper follows the strategy of adding new variables to Barro's (1991) basic cross-country regressions in order to analyze their impact on growth. Jappelli and Pagano (1992) also use the data set of De Long and Summers (1991). King and Levine (1992) carry out a detailed empirical investigation on the effects of a number of financial indicators on growth, using data from Levine and Renelt (1992).

2/ In order to check the robustness of our results, we also use De Long and Summers' (1991) data set. The results, reported in Appendix A, are very similar to those obtained using Barro's (1991) data set.

of financial development increases moderately. For the full sample we find that about one fourth of the effect of our measure of financial development on growth is channeled through the volume of investment, the rest being explained by improved efficiency of investment. The relative importance of improved efficiency of investment is higher in low- and middle-income countries than in high-income countries.

Third, when we explore the relationship between our measure of financial intermediation and economic growth in Latin America, we find a robust and significant negative correlation between them. This effect, which may appear puzzling, is interpreted in light of the extreme experiments of financial liberalization that were witnessed by Latin America during the 1970's and 1980's, and which subsequently collapsed. Section IV provides an example that shows how, in the absence of proper regulation, more financial intermediation may be associated with lower efficiency of investment. The empirical findings suggest that, indeed, the main channel for transmitting the negative effect of financial intermediation onto growth is via the adverse impact on the efficiency of investment, rather than its volume.

The paper is organized as follows. Section II provides a brief overview of the analytical and empirical literature, as well as a discussion of the issue of how to measure the degree of financial intermediation. Section III presents the empirical evidence. Section IV provides an example that shows why financial development may be negatively related to growth. Section V concludes.

II. Financial Intermediation and Economic Growth

This section provides a brief overview of the relationship between financial intermediation and economic growth. It covers both the analytical aspects of this relationship and the issue of how to measure financial intermediation.

1. An analytical overview

To organize the ensuing discussion it is useful to consider the following production function which, for simplicity, is assumed to depend only on the capital stock:

$$y_t = f(k_t), \quad (1)$$

where y_t and k_t denote output and the stock of capital at time t , respectively. By totally differentiating equation (1) and denoting the rate of growth of output by \hat{y} , the savings rate (dk/y) by s , and the marginal productivity of capital by ϕ , we have:

By equation (2), the rate of output growth is the product of the savings rate and the marginal productivity of capital.

$$\dot{y}_t = \frac{dk_t}{y_t} f'(k_t) = s_t \phi_t. \quad (2)$$

In the traditional literature on growth, emphasis has been placed on the dynamic process that would lead the economy to a steady-state equilibrium in which (per capita) output growth would eventually cease. The assumption of decreasing marginal productivity of capital plays a crucial role in ensuring convergence to such a steady-state equilibrium. In the context of equation (2), decreasing marginal productivity of capital implies that ϕ_t (and, hence, output growth) goes to zero as k_t grows over time. ^{1/} The new literature on endogenous growth, in contrast, considers a different mechanism in which the marginal productivity of capital does not converge to zero as capital grows unboundedly. ^{2/} Therefore, emphasis is placed on situations where it is possible for (per capita) real output to grow endogenously, even in the absence of exogenous productivity growth.

Financial development has a dual effect on economic growth. On the one hand, the development of domestic financial markets may enhance the efficiency of capital accumulation (hence increasing ϕ_t). On the other hand, financial intermediation can contribute to raising the savings rate and, thus, the investment rate (hence, increasing s_t). The former effect is first emphasized by Goldsmith (1969), who also finds some positive correlation between financial development and the level of real per capita GNP. He attributes this correlation to the positive effect that financial development has in encouraging more efficient use of the capital stock:

Irrespective of whether or not the existence and development of a financial superstructure increases the aggregate volume of saving and investment and thus accelerates the rate of economic growth beyond what would have otherwise been, there is no doubt that it results in a different allocation of capital expenditures among and within sectors, types of tangible assets, and regions (page 398).

In addition, Goldsmith (1969) also argues that the process of growth has feedback effects on financial markets by creating incentives for further financial development.

^{1/} Of course, with depreciation of the capital stock and a positive rate of time preference the steady-state equilibrium is reached for a bounded level of k_t (see, for instance, Solow (1956) and Blanchard and Fischer (1989)).

^{2/} See, for example, Romer (1986), Lucas (1988), and Grossman and Helpman (1991).

McKinnon (1973) and Shaw (1973) extend the earlier argument by noting that financial deepening implies not only higher productivity of capital but also a higher savings rate and, therefore, a higher volume of investment. Unlike Goldsmith (1969), where growth and financial intermediation are both thought of as endogenous, the focus of McKinnon (1973) and Shaw (1973) is on the effects of public policy regarding financial markets on savings and investment. In particular, McKinnon (1973) and Shaw (1973) argue that policies that lead to financial repression—for example, controls which result in negative real interest rates—reduce the incentives to save. Lower savings, in turn, result in lower investment and growth. Thus they conclude that higher interest rates resulting from financial liberalization induce households to increase savings. As will be discussed in more detail later on, the empirical validity of the McKinnon-Shaw hypothesis has been challenged by various authors. Díaz-Alejandro (1985), for instance, argues that the Latin American experience shows that financial deepening is unlikely to increase savings; therefore, the main contribution of financial deepening to growth should be thought of as increasing the marginal productivity of capital, rather than the volume of savings and investment.

Recent theoretical work has incorporated the role of financial factors in models of endogenous growth in an attempt to analyze formally the interactions between financial markets and long-run economic growth. Greenwood and Jovanovic (1990) present a model in which both financial intermediation and growth are endogenous. In their framework, the role of financial institutions is to collect and analyze information to channel investible funds to the investment activities that yield the highest return. Since the activity performed by financial intermediaries involves costs, Greenwood and Jovanovic (1990) show that there is a positive two-way causal relationship between economic growth and financial development. On the one hand, the process of growth stimulates higher participation in financial markets thereby facilitating the creation and expansion of financial institutions. On the other hand financial institutions, by collecting and analyzing information from many potential investors, allow investment projects to be undertaken more efficiently and, hence, stimulate investment and growth.

Bencivenga and Smith (1991) present a model in which individuals face uncertainty about their future liquidity needs. They can choose to invest in a liquid asset—which is safe but has low productivity—and/or an illiquid asset—which is riskier but has high productivity. In this framework, the presence of financial intermediation increases economic growth by channelling savings into the activity with high productivity, while allowing individuals to reduce the risk associated with their liquidity needs. Although individuals face uncertain liquidity needs, banks, by the law of large numbers, face a predictable demand for liquidity and can, therefore, allocate investment funds more efficiently. In the absence of financial intermediaries, individuals may be forced to liquidate their investment (i.e., their savings held in illiquid assets) when liquidity needs arise. Thus, the presence of banks also provides the benefit of eliminating unnecessary liquidations. Interestingly, Bencivenga

and Smith (1991) show in their model that growth increases even when aggregate savings are reduced as a result of financial development, the reason being the dominant effect that financial development has on the efficiency of investment.

Along similar lines, Levine (1992) analyzes the effects of alternative financial structures on economic growth. In his model, financial institutions raise the fraction of total savings devoted to investment and avoid premature liquidations of capital. Banks, stock markets, mutual funds, and investment banks enhance growth by promoting the efficient allocation of investment through various channels.

Saint-Paul (1992) develops a model where financial markets affect technological choice. In this model, agents can choose between two technologies: One technology is highly flexible and allows productive diversification, but has low productivity; the other is rigid, more specialized, and more productive. The economy is exposed to shocks to consumer preferences, which may result in a lack of demand for some products. Therefore, in the absence of financial markets risk-averse individuals (consumer-producers) may prefer technological flexibility rather than high productivity. Financial markets, in contrast, allow individuals to hold a diversified portfolio to insure themselves against negative demand shocks and, at the same time, to choose the more productive technology.

In a somewhat different approach, Roubini and Sala-i-Martin (1992) analyze the relationship between financial intermediation and growth by emphasizing the role of government policy. In particular, they develop a model in which financial repression becomes a tool that governments may use to broaden the base of the inflation tax. Thus financial repression yields higher seigniorage to finance government expenditures. In an optimal taxation framework where the tax instruments at the government's disposal are the inflation tax and an income tax that is subject to tax evasion, Roubini and Sala-i-Martin (1992) show that high income tax evasion induces policymakers to repress the financial system and set a high inflation rate in an attempt to generate higher revenues from the inflation tax. Since financial repression reduces the productivity of capital and lowers savings, it hampers growth.

From a different perspective, De Gregorio (1992b), and Jappelli and Pagano (1992) analyze the effects of financial market developments on the savings rate. They concentrate attention on the effect of borrowing constraints—that is, the inability of individuals to borrow freely against future income—on economic growth. This work shifts the focus from the effects of financial markets on the production side of the economy to their

effects on household behavior. A result common to both studies is that the full or partial inability of individuals to borrow against future income induces them to increase savings. The reason is that when individuals are unable to borrow, they must build up financial wealth by increasing savings in order to finance current consumption. Thus these studies suggest that, in general, financial deepening on the side of consumer credit is unlikely to increase savings. This result is consistent with casual observation in Latin America, where episodes of financial liberalization have not increased savings rates.

The implication from De Gregorio (1992b) and Jappelli and Pagano (1992) that the relaxation of borrowing constraints is unlikely to stimulate savings does not necessarily imply that such a form of financial deepening will result in lower growth. De Gregorio (1992b), in fact, suggests that the relationship between borrowing constraints and growth will ultimately depend on the importance of the effect of borrowing constraints on the marginal productivity of capital relative to their effect on the volume of savings. In particular, this paper shows that a relaxation of borrowing constraints increases the incentives for human capital accumulation. This effect is likely to increase the marginal product of capital and, hence, may lead to higher growth despite the reduction in savings.

2. Measurement of financial intermediation

This section provides an overview of the main issues that arise in connection with the choice of proxies for the level of financial intermediation.

a. Interest rates, financial intermediation, and growth

The McKinnon-Shaw hypothesis suggests that the level of financial intermediation should be closely related to the prevailing level of the real interest rate, the reason being that the level of the real interest rate indicates the extent of financial repression. According to this view (see, for instance, Fry (1988)), a positive real interest rate stimulates financial savings and financial intermediation, thereby increasing the supply of credit to the private sector. This, in turn, stimulates investment and growth. While the main channel of transmission emphasized by the McKinnon-Shaw hypothesis is the effect of real interest rates on the volume of savings, it is also recognized that positive real interest rates make the allocation of investible funds more efficient, thus providing an additional positive effect on economic growth. We argue, in contrast, that real interest rates are a poor indicator of financial intermediation and, more generally, of financial development.

The view that growth is positively related to the level of real interest rates finds empirical support in a number of studies. ^{1/} Most of these studies do no attempt to establish which is the precise channel of transmission from real interest rates to growth. Dornbusch (1990), in contrast, addresses this issue and shows that, while there appears to be a positive relationship between growth and real interest rates, this relationship cannot be attributed to the main channel of transmission emphasized by the McKinnon-Shaw hypothesis. In particular, Dornbusch (1990) finds that financial savings are not related to the level of real interest rates, and that the positive effect of real interest rates on growth does not come through its effect on the volume of investment. Khan and Villanueva (1991) suggest that positive real interest rates are a good proxy for the efficiency of capital accumulation. In view of these findings, one could conclude that a plausible interpretation (see Kormendi and Meguire (1985)) for the significance of the real interest rate in explaining growth performance reflects the fact that the real interest rate is acting as proxy for the productivity of investment, rather than for financial repression. Therefore, the discussion again turns to the question of the specific channel through which financial intermediation affects growth: the level and/or the efficiency of investment.

An additional problem is that most empirical work uses indicators of interest rates on deposits. However, a better indicator of the efficiency of the banking system is the difference between lending and deposit rates. King and Levine (1992) have used this variable in their empirical work and have found that the correlation between this indicator and per capita GDP growth is positive but statistically insignificant.

A more fundamental criticism of the McKinnon-Shaw hypothesis and of the resulting policy implication that high interest rates are beneficial for economic growth is provided by the recent literature focusing on policy credibility. This literature emphasizes that high real interest rates may reflect factors that do not bear any relation to the marginal productivity of capital on account, for instance, of public expectations of inflation and/or outright repudiation of government obligations and, more generally, lack of credibility of economic policies. ^{2/}

As emphasized by Calvo and Coricelli (1991) in the case of Eastern European economies, real interest rates may also reflect such factors as the presence of a fragile financial structure, a poor regulatory environment, and the lack of a proper legal framework to safeguard property rights. All of these factors cause high risk premia to be embodied in interest rates. Moreover, as discussed in the literature on stabilization and financial

^{1/} See, for example, Fry (1989), the World Bank (1989), Gelb (1989), Polak (1989), Easterly (1990), Khan and Villanueva (1991), and Roubini and Sala-i-Martin (1992).

^{2/} See for instance, Calvo (1988), Calvo and Guidotti (1991), Guidotti and Kumar (1991), and Persson and Tabellini (1990).

markets in the late 1970s and early 1980s, high real interest rates may have negative supply-side effects on working capital. ^{1/} This line of research argues that, because of this effect, financial liberalization can have negative consequences for output when firms are heavily dependent on working capital. The conclusion that emerges from all of these arguments is that high real interest rates may indeed have a negative impact on investment and economic growth through, for instance, credit rationing, increased production costs, or the creation of an internal debt problem as a result of the accumulation of significant amounts of arrears across domestic financial and production units.

A recent study by Greene and Villanueva (1991), which explores the determinants of private investment in a large sample of developing countries for the period 1975-87, finds a robust and quantitatively significant negative relationship between real interest rates and private investment. In a study focused on the relationship between interest rates and growth, Gelb (1989) finds no relationship between aggregate investment and real interest rates.

As noted by Calvo and Guidotti (1991), the conflicting evidence presented above regarding the relationship between real interest rates and economic growth suggests an inverted-U-curve type of relationship. Very low (and negative) real interest rates tend to cause financial disintermediation and hence tend to reduce growth, as implied by the McKinnon-Shaw hypothesis. Artificially low interest rates may create an excess demand for funds, so that investors have to be rationed, and consequently banks may face problems or may lack the incentive to allocate available credit to the most efficient projects. On the other hand, very high real interest rates that do not reflect improved efficiency of investment, but rather a lack of credibility of economic policy or various forms of country risk, are likely to result in a lower level of investment as well as a concentration in excessively risky projects. At intermediate levels real interest rates do not appear to be closely associated with growth, reflecting no clear-cut relationship between real interest rates and savings and investment. Evidence adduced by Roubini and Sala-i-Martin (1992) provides some support for this view. They find a significantly positive relationship between real interest rates and growth when episodes of very negative interest rates (below minus five percent per year) are examined, and no significant relationship when episodes of moderately negative real interest rates are considered.

In sum, these considerations suggest that real interest rates are likely to be rather poor indicators of the degree of financial intermediation, although they may be good indicators of the efficiency of investment. Therefore, the impact of real interest rates on growth cannot be easily interpreted as measuring the effect of financial development on growth.

^{1/} See Cavallo (1977), Taylor (1983) and van Wijnbergen (1983), among others.

b. Monetary aggregates and financial intermediation

Monetary aggregates provide an alternative set of variables to measure the extent of financial development. A number of empirical studies have used a wide variety of monetary aggregates to analyze the correlation between financial intermediation and economic growth. ^{1/} As in the case of real interest rates, however, the use of monetary aggregates as a proxy for the degree of financial intermediation presents problems. In particular, as noted by King and Levine (1992), different definitions of monetary aggregates may act as proxies for different roles of financial intermediation. And in some cases, monetary aggregates may be very poor indicators of the extent of financial development.

Consider first the more liquid forms of monetary aggregates, such as M1 or a broader measure such as M2. These are the aggregates that are likely to pose the most significant problems. In principle, it may be argued that the original McKinnon-Shaw hypothesis implies that a monetized economy reflects a highly developed capital market; hence a high degree of monetization should be positively related to growth performance. The basic problem with this argument lies in the fact that financial markets have two main functions (Fama (1980)): to channel funds from agents willing to save to those requiring funds (credit allocation or portfolio management), and to provide liquidity (or transactions) services. More importantly, the ability of the financial sector to allocate credit efficiently and to provide a medium of exchange are not necessarily related. While the aspect of financial intermediation that is thought to be related to investment and growth is that which refers to the ability of financial markets to allocate credit, a liquid aggregate such as M1—and in some cases M2—is mainly related to the ability of the financial system to provide liquidity, or a medium of exchange.

Therefore, one can envision situations in which a high level of monetization—say, measured by the ratio of M1 to GDP—is the result of financial underdevelopment, while a low level of monetization is the result of a high degree of sophistication of financial markets which allows individuals to economize on their money holdings. An example of the former case is provided by the so-called "monetary overhang" in Eastern Europe and the former Soviet Union. Before the implementation of market-oriented reforms, those economies had been—and most still remain—highly monetized compared to Western economies, mainly reflecting the lack of alternative assets that would serve as stores of value. Interestingly, this type of relationship is consistent with the analysis of Bencivenga and Smith (1991), which shows why financial repression may induce an increase in the stock of liquid assets relative to GDP.

^{1/} See, for example, McKinnon (1973), Gelb (1989), Neal (1989), Fry (1989). Typically monetary aggregates are scaled by dividing them by some other macroeconomic aggregate, such as GDP. King and Levine (1992) present a wide set of indicators and discuss their advantages and problems.

An example of the latter case—i.e., one in which low monetization is associated with a very sophisticated financial market—is provided by a number of economies where sustained high inflation has resulted in a steady demonetization. This phenomenon, however, has been largely stimulated by an increasing sophistication of financial markets, which allows individuals to economize on the real cash balances needed for transactions purposes.

To overcome some of the above mentioned problems, a less liquid monetary aggregate has sometimes been used to proxy for the degree of financial intermediation. For example, Gelb (1989) uses the ratio of a broad definition of money, M3, to GDP as a proxy for financial depth, and the change in M3 divided by GDP as a measure of financialization. Although these measures may be more related to the degree of credit market development than narrower definitions of money, they may still be influenced by factors other than financial depth. In particular, because M3 still includes liquid assets (M1), Neal (1988) and King and Levine (1992) have relied on indicators of quasi-liquid assets by subtracting M1 from M2.

In our ensuing analysis we use the ratio of domestic credit to the private sector to GDP as a proxy for the degree of financial intermediation. It corresponds to credit granted to the private sector by the central bank and commercial banks (line 32d from the International Monetary Fund's International Financial Statistics), as a fraction of GDP: we henceforth refer to this variable as CREDIT. The main advantage of CREDIT over other monetary aggregates is that because it excludes credit to the public sector, it represents more accurately the role of financial intermediaries in channelling funds to private market participants. Thus this is the definition of financial intermediation that should be more closely related to the level and efficiency of investment, and hence to economic growth.

However, the use of CREDIT is subject to caveats as well. In particular, while CREDIT appears to be the most appropriate indicator of the degree of financial intermediation that occurs through the banking system, it may be a weaker indicator of financial development broadly defined, to the extent that a significant portion of financial development occurs outside the banking system. This phenomenon appears to be most relevant in industrial countries, which have experienced significant non-bank financial innovation (see Goldstein, et al. (1992)). Nevertheless, it is likely that the two forms of financial development—i.e., bank and non-bank—are

positively correlated. ^{1/} Thus, the presence of financial innovation outside the banking system will show up in the form of a smaller coefficient for CREDIT (more on this in Section III). In developing countries, in contrast, most of financial development has occurred within the banking system. Therefore, in these countries CREDIT is likely to be a better proxy for financial development broadly defined.

Finally, as in the case of monetary aggregates generally, including CREDIT on the right-hand side of (per capita) output growth equations may introduce endogeneity problems. This is the case if, as suggested by the model of Greenwood and Jovanovic (1991), one expects the degree of financial intermediation to be endogenous. In that case the error term in the growth equations should be positively correlated with CREDIT, introducing a positive bias in the coefficient for CREDIT. As a result, the parameter estimates would be greater than the true coefficient. However, attempting to correct for endogeneity problems is tricky because there are no reasonable instruments for financial intermediation. For this reason, as happens with several other explanatory variables in growth equations the empirical results of the next section should be interpreted cautiously, as suggestive of broad correlations rather than indicating a causal relationship.

III. Empirical Evidence

The first set of results we present extends the cross-section regressions of Barro (1991) for average growth of real GDP per capita during 1960–85 for a sample of 98 countries. The results of adding our proxy for the degree of financial intermediation (CREDIT) to those regressions are presented in Tables 1 and 2. The basic specification follows Barro (1991). It includes as explanatory variables measures of human capital accumulation based on primary and secondary school enrollment ratios in 1960, GDP per-capita in 1960, the average level of government spending over GDP, and Barro's proxies for political instability. Unlike Barro (1991), we did not include dummies for each continent as explanatory variables in the estimations reported. Since their presence did not affect the results, they were dropped in order to simplify the exposition. Barro (1991) also includes

^{1/} To the extent that financial innovation induces a substitution away from bank credit—say, by inducing firms to resort to the stock market or other forms of direct financing—one could envision a situation where a negative relationship between bank credit and growth performance obtains as the result of a negative correlation between bank credit and non-bank intermediation. However, we do not think this is a relevant possibility. Later on we will present a case—i.e., Latin America—in which a negative relationship between CREDIT and growth is observed. Especially because those results are obtained in a context where growth performance is very weak (and therefore, no development of non-bank intermediaries is expected), they are interpreted as arising from lack of proper financial regulation, rather than from non-bank financial innovation.

Table 1. Financial Intermediation and Growth
(Barro (1991) data. Full sample and high-income countries)

Regression No.	(1)	(2)	(3)	(4)	(5)
CREDIT	0.018 (2.30)	0.024 (3.58)	0.010 (1.71)	0.009 (1.40)	-0.005 (-0.67)
Constant	0.018 (2.51)	0.025 (3.89)	0.018 (2.03)	0.027 (2.33)	0.007 (-0.35)
Investment Rate	0.066 (1.90)		0.096 (2.82)	0.051 (1.24)	0.088 (1.72)
Primary School Enrollment (1960)	0.013 (2.14)	0.018 (2.94)	0.002 (0.36)	-0.011 (-1.15)	-0.015 (-0.40)
Second. School Enrollment (1960)	0.024 (2.08)	0.032 (3.31)	0.044 (3.48)	0.033 (4.37)	-0.001 (-0.11)
GDP per capita (1960)	-0.007 (-6.28)	-0.008 (-6.61)	-0.007 (-5.64)	-0.005 (-3.74)	-0.007 (-1.87)
Government Spending	-0.113 (-3.80)	-0.112 (-3.80)	-0.161 (-4.22)	-0.049 (-1.55)	-0.015 (-0.40)
Political Instability <u>1</u> /	-0.017 (-2.75)	-0.019 (-2.80)	-0.023 (-2.80)	-0.045 (-4.23)	-0.066 (-2.91)
Political Instability <u>2</u> /	-0.002 (-1.03)	-0.004 (-1.60)	-0.003 (-1.04)	0.008 (1.74)	0.015 (1.74)
Sample	Full Sample 1960-85	Full Sample 1960-85	Full Sample 1970-85	High Income 1960-85	High Income 1970-85
R ²	0.57	0.54	0.50	0.73	0.66
No. observations	95	95	95	31	31

Dependent variable: Average GDP per capita growth 1960-85. t-statistics in parentheses. Standard errors were computed using White's robust procedure. CREDIT corresponds to the ratio between domestic credit to the private sector (line 32d IFS) and GDP. For a description of the rest of the variables see Barro (1991).

1/ Barro's measure of the number of revolutions and coups per year.

2/ Barro's measure of assassinations per million population per year.

Table 2. Financial Intermediation and Growth
(Barro (1991) data. Middle- and low-income countries)

Regression No.	(6)	(7)	(8)	(9)	(10)
CREDIT	0.044 (2.16)	0.054 (2.77)	0.048 (2.39)	0.135 (3.62)	0.081 (1.01)
Constant	0.015 (1.08)	0.022 (1.40)	0.017 (1.02)	0.042 (3.86)	0.033 (1.74)
Investment Rate	0.103 (2.38)		0.117 (1.02)	0.099 (1.89)	0.148 (2.22)
Primary School Enrollment (1960)	0.026 (2.33)	0.031 (2.33)	0.019 (1.75)	-0.003 (-0.31)	-0.015 (-0.87)
Second. School Enrollment (1960)	-0.033 (-1.79)	-0.013 (-0.56)	0.014 (0.66)	0.139 (4.70)	0.121 (3.80)
GDP per capita (1960)	-0.015 (-2.77)	-0.012 (-2.10)	-0.016 (-4.18)	-0.087 (-4.40)	-0.050 (-1.55)
Government Spending	-0.127 (-3.35)	-0.138 (-3.55)	-0.203 (-3.97)	-0.139 (-3.21)	-0.187 (-2.42)
Political Instability <u>1</u> /	-0.011 (-1.55)	-0.012 (-1.45)	-0.017 (-1.95)	-0.013 (-1.26)	-0.022 (-1.39)
Political Instability <u>2</u> /	-0.000 (-0.15)	-0.004 (-1.38)	-0.014 (-0.39)	-0.022 (-3.12)	-0.009 (-0.59)
Sample	Middle Income 1960-85	Middle Income 1960-85	Middle Income 1970-85	Low Income 1960-85	Low Income 1970-85
R ²	0.78	0.73	0.72	0.62	0.47
No. observations	32	32	32	32	32

Dependent variable: Average GDP per capita growth 1960-85. t-statistics in parentheses. Standard errors were computed using White's robust procedure. CREDIT corresponds to the ratio between domestic credit to the private sector (line 32d IFS) and GDP. For a description of the rest of the variables see Barro (1991).

1/ Barro's measure of the number of revolutions and coups per year.

2/ Barro's measure of assassinations per million population per year.

the 1960 purchasing power parity investment deflator and its deviation from the sample average. After CREDIT was included in the regressions, we found that the coefficients of the indicators of PPP investment deflators were sometimes non-significant, and their inclusion did not affect other parameter estimates significantly. Therefore, to avoid many changes of specification we report results where the indicators of PPP investment deflators are omitted. The estimations were carried out using OLS, and the standard errors were computed using White's robust procedure. 1/ 2/

Regressions (1) and (2) correspond to the full sample of countries for the period 1960-85. They show that per capita real output growth is positively correlated with CREDIT. The remaining parameter estimates are in line with those found by Barro (1991). As discussed in the previous section, it is important to disentangle the effects of financial intermediation on the volume of savings and investment from those on the efficiency of investment. To examine this issue, equation (2) excludes the volume of investment from equation (1). If the main channel through which financial intermediation affects growth is the volume of investment, then the coefficient of CREDIT should increase substantially when investment is excluded as an explanatory variable, because CREDIT would also be capturing its indirect effects on growth through fostering investment. In contrast, as indicated by regression (2), the coefficient of CREDIT increases by a third. This suggests that approximately one fourth of the effect of CREDIT on growth is transmitted through the volume of investment, while the remaining three fourths reflect the effect of CREDIT on the efficiency of investment. 3/ Thus, these findings support the hypothesis that the effects of financial intermediation on growth, as indicated by most of the literature, are primarily transmitted through an increase in the marginal productivity of capital. These results contrast with those of King and Levine (1992), who find that the effect of financial intermediation on growth comes mainly through an increase in investment. 4/

As discussed in Section II, CREDIT may be a weak indicator of financial development in situations where substantial financial innovation occurs outside the banking system. Under these conditions, higher growth is not

1/ Appendix A presents regressions using De Long and Summers' (1991) data set. Most of the discussion that follows in the text is corroborated by the results reported in Tables A.1 and A.2.

2/ The measure of government spending excludes education and defense expenditure in order to proxy for government consumption. None of the results change if total government expenditure is used.

3/ Using De Long and Summers' (1991) data set, the comparison changes to one third against two thirds.

4/ Using real interest rates on deposits as a proxy for financial depth, Gelb (1989) finds a positive correlation between financial depth and growth, but no effect between investment and financial depth, concluding that financial depth affects growth positively because it increases the efficiency of investment.

necessarily accompanied by a higher volume of credit to the private sector. In order to explore this issue we examined the relationship between CREDIT and growth across sub-periods and across sub-samples of countries. In particular, the above considerations suggest the following conjectures: (a) the effect of CREDIT on growth should be weaker in the 1970's and 1980's, as these periods are associated with higher financial innovation outside the banking system, and (b) the effect of CREDIT on growth should be weaker in industrial countries, where financial innovation outside the banking system has been the largest. Results support the validity of the above conjectures. Regression (3) restricts the sample to the period 1970-85. It shows that for the entire group of countries the correlation between CREDIT and growth is smaller than for the 1960-85 sample. The coefficient on CREDIT falls to approximately half of that obtained for the full sample. The same result obtains using De Long and Summers' (1991) data set, where the coefficient of CREDIT in the 1975-85 period is about a quarter of the level that obtains in the 1960-75 period.

To explore further the robustness of previous results and to see the patterns that emerge across different stages of development, we run the specification given in regressions (1) to (3) for different sub-samples of countries classified according to their levels of income in 1960. The original sample of 98 countries in Barro (1991) was divided into high-income countries (32 countries), middle-income countries (33 countries) and low-income countries (33 countries). The countries included in each group are listed in Table B.1 in Appendix B. The sample of low-income countries is composed mainly of African countries. ^{1/} The findings for high-income countries are presented in Table 1, while the results for middle-income and low-income countries are presented in Table 2.

Compared to the rest of the sample, the effect of financial development on growth in high-income countries is relatively small. In particular, the effect in the period 1970-85 is not significantly different from zero, as shown by regression (5). As discussed earlier, the contrast between the periods 1960-85 and 1970-85 may reflect the significant financial innovation outside the banking system that occurred in industrialized countries during the 1970's and 1980's. Alternatively, this result may suggest that increased efficiency from further financial development in high-income countries may have reached the stage of diminishing returns.

As Table 2 shows, the impact of CREDIT on growth increases significantly as one moves progressively from high-income to low-income countries. However, while this finding is consistent with our previous conjecture, it should be noted that it could also reflect a larger bias in the coefficient in the sample of low- and middle-income countries. As discussed in the previous section, if CREDIT is endogenous then the bias is likely to be positive. Further research will be required to assess more precisely the

^{1/} Barro's (1991) sample includes 12 Latin American countries and 37 African countries.

presence of such a bias. Table 2 also reveals that the effect of CREDIT on growth declines in the period 1970-85 for both groups of countries. Unlike the case of high-income countries, it is less clear that in low-income countries this fact can be explained in terms of increased development of non-bank financial intermediation.

When the volume of investment is included in the sample of middle-income countries (regression (6)), the increase in the size of the coefficient on CREDIT is rather small. A similar result is obtained for the sample of low-income countries, where the coefficient increases from 0.135 to 0.146 when investment is excluded. The largest value is obtained for the sample of high-income countries, where the coefficient increases from 0.009 to 0.015. Overall these findings suggest that, except for high-income countries, the effect of financial development on the volume of investment is relatively small and, hence, most of the beneficial effect on growth comes from the increased efficiency of investment.

Although our focus is on financial intermediation, it is worth noting some other interesting results that emerge from Table 2. First, the effect of initial levels of primary and secondary school enrollment ratios differs significantly across groups of countries. Second, government consumption and Barro's (1991) indices of political instability are in general negatively related with growth in all groups of countries, although magnitudes and significance levels differ across them. Third, all groups of countries show some degree of conditional convergence.

We now analyze the Latin American experience in greater detail. For this purpose we extend the estimations of De Gregorio (1992a). The data set consists of panel data for 12 Latin American countries using 6-year average data for the period 1950-85. The basic specification includes investment rates, literacy rates as a proxy for human capital, foreign investment, inflation, GDP per capita in 1960, and government spending. The estimations are carried out using panel data with random effects, and the standard errors are computed using White's robust procedure. The main results are presented in Table 3.

As was the case for the regressions based on Barro's (1991) data set, the inclusion of CREDIT as an explanatory variable does not alter the coefficients of other explanatory variables—with the exception of government spending which becomes insignificant. Interestingly, the coefficient of CREDIT is significantly negative. This result is obtained under many specifications and appears to be robust when estimated in the full sample. In addition, as regressions (11) and (12) show, a negative effect is found regardless of whether investment is included as a right-hand-side variable. This result is in sharp contrast with those obtained with the Barro (1991) data set; because of its robustness it merits further examination.

Table 3. Financial Intermediation and Growth in Latin America
(De Gregorio (1992a) data)

Regression No.	(11)	(12)	(13)	(14)	(15)
CREDIT	-0.092 (-3.20)	-0.104 (-3.83)	-0.045 (-0.76)	-0.029 (-0.52)	-0.087 (-2.20)
Constant	-0.051 (-1.85)	-0.056 (-2.29)	0.010 (0.49)	0.004 (0.21)	-0.063 (-3.09)
Investment Rate		0.176 (3.33)		0.062 (1.61)	0.050 (0.93)
Literacy Rate ($\times 10^{-2}$)	0.116 (3.56)	0.069 (2.08)	0.045 (1.59)	0.029 (0.95)	0.105 (1.94)
Foreign Investment	0.345 (2.30)	0.354 (3.02)	0.619 (4.71)	0.588 (4.82)	0.284 (1.94)
Inflation (log) ($\times 10^{-2}$)	-0.763 (-3.20)	-0.855 (-4.27)	0.048 (0.248)	-0.045 (-0.25)	-0.930 (-4.35)
GDP per capita (1960) ($\times 10^{-5}$)	-1.024 (-4.27)	-0.681 (-2.83)	-0.917 (-3.81)	-0.781 (-3.45)	-0.860 (-4.15)
Government Spending	-0.074 (-0.99)	-0.031 (-0.50)	-0.003 (-0.07)	0.002 (0.06)	-0.063 (-1.00)
Sample			1950-68	1950-68	Excludes Argentina, Brazil and Chile
R ²	0.45	0.55	0.50	0.56	0.66
No. observations	62	62	38	38	46

Dependent variable: Average GDP per capita growth in 6 year-periods during 1950-85. t-statistics in parentheses. Standard errors were computed using White's robust procedure and the estimations were done using panel data with random effects. CREDIT corresponds to the ratio between domestic credit to the private sector (line 32d IFS) and GDP. For a description of the rest of the variables see De Gregorio (1992a).

Before analyzing in more detail the result regarding the coefficient of CREDIT, it is interesting to note that after CREDIT is included in the regression the effect of inflation on growth is still negative, and with a value statistically unchanged compared to that which obtains when CREDIT is excluded. It has been argued that the negative correlation between inflation and growth may simply reflect the fact that inflation is a proxy of financial repression. The results presented in Table 3 show that inflation exerts a negative effect on growth even after we control the degree of financial development.

Regressions (13) to (15) present results for some selected sub-samples. Regressions (13) and (14) show that the effects of CREDIT are not significant during the first half of the sample, the 1950's and 1960's. In other words, the negative effect of CREDIT on growth is attributable mainly to the last sub-periods of the sample; that is, there is a strong negative correlation between financial intermediation and growth during the 1970's and 1980's in Latin America. Finally, regression (15) shows that the negative correlation between CREDIT and growth is still present when Argentina, Brazil and Chile are excluded from the sample, countries that might be thought, a priori, to be driving the results.

The above findings constitute the first evidence we are aware of that there are cases where a robust negative relationship exists between financial intermediation and growth. ^{1/} At first glance, this evidence may appear puzzling. In our view, however, these findings are less controversial once one considers that the negative relationship between financial intermediation and growth is obtained for Latin American countries during the 1970s and 1980s, a set of countries and a time period when financial markets were exposed to extreme conditions. In particular, we think our findings may reflect the effects of experiments of extreme liberalization of financial markets followed by their subsequent collapse. The following paragraphs attempt to explain the reason for the apparent

^{1/} In independent work, Gertler and Rose (1991) examine the correlation between CREDIT and the level of real per capita income using panel data for 69 developing countries with annual observations during the period 1950-88. They find a significant positive correlation, except when they run the regression in first differences, where they find a negative coefficient, i.e., the rate of growth of income and the rate of growth of CREDIT are negatively correlated. Although those results are not fully comparable to ours and they dismiss this correlation as stemming from business-cycle, rather than long-run correlations, the similarity with our findings is noteworthy.

contradiction between the results obtained for Latin America and those presented earlier. 1/

After years of financial repression in Latin America, the 1970s witnessed substantial efforts to liberalize domestic capital markets in several of these countries. Many of these experiments collapsed in the early 1980s (see Díaz-Alejandro (1985)). The liberalization of financial markets was often undertaken in the context of poor regulatory environments, resulting in very fragile financial systems. The negative effects of lack of regulation were compounded by widespread expectations that the financial system would be bailed out in the event of failure. In many cases, this led to massive over-lending. Therefore, a high degree of financial intermediation in the sample of Latin American countries was often a sign of a fragile and over-exposed financial system, rather than one that was efficiently allocating credit.

An important feature of the Latin American experience is the massive government intervention after the collapse of financial systems. This intervention most likely validated expectations and, hence, appears to be an essential factor in explaining the behavior of the banking systems in periods preceding their collapse. Regardless of the existence of formal deposit insurance, governments bore most of the costs of financial crises by bailing out banks and protecting depositors. The fact that government bailouts occurred independently of the presence of formal deposit insurance legislation strongly suggests that their policy of not bailing out failing banks was simply time-inconsistent; all agents realized that the government had an incentive to intervene after a collapse occurred and that, consequently, it could not stick to its announced policy of non-intervention. As the Latin American experience illustrates, 2/ banks may act on the assumption that the government will provide some degree of relief in the event of a crisis.

There are several possible reasons behind a government's incentive to intervene in the event of a financial crisis. A traditional explanation is that governments do not want the public to think that the financial system can collapse; consequently, they let it be known that relief will be provided at the first sign of a portending crisis. After this has happened, people tend to expect the government to repeat this action at later dates. Another explanation is that because of political pressure (or preferences), governments do not want depositors—particularly holders of small deposits—

1/ We run all regressions in Table 3 with commercial bank credit to the private sector (line 22d) as a ratio of GDP instead of CREDIT. This measure excludes central bank credit to the private sector because in some instances central bank credit could be more related to fiscal developments than financial intermediation. The results of Table 3 are robust to this change in the proxy for financial intermediation.

2/ In the U.S. the case of the Continental Illinois and the S&L crises are examples of massive bailouts.

to suffer significant losses. Therefore, regardless of governments' assurances that there will not be a bailout of financial institutions, and even in the absence of formal deposit insurance, private agents may expect that some form of relief will be forthcoming to banks and/or depositors in the event of a crisis. In turn, the expectation of a bailout induces inefficient behavior on the part of banks. In particular, banks will tend to be less careful in evaluating credit applications and, as a result, they may end up over-lending. This inefficiency is likely to translate into a reduction of long-run growth. The next section provides an example to illustrate this point. ^{1/}

The above considerations suggest that the negative relationship between financial intermediation and long-run growth observed in the sample of Latin American countries comes from a negative effect on the efficiency of investment, rather than from effects on the volume of investment. In fact, the above considerations point towards the possibility that more financial intermediation may be associated with over-lending, rather than with rationing. Thus, more financial intermediation could be associated with higher but less efficient investment.

The conjecture that the negative relationship between financial intermediation and growth is due to a loss of efficiency is borne out by the empirical findings in Table 3. As was the case with the regressions run on Barro's (1991) data set, regressions (11) and (12) show that the coefficient of CREDIT remains broadly unchanged once investment is included as an explanatory variable. This result provides additional support for the view that the main channel of transmission from financial intermediation to long-run growth is the efficiency of investment, rather than its volume.

IV. Over-lending and Financial Crises: An Example

This section provides an example to illustrate the possibility that in the absence of proper regulation expectations about government intervention in the case of a financial crisis may lead to over-lending by banks, coupled with a loss of efficiency in the allocation of funds.

To keep the analysis simple we consider the behavior of a single bank in an unregulated financial market when it knows (or believes) that in the event of a crisis it will be partially bailed out by the government. Furthermore, we assume that there is an infinitely elastic supply of funds so that we can abstract from the effects of financial markets on the volume of savings.

^{1/} In a related context Isard, Mathieson and Rojas-Suárez (1992) present a model in which government's protection (implicit or explicit) of depositors may reduce their incentive to evaluate the financial position of banks. This in turn reduces market discipline and increases financial fragility.

In each period, a representative bank can finance a continuum of projects. Each project, indexed by x , requires a unitary loan and yields a return equal to αx . Parameter α is common to all projects and is stochastic. It takes the value α^h with probability h and α^l with probability $1-h$. Since $\alpha^h > \alpha^l$ superscript h represents a high-productivity state of nature and l a low-productivity one. The return x is assumed to be uniformly distributed over the range $[\underline{x}, \bar{x}]$; for normalization it is assumed that $\bar{x} - \underline{x}$ is equal to unity.

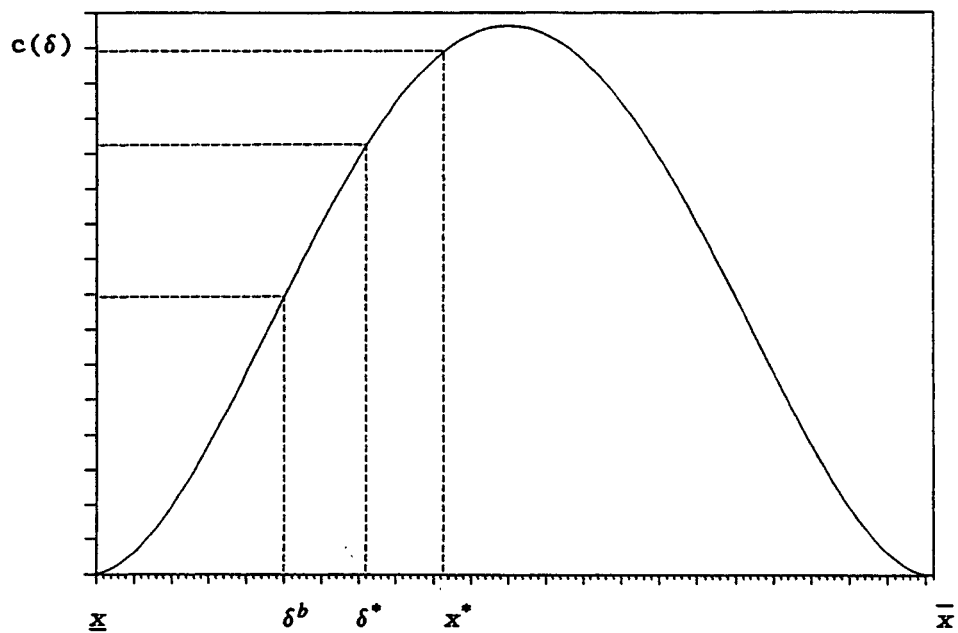
The loan contract stipulates an interest rate equal to $r-1$; hence, amortization plus interest equals r in the case that αx is greater than r . In the event that αx is less than r , all of the return on the project (i.e., αx) is paid to the bank. It is assumed that all projects are profitable in the state of high productivity; hence, $\underline{x}\alpha^h > r$. Thus the bank is able to obtain full repayment on its loan in high-productivity states. In contrast, it is assumed that in low-productivity states only projects with return $x > x^*$ receive a positive net return. That is, x^* is such that $\alpha^l x^* = r$. This implies that in low-productivity states the bank gets partial repayment on loans invested in the sub-interval of projects yielding a return below x^* .

Banks, in turn, pay interest to depositors at the rate $\rho-1$, regardless the realization of α . Since the bank may make losses in low-productivity states, it may need government relief to be able to meet the interest payment to depositors in full. It is assumed, therefore, that the government bails out banks by paying a fraction b of the payments owed to depositors in the event that productivity is low. This implies that a bank which lends to all projects with return higher than δ pays $(1-b)\rho(\bar{x}-\delta)$ to depositors from its own resources when $\alpha=\alpha^l$. The fraction b is the minimum bailout that keeps the bank solvent. Hence, one may think of b as an indicator of the fragility of the financial system; for a given size of loss a higher b means the bank has a lower capacity to absorb that loss from its own resources (e.g., capital plus reserves).

The main purpose of banks is to review the various projects in order to determine their quality. The technology for evaluating projects is such that, by paying a cost $c(\delta)$, the bank can determine whether a project has a return x greater or less than a given value δ . Presumably, distinguishing whether a project is very good or very bad is cheap. What is costly is to evaluate projects of average quality. Thus, a reasonable shape for the cost function $c(\delta)$ is as shown in Figure 1. The cost function $c(\delta)$ can be thought of as the amount of resources spent by a bank in screening projects. We assume that x^* is below x^m , and for all x below x^* the cost function is convex.

Since banks make profits lending to all projects when $\alpha=\alpha^h$, but incur losses for a range of projects with $x < x^*$ if $\alpha=\alpha^l$, the optimal strategy for a representative bank is to choose a value of δ , lend to all projects with $x > \delta$, and deny loans to the rest.

Figure 1: Screening Costs



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We can now characterize the optimal choice of δ . Expected bank profits are given by:

$$\begin{aligned} E\pi &= hr(\bar{x}-\delta) + (1-h)[r(\bar{x}-x^*) + \int_{\delta}^{x^*} \alpha' x dF(x)] - c(\delta) - (1-b)\rho(\bar{x}-\delta) \\ &= hr(\bar{x}-\delta) + (1-h)[(\bar{x}-x^*) + \frac{\alpha'}{2}(x^{*2}-\delta^2)] - c(\delta) - (1-b)\rho(\bar{x}-\delta). \end{aligned} \quad (3)$$

The optimal choice of δ , denoted by δ^* , is given by the following condition:

$$c'(\delta^*) = \rho[h + (1-h)(1-b)] - hr - \alpha'\delta^*(1-h). \quad (4)$$

Equation (4) states that, at the optimum, the bank equates the expected marginal benefit with the marginal cost—i.e., interest plus screening costs—associated with an additional unit of lending, $\bar{x}-\delta$. Since $c(\delta)$ is convex over the relevant range, equation (4) implies that there is a positive relationship between the amount of bank lending, $\bar{x}-\delta$, and the size of the bailout expected from the government, b . Moreover, equation (4) implies that higher financial fragility—as measured by a higher b —is not only associated with more lending, but also with less screening on the part of banks.

In sum, this example shows how, because of government incentives to provide relief to the financial system during crisis, the level of financial intermediation—measured by bank lending to the private sector—may be positively associated with lower productivity of investment and with greater fragility of the financial system. In turn, this type of consideration may explain why, in situations where the financial system is liberalized and allowed to operate under a poor regulatory environment, higher financial intermediation may have negative effects on growth performance, as suggested by recent Latin American experience.

V. Conclusions

This paper has examined the empirical relationship between financial development and economic growth. The review of the literature and our empirical findings suggest that, by and large, financial development leads to improved growth performance. However, as the Latin American experience of the 1970's and 1980's and the analysis of Section IV suggest, there may be instances where unregulated financial liberalization and expectations of government bailouts can lead to a negative relationship between the degree of financial intermediation and growth. Our findings also strongly suggest that the main channel of transmission from financial development to growth is the effect on the efficiency of investment, rather than its level.

Table 1. Financial Intermediation, Growth and Equipment Investment, 1960-85
(De Long and Summers (1991) data)

Regression No.	(A1)	(A2)	(A3)	(A4)	(A5)
CREDIT	0.022 (1.95)	0.036 (3.28)	0.017 (2.34)	0.017 (1.55)	0.025 (2.31)
Constant	-0.018 (-1.64)	0.001 (0.06)	-0.014 (-1.89)	-0.029 (-1.73)	-0.032 (-1.87)
Equipment Investment share	0.169 (2.24)		0.274 (5.51)	0.184 (2.21)	
Non-Equipment Investment share	0.055 (1.65)		-0.015 (-0.54)	0.009 (0.25)	
Labor Force Growth	0.063 (0.30)	-0.009 (-0.04)	0.051 (0.36)	0.165 (0.77)	0.206 (0.94)
GDP/wkr. gap 1960	0.022 (2.39)	0.014 (1.48)	0.028 (3.48)	0.044 (3.25)	0.051 (3.85)
Sample Barro	Full Sample	Full Sample	High Productivity Including Barro	Including	Including
			Countries	Regressors	Regressors
R ²	0.34	0.21	0.80	0.50	0.45
No. observations	57	57	23	57	57

Dependent variable: Average GDP per worker growth 1960-85. t-statistics in parentheses. Estimations were done with OLS. CREDIT corresponds to the ratio between domestic credit to the private sector (line 32d IFS) and GDP. For a description of the rest of the variables see De Long and Summers (1991).

Table 2. Financial Intermediation, Growth and Equipment Investment, Sub-periods
(De Long and Summers (1991) data)

Regression No.	(A6)	(A7)	(A8)	(A9)
CREDIT	0.040 (2.76)	0.012 (0.82)	0.022 (1.76)	0.011 (1.16)
Constant	-0.005 (-0.41)	-0.037 (-2.22)	-0.007 (-0.57)	-0.025 (-1.93)
Equipment Investment share	0.067 (0.74)	0.252 (2.48)	0.240 (2.88)	0.300 (3.33)
Non-Equipment Investment share	0.043 (1.05)	0.113 (2.13)	-0.060 (-1.38)	0.068 (1.43)
Labor Force Growth	0.208 (0.80)	-0.394 (-1.20)	0.106 (0.46)	-0.294 (-1.29)
GDP/wkr. gap 1960	0.016 (1.38)	0.033 (2.55)	0.050 (3.77)	0.004 (0.31)
Sample	Full Sample 1960-75	Full Sample 1975-85	High Pty. Count. 1960-75	High Pty. Count. 1975-85
R ²	0.25	0.27	0.80	0.50
No. observations	57	59	23	57

Dependent variable: Average GDP per worker growth. t-statistics in parentheses. Estimations were done with OLS. CREDIT corresponds to the ratio between domestic credit to the private sector (line 32d IFS) and GDP. For a description of the rest of the variables see De Long and Summers (1991).

Table 1. Classification of Countries by
Income per Capita in 1960

High Income	Middle Income	Low Income
United States	Hong Kong	Ivory Coast
Switzerland	Peru	Zambia
Luxembourg	Cyprus	Korea (south)
Canada	Costa Rica	Thailand
New Zealand	Nicaragua	Sudan
Denmark	Singapore	Madagascar
Venezuela	Greece	Zimbabwe
Germany	Jamaica	Haiti
Australia	Portugal	Pakistan
Sweden	Guyana	Nigeria
Norway	Colombia	Morocco
United Kingdom	Brazil	Ghana
Trinidad and Tobago	Algeria	India
Netherlands	Malta	Cameroon
Iceland	Guatemala	Egypt
France	Turkey	Indonesia
Belgium	Panama	Botswana
Finland	Ecuador	Central African Republic
Austria	Jordan	Nepal
Uruguay	Malaysia	Kenya
Italy	El Salvador	Liberia
Argentina	Mauritius	Bangladesh
Chile	Papua New Guinea	Swaziland
Israel	Paraguay	Togo
South Africa	Sri Lanka	Burundi
Ireland	Dominican Republic	Uganda
Spain	Bolivia	Zaire
Japan	Philippines	Burma
Mexico	Taiwan	Ethiopia
Iran	Tunisia	Sierra Leone
Fiji	Gabon	Rwanda
Barbados	Senegal	Malawi
	Honduras	Tanzania

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