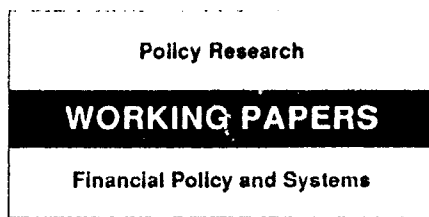


WPS 814



Country Economics Department  
The World Bank  
December 1991  
WPS 814

# Finance, Growth, and Public Policy

Mark Gertler  
and  
Andrew Rose

A thriving financial market depends not only on a prudent regulatory regime but also on having enough creditworthy borrowers. Policies in the real sector -- macroeconomic, public finance, and trade policies -- that directly stimulate growth and stability should be pursued in concert with financial reform.

This paper — a product of the Financial Policy and Systems Division, Country Economics Department — is part of a larger effort in the Department to study the impact of financial reform. This research, "The Impact of Financial Reform (RPO 676-13), was funded by the World Bank's Research Support Budget. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Wilai Pitayatonakam, room N9-003, extension 37666 (48 pages). December 1991.

Development economists have long argued that modern financial markets are important to growth and that financial repression is a serious obstacle to progress in many developing countries. But the liberalization of financial markets has been disappointing in many countries — at times appearing to produce chaos rather than growth, and forcing many countries to retreat from deregulation. Now that economic stagnation seems to persist in many developing countries, many policymakers face a dilemma: Should they cling to repressed financial markets or try the road to reform once again?

Gertler and Rose consider the relationship between finance and growth and the appropriate role of government policy. Many economists have stressed how problems of asymmetric information and contract enforcement impede the functioning of financial markets in developing countries. Gertler and Rose flesh these theories out to make them relevant to policymakers.

They explain that information gaps and enforcement frictions introduce a premium in the cost of external funds. Factors such as the borrower's financial health, the efficiency of financial intermediation, and the ease of enforcing private financial contracts govern the size of this premium. How financial factors contribute to development may be understood along these

lines. As for financial structure, financial contracts and institutions ought ideally to be designed to minimize this premium.

What are the practical implications for policymakers? The long-term answers are easiest. A largely decentralized capital market is optimal. Incentive problems may inhibit the functioning of financial markets, but the most direct way for the government to mitigate them is to provide an efficient system for enforcing contracts. Publicly managing credit flows is likely only to make investments more efficient, by creating incentive problems. To the extent that some sectors merit public assistance, tax credits or subsidies in conjunction with the private allocation of credit is preferable to directly regulating credit flows. The government should refrain from active involvement in the credit business, except to act as lender of last resort in times of widespread financial crisis.

Liberalization of financial markets alone is not a panacea. Financial and real development must be a joint product. Liberalization can enhance growth but successful liberalization requires a viable borrowing class; governments that slow liberalization when borrower net worth is under pressure and accelerate it when the real economy is thriving are likely to experience more successful financial reforms.

The Policy Research Working Paper Series disseminates the findings of work under way in the Bank. An objective of the series is to get these findings out quickly, even if presentations are less than fully polished. The findings, interpretations, and conclusions in these papers do not necessarily represent official Bank policy.

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## Introduction<sup>1</sup>

Development economists have long argued that the evolution of financial markets is an important dimension of growth. A corollary view is that financial repression in many LDCs is a serious obstacle to progress. But, unfortunately, many countries have had disappointing experiences with liberalization. Freeing up financial markets often appeared to produce chaos rather than growth, forcing many countries to retreat from deregulation. Now that economic stagnation seems to persist in many developing countries, policy-makers face a dilemma: Should they cling to repressed financial markets or, instead, should they try the road to reform once again?

In this paper, we reconsider the relation between finance and growth, and the appropriate role of government policy. We update earlier treatments of the subject by applying insights from recent theoretical literature that draws out the connection between the efficiency of financial markets and macroeconomic performance.<sup>2</sup> We try to informally sketch a paradigm meant to be useful for thinking about the special problems that plague financial systems of developing countries. The overriding objective is to provide a basis for thinking about the process of financial reform. In addition, we present some macroeconomic evidence bearing on the relation between finance and growth.

Section I develops a benchmark for analysis by characterizing the role of financial markets in a setting of perfect markets. Section II provides a brief overview of the stylized facts on the relation between finance and growth. Section III presents a nontechnical discussion of the relevant theory. The theory emphasizes not only how the efficiency of financial markets may contribute to growth, but also how the real sector feeds back to influence the performance of the financial system.

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<sup>1</sup>This paper was prepared for a World Bank research project (The Impact of Financial Reform, RPO 676-13). The authors wish to thank Izak Atiyas, Jerry Caprio, Steven Kamin, and Salvador Valdes-Prieto for their comments

<sup>2</sup>See Gertler (1988) for a survey.

Section IV extends the analysis to the special problems of developing countries, including financial repression and obstacles to financial reform. We draw several related kinds of policy conclusions. First, even though frictions exist which impede the performance of private financial markets, a decentralized capital market is vastly superior to a system of publicly managing credit flows. To flourish, a private capital market requires an efficient system of contract enforcement and a viable borrowing class. Public policy should be directed specifically toward these objectives, and away from directly tinkering in credit flows. Second, liberalization must be coordinated both with policies that encourage growth and stability of the real sector. Financial reform alone is insufficient to generate recovery, and some aspects of reform may even be counterproductive in the short term due to an initial adverse impact on borrowers' creditworthiness. Enhancing the creditworthiness of borrowers through prudent "real sector" policies is crucial to the success of any liberalization. Finally, to avoid potentially massive efficiency costs, any deregulation of financial markets must be coordinated with the design of the financial safety net. While some (or all) of these policy conclusions may not be new, we think that our way of deriving them may offer a fresh perspective.

Section V presents some formal econometric evidence on the relation between finance and growth, in order to confirm that the evolution of the financial sector is an important dimension of the growth process, and to give some feel for the rough magnitudes. We use a panel of developing countries, and differ from most existing studies, beginning with Goldsmith (1969), by formally exploiting both the time series and cross-sectional dimensions of the panel. Our results are consistent with the earlier studies. We find that, across developing countries, a one percentage point rise in per capita income is associated with a one and a half percentage point increase in private domestic credit. While differences arise across continents (stronger for Asia, weaker for Africa), the relation is otherwise very robust. Concluding remarks are in Section VI.

To narrow the focus, we ignore specific issues related to sovereign

borrowing -- in particular, the issues posed by the inability to enforce contracts across national borders. Our analysis, however, will have something to say about the consequences of a large foreign debt overhang for the economic performance of LDCs.

### **I. Financial Systems Under Perfect Markets**

A financial system contributes to growth and development by mobilizing saving and then efficiently allocating this saving across investment projects. Related to effectively engineering flows of funds is providing insurance to risk averse savers and investors. An added task within an open economy is helping domestic lenders and borrowers compete effectively in international capital markets.

As a way to organize our thinking, we first consider how financial markets work in an idealized economy, one with the key features of the Arrow-Debreu paradigm. We begin with this paradigm because it often serves as the basis of policy recommendations. Suppose that perfect competition exists, that information is freely available, and that individuals can credibly commit to honoring all agreements. The financial system performs flawlessly in this environment. The absence of informational frictions and the ability of contracting parties to make credible promises implies that everyone is able to lend and borrow freely at risk-corrected rates of interest. Market forces consequently allocate income efficiently between consumption and saving, and then in turn allocate saving efficiently across investment projects. Each individual adjusts his saving to equalize the marginal utility of a unit of foregone consumption with the expected marginal benefit -- the expected product of the gross return on saving and the discounted marginal utility of future consumption. The total funds furnished from saving flow to equalize risk-corrected marginal returns across investment projects. Competitive forces ensure that lending and borrowing rates adjust to clear markets and that no one earns extranormal profits. And the entire process is costless; the flow of funds from savers to borrowers does not absorb any resources.

An open economy differs in that there is no exact link between domestic saving and investment. In the pure Arrow-Debreu version of the international economy, country borders are essentially meaningless. Domestic borrowers compete on an equal footing with foreign borrowers in the international capital market, much the same as corporations located in New York and New Jersey compete for funds in the U.S. capital market. The analogous point is true for savers. These individuals are able to search over the entire world capital market for the best possible risk-corrected returns. Notably, the basic Arrow-Debreu framework -- with constant returns to scale -- predicts that funds will flow from low marginal product of capital rich countries to high marginal product of capital poor countries, just as the capital market works to equalize risk-corrected marginal products of capital within a country's border.<sup>3</sup>

An aspect of allocating of saving and investment is providing insurance. Through a variety of mechanisms -- e.g., diversification, futures markets, debt-equity swaps -- individuals are able to shed completely exposure to idiosyncratic risks and to share optimally the impact of systemic risks. Borrowers thus need only pay lenders a premium for the systemic risk associated with their particular investments, regardless of the amount of idiosyncratic risk. The key point is that, with perfect markets, the financial system washes a considerable quantity of risk out of the economy.<sup>4</sup> In equilibrium, only (optimally shared) systemic risks are left to influence saving and investment. And, given that the variation in GNP is a rough measure, this is not much risk at all. Diminishing the impact of risk, therefore, is an important way in which the financial system increases the attractiveness of saving and investing, and ultimately contributes to growth.

Another dimension of allocating saving and investment is liquidity

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<sup>3</sup>This presumes that technology is the same across countries, so that differences in capital explain cross-country differences in output.

<sup>4</sup>As an example, the Arrow-Debreu model predicts a risk premium for equity of only about one half percent (Mehra and Prescott, 1985). Part of the reason for this low number is that perfect diversification is possible. The actual equity premium in the United States was about six percent for the 1960s-70s.

provision. Indeed, liquidity problems never arise in the Arrow-Debreu economy. Borrowers and lenders are able to make fully contingent arrangements to insure against unanticipated short term needs for funds. Similarly, since information is perfect and markets for all financial claims are thick, "distress" sales of assets always yield the true market value. For this reason, and also because a full set of contingent claims markets exists, there is no need for precautionary holdings of safe assets.

Relatedly, there is no need for a public lender of last resort as safeguard against a liquidity crisis. Here, the government cannot out perform the private sector. Through private contracts, individuals are able to obtain the efficient amount of insurance. In general, any public intervention in financial markets is only counterproductive since the private market outcome is fully efficient.

Finally, the perfect markets paradigm is silent about the role of financial contracts and institutions. The theory only makes predictions about real allocations. Financial structure is both irrelevant and indeterminate, in keeping with the Miller-Modigliani theorem. Growth accordingly depends only on real factors -- mainly, changes in technology and the supply of productive inputs. Because it is costless to obtain information and enforce contracts, individuals can enter financial relationships without the aid of institutions. That is, financial intermediaries are not essential. The theory accordingly offers no particular predictions about the evolution of financial relationships and institutions in the growth process.

## **II. Financial and Real Development: An Overview**

Even in the most advanced economies, financial markets perform less well than the Arrow-Debreu model predicts. Studies of U.S micro data, for example, consistently suggest that frictions are present in loan markets which raise the cost of borrowing, particularly for low wealth consumers and small firms. Panel data studies of individual households, for example, indicate that consumption spending by low wealth consumers is "excessively-sensitive" to



current income (Zeldes, 1989). Similarly, panel data studies of firms show that investment is sensitive to current cash flow, even after controlling for expected future profits. (Fazzari, Hubbard and Peterson, 1988; Gilchrist, 1990). And the cash flow effect is stronger for firms likely to be constrained a priori (e.g., small firms). In addition, both households and firms hold sizable quantities of liquid assets. This suggests that the need for (at least some degree of) self-insurance arises even in industrialized economies.

Determinant financing patterns are also present in U.S. data, implying a clear violation of Miller-Modigliani. Small firms rely on internal funds and bank credit. Typically, only large mature firms directly obtain funds from lenders. Issues of equity, commercial paper and debt are concentrated amongst these firms. Evidence from other countries is broadly consistent with this pattern.

At the macroeconomic level, the collapse of financial markets in the Great Depression demonstrates that major disruptions in the flow of funds are possible, and that these episodes can severely impede real activity, even within industrialized countries (Bernanke, 1983). Recent examples are the financial crises in several southern cone countries that followed in the wake of the liberalizations of the 1970s (Diaz-Alejandro, 1983). The possibility of financial crises also raises the difficult question of public policy. Most policy makers and economists agree that some kind of safety net is essential. However, the provision of public insurance introduces some clear efficiency tradeoffs. The current crisis in the U.S. banking and saving and loan industries provides a clear example. A similar message follows from the outcomes of the financial reforms in Latin America, as we will discuss.

More to broader point here, the international evidence suggest a determinate relation between the states of development in the real sector and the financial sectors.<sup>5</sup> The general patterns hold across countries, as well as across time within a country. In the poorest of the LDCs, individuals and

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<sup>5</sup>See The World Bank Development Report for more detailed statistics on this phenomenon.

firms rely heavily on internal resources and informal credit arrangements. As well, they hoard inventories of goods to self-insure, in effect siphoning saving from productive investments. Commercial banks are the predominant financial institutions. Formal markets for direct credit -- particularly for long term debt and equity -- are virtually non-existent. These countries also borrow relatively little from abroad. A sizable fraction of external funds, moreover, is obtained from public sources.

Financialization appears to accompany growth in the real sector.<sup>6</sup> As economies develop, non-bank intermediaries crop up, offering borrowers and lenders a greater range of options. Another outcome is that more capital tends to flow in from abroad, in contrast to the prediction of the simple neoclassical model. Across developing countries, the ratio of external borrowing to GDP tends to rise with GDP.<sup>7</sup> Further, the composition shifts from public sources to private sources.

As development proceeds further, markets for direct debt and equity emerge.<sup>8</sup> The variety and magnitude of financial institutions and services continues to grow, improving the allocation of saving and investment. For example, insurance companies and pension funds become important sources of long term credit. They also improve the allocation of saving by reducing the need for individuals to self insure.<sup>9</sup> Because less saving is needed for safe assets like government debt and durable goods inventories, more can flow to productive investments.

The observed link between financialization and growth is suggestive that financial factors may be important in development, but of course is not definitive about the exact nature and importance of the interaction, or about the proper role of public policy. To explore these issues further, it is

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<sup>6</sup>Gurley and Shaw (1956) outline the stages of financialization.

<sup>7</sup>See Gertler and Rogoff (1990) for evidence.

<sup>8</sup>Equity markets exist in some developing countries, but typically these markets are not very liquid. See the World Bank Development Report (1989).

<sup>9</sup>Sencevenga and Smith (1990) formalize this point.

useful to turn to a discussion of theories that may rationalize a meaningful interaction between the real and financial sectors.

### III. Financial Factors in Growth and Development: Theory

A major challenge for any theory of finance and growth is to explain the joint evolution of the financial and real sectors. It is insufficient, for example, to simply posit that financial markets work less well in poorer countries, and then proceed to explore the consequences. Financial systems are endogenous, after all. And they change over time. Required is an understanding of what determines the relative efficiency of a country's financial system, and how this efficiency may evolve.

A useful way to organize thinking is to first identify the primitive factors that might explain why the Miller-Modigliani theorem doesn't apply in practice. The most natural candidates are limited information and limited ability to enforce contracts.<sup>10</sup> Either factor is, to varying degrees, characteristic of real-world financial markets, particularly financial markets in developing countries. And incorporating either factor in a model is conceptually the most basic way to step outside the confines of the Miller-Modigliani.

In this section we first present a general description of how informational and enforcement problems introduce frictions in the relationship between individual borrowers and lenders. As we argue, these factors effectively force borrowers to pay an additional premium for uncollateralized loans and for insurance. We refer to this added cost generically as "the premium for external finance." We then illustrate the implications for financial structure, including the nature of both financial contracts and institutions. Next is a discussion of what we view as an important general prediction of these kinds of theories: an inverse relation between borrower net worth and the premium for external finance. We conclude by describing the

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<sup>10</sup>See Hart and Holmstrom (1986) for an excellent survey of the economics of information, which contains applications to financial markets.

general predictions of our story regarding the link between finance and growth. Along the way, we try to draw out the issues pertinent to public policy.

*IIIa. The premium for external finance*

To sharpen the analysis, consider the example of farmer who is in need of funds to obtain seed for growing corn. The investment is risky because the quantity of corn harvested is random. It is a stochastic function of the amount of seed planted, the soil quality, and the effort the farmer puts into planting and maintaining his crop.

In the Arrow-Debreu setting, the farmer borrows funds from lenders and in the process enters a financial agreement that specifies all the relevant actions he is to take under every potential circumstance, as well as a set of state contingent payoffs to each party. In particular, the parties agree in writing to the time and effort the farmer must place into harvesting and planting. They also agree to the payments each party should receive, depending on the realized harvest of corn. The soil quality figures into this calculation since it affects the probability distribution of the harvest outcome. If the crop risk is purely idiosyncratic, the expected payment to lenders must equal the riskless interest rate. To the extent there is systemic risk, perhaps due to weather conditions, lenders are compensated with an additional premium.

A key point is that with perfect information and perfect contract enforcement the farmer's real investment decision is both socially efficient and independent of his financial position. Regardless of his balance sheet, it is always optimal for the farmer to invest so as to maximize the value of his farm -- that is, for him to plant seed until the expected gain from the corn harvest equals the risk-corrected opportunity cost of funds. Further, the kind of financial claims the farmer issues is indeterminate. Though the total expected payments to lenders must properly reflect the systemic risk, the exact pattern of payoffs across risky output realizations may take

numerous forms. Whether the firm issues equity or risky debt does not matter so long as lenders receive in expectation the risk-corrected opportunity cost of funds. Also immaterial is whether the farmer finances his acquisition of seed with internal funds, by borrowing from financial institutions or by obtaining credit directly from individual lenders.

As we have emphasized, the prediction of efficient allocations of saving and investment -- independent of the nature of financial institutions -- relies on the supposition that individuals may costlessly write and enforce richly detailed financial contracts. This "completeness" of financial markets, however, may not be a reasonable approximation of reality if either information or the ability to enforce contracts is significantly limited. In our example of the farmer, both these restrictions are quite plausible.

It is reasonable to hypothesize that real world lenders may not be able to freely observe all the relevant aspects of the farmer's investment project. They may have less knowledge than the farmer about the soil quality. They may have difficulty monitoring how hard he works. They may find it costly to verify the size of the harvest. In each of these situations, the farmer can potentially gain by exploiting his advantage in information.

It is also plausible that enforcing particular aspects of the financial contract is costly, perhaps even prohibitively costly. Even if lenders can freely observe all the relevant economic variables, the same may not be true for third party institutions such as courts, making it difficult to enforce contracts based on these contingencies. For example, even if lenders can freely determine that the farmer has misrepresented the size of his crop, it may still involve considerable expense to demonstrate this point in court. Costs of carrying out punishments -- e.g., costs of collecting fines or imprisoning offenders -- may also be factor, particularly for developing countries. In either case, enforcement costs permit circumstances to arise where the farmer gains on net by walking away from his debts, much as like for

a sovereign country.<sup>11</sup>

Rational lenders recognize the potential for conflicts of interest with the farmer, and try to structure the financial arrangements accordingly. The information and enforcement problems, however, limit the scope of the financial contract -- the feasible set of contingencies and covenants -- and, in doing so, limit the flexibility lenders have in regulating the farmer's behavior. Mitigating the possible incentive problems, therefore, may involve restrictions on the financial contract that introduce some kind of real costs. In this way, frictions enter the financial process.

Intuitively, a wedge emerges between the cost of (uncollateralized) external funds and internal funds.<sup>12</sup> That is, the farmer pays a premium for uncollateralized external funds. Roughly speaking, this premium compensates for the costs of resolving the conflict of interests with lenders. It may consist of both explicit and implicit components, depending on the nature of the incentive problem and the informational structure. If his particular soil quality is not publicly observable, for example, the farmer may have to pay an explicit "lemons" premium for external funds. This is because lenders are forced to use the average soil quality in the region to calculate the expected harvest yield.<sup>13</sup> Lenders will also charge an explicit premium to compensate for any expected costs of evaluation or monitoring.<sup>14</sup>

The implicit component of the premium reflects loss in the value of the borrower's investment that stems from any constraints on the financial relationship. One example is the reduction in expected profits the farmer suffers if lenders restrict the size of the loan, perhaps in fear that he will

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<sup>11</sup>Even in the U.S., limits on punishments seem characteristic of financial arrangements. For example, under U.S. bankruptcy laws, consumers can walk away from their debts and still retain their most vital assets -- their homes and their human capital. See Kehoe and Levine (1989) for an abstract discussion of how limits on punishments introduce inefficiencies in domestic capital markets.

<sup>12</sup>See Bernanke and Gertler (1989, 1990) for explicit calculations of this premium).

<sup>13</sup>See Mankiw (1986) and Bernanke and Gertler (1990) for examples.

<sup>14</sup>See the costly state verification model of Townsend (1979), Gale and Hellwig (1985) and Williamson (1987) for examples.

misuse the funds or renege on his debts. Another one is the reduction in expected utility owing to restrictions on the amount of insurance lenders are willing to provide. If lenders are unable to observe how well the business is managed they may restrict the extent they insure the farmer against bad harvests. They may instead require that the farmer bear a good portion of the risk, as a way to motivate him to properly plant and harvest his crop<sup>15</sup>. This limitation on insurance reduces the expected utility gain to the farmer, and thus reduces the value of his investment.

Figure 1 and 2 illustrate how the premium for external finance distorts the farmer's real investment decision. In each diagram, the dotted lines represent the demand and supply curves for investment funds under perfect information, and the solid lines represent these curves when incentive problems are present. Under perfect information, the farmer faces a perfectly elastic supply curve of investment funds. The discount rate is  $\rho$ , equal to the sum of the riskless rate and a premium that reflects any systemic risk. The demand curve is downward sloping because the expected marginal increase in the harvest yield is diminishing. Point E, where the two dotted lines intersect, is the value-maximizing choice of investment. This outcome, however, may not be feasible if incentive problems are present.

Limits on either information or enforcement potentially affect the position of both the demand and the supply curves. Up to the point where the quantity of funds equals the farmer's collateralizable net worth -- call this value  $W$  -- the supply curve is unchanged. The opportunity cost of funds remains the same as under perfect information since the farmer is able to either self-finance his investment or provide perfect collateral for any funds borrowed. Beyond  $W$ , uncollateralized external finance is required. The supply curve rises, reflecting the premium on external funds that emanates from the incentive problems. The supply curve continues to rise as external finance increases, and may eventually bend backwards. This might be the case, for example, if the quality mix of borrowers declines with increases in the

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<sup>15</sup>Incomplete insurance is a standard approach to mitigating moral hazard problems (see Hart and Holmstrom, 1986.)

loan rate.<sup>16,17</sup> After a point, further increases in the loan rate may actually reduce the expected return to lenders, given the impact on the quality mix. The farmer's demand for funds may decline as well, if solving the incentive problem requires restricting the quantity of insurance he can obtain against a bad crop yield. Presuming he is risk averse, this restriction reduces the farmer's expected marginal utility gain at each level of investment thereby pushing downward his demand curve for investment funds.

The combined impact on the demand and supply curves forces the farmer's desired investment level below the socially efficient value, as Figure 1 illustrates. Indeed, if the supply curve bends backward before it intersects the demand curve for funds, the farmer is "rationed" in the sense that his demand for investment funds exceeds the supply at the prevailing rate of interest. Figure 2 illustrates this possibility. Regardless of whether there is rationing, though, the costs imposed by incentive problems ultimately distort the farmer's investment decision. Investment in either case is below the level that would prevail under perfect information.

The premium attached to external funds equals the wedge between the perfect information demand and supply curves arising at the equilibrium level of investment. This value reflects the real cost that the incentive problem adds to the marginal dollar of external finance. Dividing the premium by the firm's discount rate under perfect information yields the excess of the firm's "Q" value of investment over unity.<sup>18</sup> As Figure 1 makes clear, the farmer's marginal Q value exceeds unity; and it is larger, the more severe the impact of the incentive problems.

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<sup>16</sup>Since high quality borrowers pay higher interest than they would under perfect information, and low quality borrowers pay lower interest than they would otherwise, the former are more likely to drop out of the market as the riskless rate rises. This reduces the quality mix, making the lemons problem worse. See Stiglitz and Weiss (1981) and Mankiw (1986).

<sup>17</sup>Bankruptcy cost could also make the supply curve bend backwards, since the probability of bankruptcy is increasing in the loan rate. See Williamson (1987) for an example.

<sup>18</sup>A firm's Q ratio equals the ratio of the marginal product of capital to the replacement cost. Under perfect capital markets, firms with Q values exceeding unity should always be investing. The relationship breaks down with imperfect capital markets, however (see, e.g., Fazzari, Hubbard and Peterson, 1988).



The relationship between  $Q$  values and exposure to credit problems is consistent with the evidence.<sup>19</sup> Fazzari, Hubbard and Peterson (1988) show that, on average,  $Q$  values are higher for U.S. corporations firms that are likely to face credit-constraints. [See also Gilchrist (1990).] Cross-country evidence is supportive as well. Kong (1991) demonstrates that the average  $Q$  values for Korean corporations are considerably above the norm for U.S. firms, and cites credit market problems as a likely explanation.

### *IIIb. Financial Structure*

The nature of the financial arrangement -- the payoff structure, covenants, etc., -- affects the incentives of borrowers. In this respect, financial structure influences real decisions when either limited information or limited enforcement are factors. One would expect that individuals design financial relationships to minimize any loss in the value of the investment owing to potential incentive problems. By pursuing this logic, we are able to pin down financial structure.

The exact financial structure that arises of course depends on the nature of the informational and enforcement problems. No general results are available. In many cases, particularly ones where moral hazard is a problem, standard debt emerges as the optimal contract. Debt mitigates the incentive problem by forcing the borrower to internalize the consequences of his actions.<sup>20</sup> It does so by making him the residual claimant for his investment.

Under a debt contract the borrower pays a fixed obligation contingent on not defaulting, and gets to keep the remainder of his net earnings; while he loses everything (including possibly his job) in the event of default.

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<sup>19</sup> $Q$  could also be above unity if there is imperfect competition. It could also be temporarily above unity if there are adjustment costs. Gilchrist controls for these factors and still finds an important effect of credit constraints.

<sup>20</sup>Recent approaches to motivating debt include Lacker (1990) who emphasizes the inability to observe borrower cash flows (somewhat in the spirit of Townsend (1979), though with an emphasis on collateral rather than costly state verification to resolve the incentive problem. Hart and Moore (1988) emphasize the control right that debt affords.

This result is somewhat fragile though. In general, it is desirable to condition payoffs and covenants on all economically relevant variables that are publicly observable (and thus easily verified in court). Optimal contracts often look something like equity, or perhaps a combination of debt and equity. For example, if systemic risk -- i.e., business cycle risk -- affects the investment outcome, then the optimal arrangement is not likely to be simple debt, but rather a mixture of debt and equity, where equity acts as a kind of cushion against the business cycle: Incentive considerations dictate that the borrower should bear considerable portion of the idiosyncratic risk, but that the outside lenders should absorb the lion's share of the systemic risk.<sup>21</sup> Intuitively, it is not optimal to punish the borrower if his investment is performing poorly because the economy is in recession, as this is clearly a circumstance beyond his control. Equity facilitates sharing aggregate risks, as dividends may be lowered in recessions and raised in booms.

Other devices to address the informational and enforcement problems include: evaluation and monitoring; credit ceilings; collateral or balance sheet requirements; and restrictions on the use of inputs (to the extent input use is observable). Adjusting the maturity structure is also a possibility. Lenders may exert greater control over borrowers by issuing short term debt, which in effect forces borrowers to regularly account for their actions. This consideration is likely an important factor underlying the absence of markets for long-term credit in many developing countries.

Relatedly, lengthening the horizon of the borrower/lender relationship improves financial efficiency. An on-going relationship increases the control lenders have over borrowers. Informational barriers lessen with time. A richer menu of incentive devices is available.<sup>22</sup> Lenders can restrict access to future credit in the wake of a poor earnings performance, for example. Long-term borrower/lender relationships, facilitated by financial

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<sup>21</sup>See Gertler and Hubbard (1991) for a formalization of this point.

<sup>22</sup>See, for example, Townsend (1987), Green (1987), Stiglitz and Weiss (1983) and Gertler (1990).

intermediaries, are characteristic of credit markets throughout the world. Indeed, only in a few-developed countries, such as the U.S., are "arms-length" credit transactions popular.

The general framework here also allows us to think about financial institutions. Financial intermediaries play two interrelated roles in this kind of environment: One is loan evaluation and monitoring. The other is liquidity provision. These features are central in traditional stories about intermediation. What is new in the last decade is capturing these features with endogenously-motivated intermediary structures.

Evaluation and monitoring of borrowers is the most direct way to confront incentive problems. Scale economies explain why lenders delegate the job to financial institutions. In this way, intermediaries reduce the premium on external finance. A theory of intermediary financial structure emerges once one recognizes the potential for conflict of interests between the intermediary and its depositors. In the process of evaluating and monitoring, the intermediary obtains information about borrowers that is not readily available to depositors. For the same general reasons as any borrower of funds, the intermediary may wish to exploit its informational advantage. Further, just as the intermediary might find it impossible or at least very costly to enforce certain kinds of agreements with borrowers, depositors may similarly have difficulty enforcing certain kinds of agreements with the intermediary.

Like any rational borrower, the intermediary picks a financial structure which minimizes the premium it must pay for external funds (depositor and short term wholesale funds in the case of an intermediary). An additional device available to the intermediary is diversification. By diversifying its portfolio, the intermediary is able to reduce the impact of idiosyncratic risk and, in doing so, reduce the scope it has for cheating its depositors.<sup>23</sup> In the limiting case of perfect diversification the only risk to the banks

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<sup>23</sup>This is the "delegated monitoring theory of financial intermediation, developed in Diamond (1984) and Williamson (1986).

portfolio is systemic. Systemic shocks, however, are typically beyond the intermediaries ability to disguise or control. Diversification accordingly reduces the "incentive" premium required to attract deposits.

Wrapped in the same package, thus, is an explanation for several basic features of intermediation: evaluation and monitoring, heavily diversified portfolios, and asset transformation (liabilities safer than assets). It is possible to extend the basic story to capture additional characteristics. For example, one hypothesis for why the intermediaries issue demandable debt is that the short maturity provides depositors a way to discipline the intermediary, much the same way as shortening the maturity structure gives any lender greater leverage over a borrower.<sup>24</sup>

We can extend our thinking to interpret the role of intermediaries in liquidity provision.<sup>25</sup> Problems of limited information and enforcement preclude most individuals and firms from using the securities market to perfectly insure against sudden needs for funds. Intermediaries offer liquidity in two basic ways. One is by issuing liabilities that are safe and short term, possibly demandable. The other is by entering arrangements to provide loans on short term notice, either explicitly by offering a line-of-credit or implicitly as the outcome of an on-going relationship with a borrower. By overcoming informational barriers that could slow the process down, intermediaries are able to facilitate the delivery of loanable funds required on short term notice.

Liquidity provision contributes to financial efficiency in two related ways. First, it reduces both the risk of saving and the risk of investing; and therefore lowers the premium on external finance. Second, it mitigates the need for inefficient forms of self-insurance. By diversifying independent risks, intermediaries can minimize the quantity of safe assets needed to provide liquidity insurance, and can therefore minimize the diversion of funds

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<sup>24</sup>See Calomiris and Kahn (forthcoming).

<sup>25</sup>See also Caprio and Honohan, (1991).

from productive investments. This latter point really applies to the role of intermediation in all forms of insurance.

Along with the benefits of having financial institutions provide liquidity come potential costs. The costs stem from the potential strain placed on intermediary balance sheets. The process of liquidity provision (often) appears to involve supplying liquid liabilities in conjunction with holding illiquid assets. This is particularly true for commercial banking. Asset illiquidity results from the information-intensive nature of most bank loans. As we have suggested, a bank is likely to possess considerably greater information about the quality of its loans (and so on) than substitute lenders. For "lemons" reasons, accordingly, liquid secondary markets for commercial bank loans typically do not exist. Even in the U.S., markets for loan sales are in a relatively primitive form. Those kinds of markets which do succeed often involve assets with a recognizable collateral value, such as houses or automobiles. (Indeed, it is interesting to note that U.S. financial markets could not support an active secondary market for junk bonds.)

The particular combination of liquid deposits and illiquid loans makes banks subject to the risk of depositor panics. This basic feature of commercial banking is oft-cited as the reason for public intervention in banking in most countries.<sup>26</sup> Interventions take the form of either explicit deposit insurance, as in the U.S., or concentration of banking with implicit government guarantees, as in Japan and most of Europe.

The issue of public intervention is subject to considerable debate, however. The cost of publicly safeguarding financial institutions is reducing the incentives of these institutions to safeguard themselves. Undertaking costly evaluation and monitoring of loans is less profitable, for example, if an intermediary can always rely on readily available, publicly insured deposits. In addition, it may be directly profitable for institutions to take advantage of the publicly provided insurance subsidy by investing in risky projects, even if they yield negative present value. The institution profits

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<sup>26</sup>Diamond and Dybvig (1983) present a model aimed at this issue.

if its loan portfolio pays off, while the taxpayers pick up the tab in the opposite case. The savings and loan scandal attests to this point. So do aspects of the liberalization calamity in South America, as we discuss later.

Key to the debate over public intervention is whether intermediaries can design private financial arrangements to insulate themselves from distress.<sup>27</sup> One device, for example, is suspension of convertibility. Though, as many have argued, this mechanism does not work well if systemic factors are responsible for depositor outflows. Other possibilities include indexing deposit contracts to systemic disturbances. The advantage of this approach is that it forces depositors to share the impact of systemic shocks, as opposed to having the payoff depend on their respective places in line at the bank.<sup>28</sup> It is this latter feature of bank liabilities, in conjunction with illiquid bank assets, that makes these institutions subject to depositor panics.

On the other hand, it is an open question as to whether in fact it is practical for depository institutions to offer suitably indexed deposits. Even if it is difficult to pin down the precise theoretical reasoning, historical experience suggests that purely private attempts to insure the financial system do not work well in the presence of systemic disturbances. The experience of the Great Depression is perhaps the best example of this point.

### *IIIc. Borrower Net Worth and Financial Efficiency*

The predictions about real activity and financial structure that evolve from these kinds of models are often closely tied to the details of the particular environment, including the exact nature of the incentive problem. Empirical relevance, however, requires general predictions. One broad implication of these theories is that the premium for external finance -- and

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<sup>27</sup>For some interesting perspectives on this issue, see Wallace (1989) and Chari (1990).

<sup>28</sup>Diamond and Dybvig (1983) refer to this feature of deposit contracts as "the sequential service constraint." The depositor always bears the risk that, if he is not early enough in line, he can lose everything. This contrasts with equity, for example, where losses are shared equally by creditors.

hence the magnitude of the distortion of real activity -- depends inversely on borrower net worth, broadly defined.<sup>29</sup> As we will argue, the behavior of borrower net worth is at the core of the link between finance and aggregate economic activity. This includes being a factor that determines the extent of intermediation. Financial crises, further, can often be interpreted as involving severe disruptions of borrower net worth.

We define a borrower's net worth as the sum of his net liquid assets and the collateral value of his assets not in liquid form. The latter consists of not only tangible physical assets, but also of any prospective future earnings that the borrower can credibly offer as collateral. In the example of the farmer, borrower net worth includes his net financial assets and the unencumbered value of his capital equipment (e.g., tractors) and land. Suppose further that the farmer is especially talented at managing his particular plot of land. Then any expected future rents earned from this skill that he can credibly post as collateral for a current loan also enter the measure of his relevant net worth.<sup>30</sup>

Simply put, greater net worth implies either additional funds available for internal finance or additional collateral available to back external finance. More precisely, greater net worth increase a borrower's potential stake in his investment. This serves to align his incentives more closely with outside lenders', and thus lower the required premium on external funds. In the limiting case where his net worth is sufficient to effectively permit him a one hundred percent stake in his investment, the borrower completely internalizes all the consequences of his actions.<sup>31</sup> The premium for external

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<sup>29</sup>Bernanke and Gertler (1989, 1990) and Calomiris and Hubbard (1990) emphasize this mechanism. See Hubbard and Kashyap (1992) for direct evidence. Greenwald and Stiglitz (1986) offer a related story, which centers on equity rationing.

<sup>30</sup>Note that the ex post return on assets serving as collateral need not be certain; the value of the collateral will simply incorporate the effect of the uncertainty. What is important, however, is that the borrower—in this case the farmer—is unable to secretly manipulate the ex post return.

<sup>31</sup>If the borrower is risk-neutral, it is always optimal for him to invest as much of his wealth as possible in his own project, up to the point where the premium for external finance is driven to zero. If he is risk averse, a tradeoff emerges between the need to reduce the premium for external finance and the need to diversify. Incentive considerations dictate that, in general, the borrower is less than fully insured. The text elaborates on this point.

finance disappears. Conversely, if his net worth is sufficiently low -- negative net worth is a possibility, if past debts are high -- the required premium may be prohibitive. Lenders may refuse to supply funds despite the fact the investment may have a positive present value in setting of perfect markets.

Figure 3 illustrates the impact of a shift in borrower net worth on investment. An increase in net worth raises the threshold value of investment above which suppliers of external finance impose a premium. The supply curve shifts rightwards as a consequence. The demand curve may also shift rightward, partly because greater net worth might permit the borrower to obtain more insurance, and partly because his willingness to bear risk may rise (if his relative risk aversion is declining in wealth). The combined effect of the shifts in the supply and demand curves is to lower the premium attached to external finance at each level of investment. The equilibrium level of investment rises accordingly.

It is important to emphasize the simultaneous nature of the interaction between financial and real factors. A kind of financial propagation mechanism emerges. The borrower's accumulated net worth depends both on his past earnings and on his anticipated future prospects.<sup>32</sup> Thus, previous economic shocks persist into the future by affecting the current premium for external finance. A streak of good harvests, for example, allows the farmer to build up his stock of financial assets, and consequently improve the terms under which he receives new loans. Conversely, beliefs about future economic fundamentals feed into the present, also by influencing the premium for external finance. News that corn prices are likely to be low for the next five years reduces the value of the farmer's land. Expected future quasi-rents owing to his particular farming talent decline as well. The combined effect of this pessimism about the future on his net worth raises the premium he must pay to borrow funds for the current planting season.

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<sup>32</sup>Gertler (1990) formalizes how beliefs about future economic conditions impacts on borrower net worth, in a setting with multi-period financial arrangements.



Overall, financial factors magnify swings in economic activity. This kind of prediction is true both at the cyclical and secular frequencies, implying that the analysis is relevant to growth as well as business fluctuations.<sup>33</sup>

The simple framework also provides some insight into how a collapse in borrower net worth could generate a financial crisis. There are several ways this might come about. One is a revaluation of unindexed debt due to a large unanticipated shift in the price level or the exchange rate. A classic example of the former is the sharp deflation of the Depression which, over a four year period, raised the real value of outstanding debts nearly thirty percent.<sup>34</sup> As we will discuss later, sharp rises in exchange rates in the 1980s similarly raised the real value of foreign debts owed by borrowers in Latin American countries.<sup>35</sup> Another possibility is a sharp fall in the value of collateral owing to events in the real economy. The decline in real estate prices in the U.S. is a good example, as is the decline in export prices for Latin American countries. The sharp rise in world interest rates in the late seventies and early eighties had a qualitatively similar impact on discounted values of collateral assets. Finally, policy changes that have redistributive effects, such as structural adjustment programs, are capable also produce the kind of sharp swing in borrower net worth that could lead to a financial crisis (see Caprio, 1991).

In each of these cases, the sudden large drop in borrower net worth yanks both the supply and demand curves for funds inward, sharply contracting investment. Indeed, if the borrower's net worth becomes sufficiently negative, investment is no longer feasible. In this case, the supply curve moves leftward to the point where it is no longer intersects the demand curve at a positive value of investment (or, where it bends backward before it reaches a positive investment level.) Figure 4 illustrates an "investment

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<sup>33</sup>For an application of this kind of mechanism to growth, see Banerjee and Newman (1991).

<sup>34</sup>Bernanke and Gertler (1989) provide a formal—though stylized—analysis of a debt deflation.

<sup>35</sup>See Froot and Stein (forthcoming) for an example of how exchange rate revaluations may induce wealth redistributions that have real effects. The example they pursue is foreign direct investment.

collapse", owing to insufficient borrower net worth.

Net worth is also a relevant consideration for the efficiency and extent of financial intermediation.<sup>36</sup> By building up its capital base, an intermediary is able to reduce the premium it must pay for depositor funds, just as any borrower with greater net worth is able to reduce the premium required for external finance. A fluid system of financial intermediation is therefore more likely with a well capitalized group of financial institutions. It also follows that a sharp decline in intermediary net worth is a potential source of disruption. As with individual borrowers, possible causes are sudden declines in the collateral value of assets or in expected future profits. A sharp rise in interest rates for example could reduce the value of an intermediary's long-term assets. It could also lower expected future profits by reducing both the quantity and quality of the intermediary's potential loan customers.

#### *IIId. Summary implications for finance and growth*

Our analysis suggests a symbiotic relation between finance and growth. Development of the real sector tends to reduce the premium attached to external finance, which in turn serves to stimulate further development. Several broad empirical regularities are associated with this process: evolution from self-finance to external finance; development of intermediation, and subsequent development of markets for direct credit; increased access to world capital markets; and, finally, narrowing of the spread between loan and deposit rates, along with a rise in the riskless rate. Underlying the general process are several interrelated factors.

First, as economies develop, the average net worth of its borrowers improves. An analogy may be drawn with the experience of a firm over its life-cycle. When the firm starts up it has low net worth for two basic reasons: it has limited financial resources and collateralizable assets; and it

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<sup>36</sup>See Bernanke and Gertler (1987) for a formalization of this point.

has an unsure horizon. The cost of external finance is high, accordingly. The firm thus relies heavily on internal funds to finance investments. Over time it accumulates both financial and physical assets. Also, by establishing a track record and gaining experience, it possibly raises the market's assessment of its survival probability. The resulting rise in net worth makes obtaining external finance feasible. The likely first candidate is bank credit, since net worth is probably still insufficient to eliminate gains from evaluation and monitoring. As the firm grows further and establishes a more certain horizon, it may eventually reach the point where net worth is sufficient to obtain direct credit. Indeed, one may think of a developed country relative to a developing one as having the cross-section of its borrowers consist of a greater fraction with characteristics resembling firms in the mature phase of its life-cycle, as opposed to the early phase.

External effects are likely to be important as well. If increasing returns are important, the evolution of net worth is likely to depend on the development of the aggregate economy, as well as on individual factors. That is, there are likely to be external effects on expected profitability, and therefore external effects on borrower net worth.

In this regard, our story is quite compatible with recent growth theory (e.g., Romer, 1986; Lucas, 1986). This literature appeals to spillover effects on productivity stemming from increasing returns to explain why persistent growth rates between developed and less developed countries are possible -- i.e., why diminishing returns doesn't take over -- and relatedly why development traps are possible. To the extent the external effects impact on borrower net worth, financial factors -- via the effect on the premium attached to external finance -- amplify the impact of increasing returns on growth. Relatedly, they tighten the potential development trap. Net worth is likely to be lower than would be otherwise for borrowers in a country that is not exploiting increasing returns - e.g., due to low human capital development. Consequently the typical premium on external finance is higher, which in turn inhibits investment further, making it even more difficult to exploit the increasing returns (via human capital accumulation, etc.) Thus,

financial considerations would seem to exaggerate the dispersion in output growth rates owing to increasing returns. Along with this prediction comes a theory of relative capital market development as well.

There is another respect in which increasing returns may be a factor in financial development. As the pool of quality borrowers increases, the potential for a thick secondary market for the securities of these borrowers rises. The stock market in the U.S., for example, would not be active if there were only a few suppliers of equity. The fact that there are many potential suppliers contributes to increasing the liquidity of the market. The presence of the liquid market in turn lowers the cost of the issuing equity. The experience of the U.S. junk bond market is informative here. The costs of issuing junk fell when it was perceived that a liquid market was possible. When the secondary market fell apart (in the wake of increasing defaults on these bonds), the cost of issuing junk rose precipitously.

Another important factor involves the evolution of the auditing and enforcement technologies that occurs as economies develop. To the extent there are increasing returns in developing legal systems, we would expect the ability to enforce contractual relationships to rise as economies develop. Development and adoption of monitoring and evaluation technologies should contribute to reduce the premium on external finance.

Growth also stimulates the development of financial intermediation, which in turn feeds back into growth.<sup>37</sup> Intermediaries of course benefit from improvements in monitoring and enforcement technologies. Competition ensures that these benefits are passed on to savers and investors. Improvements in the overall quality of borrowers increases the base of potential loan customers, and accordingly facilitating the development of intermediation, especially to the extent increasing returns is important to the development of financial institutions. Also, fixed costs in developing an effective regulatory system suggests that richer countries may have an advantage in mitigating the bad incentive effects associated with providing a

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<sup>37</sup>See Greenwood and Jovanovic (1990) who emphasize the importance of fixed costs.

public safety net for the financial system.

Finally, the reduction in the premium for external finance that accompanies the development of intermediation (and the growth of borrower net worth) manifests itself in a reduced spread between the loan and deposit rate.<sup>38</sup> Further, the increased liquidity provision connected with an enhanced intermediary sector reduces the need for self-insurance. This tends to lower the value placed on riskless securities. The riskless rate rises for this reason, and also because the decline in the premium for external finance pushes up the competitive equilibrium return on saving.

In sum, a natural product of improved development of the real sector is a more efficient financial sector, and vice-versa. The reduction in the premium for external funds increases investment and improves the allocation of existing investment funds. For an open economy, the improved efficiency of the domestic financial system enables more funds to flow in from abroad relative to the existing benchmark.

#### IV. Problems of Developing Countries

We now turn our attention to two closely related issues are particularly relevant to the experiences of developing countries. The first involves the consequences of financial repression and the second, the consequences of financial liberalization. Mentioned along in this discussion are the consequences of the debt crisis.

##### *IVa. Financial Repression*

As we have been emphasizing, a well functioning financial system features private contracts and private institutions designed to minimize the problems of limited information and enforcement. The most direct way the

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<sup>38</sup>Unfortunately, it is tough to get good measures of the spread between loan and deposits rates for many LDCs. See Hanson and Rocha (1985) for a discussion. In principle, checking whether loan/deposit spreads are higher and riskless rates are lower in poorer countries would seem to be a good way to test some of our theory. One major difficulty, however, is that factors such as reserve requirements and other legal restrictions will influence the spread.

government can contribute to this process is by offering an efficient judicial/regulatory system, one which facilitates the enforcement of private contracts and punishes fraud effectively. There is as well a role for some kind of public safety net to guard against a disruptive liquidity crisis, as we have discussed. But this objective must be balanced against the efficiency costs of providing public insurance.

Historically, public intervention in credit markets in developing countries seems to go well beyond the "minimalist" approach just described, despite virtually unanimous agreement that these interventions have been largely detrimental. As we see it, the traditional approaches fail by not attacking the basic sources of frictions in credit markets: the incentive problems owing to limited information and limited enforcement. Instead, governments have tried to directly manage credit flows through systems of subsidies, interest rate ceilings, and direct government intermediation. Not only do these policies inhibit the functioning of the price system; if anything, by inhibiting the formation of disciplining mechanisms in the private market, they tend to magnify the adverse consequences of the information and enforcement problems.

Conventional discussions of financial repression focus on the allocative consequences of interest rate ceilings, targeted credit programs, and regulatory costs imposed on intermediation such as reserve requirements. The analysis usually proceeds by taking a market that would otherwise function perfectly well, and then exploring the consequences of a government induced distortion such as a loan or deposit rate ceiling. In our view, the relevant *laissez-faire* benchmark should allow for distortions in financial markets prior to government intervention, owing to the kinds of incentive problems we have been discussing. *An additional consideration then, is how the government policies affects the incentives of borrowers (including financial intermediaries) to exploit the environment of limited information and limited enforcement.*

Government managed and controlled intermediaries are likely less

efficient at confronting incentive problems. One example of this is a lax approach to collecting delinquent debts, cited by Venereso as pervasive in many developing countries. Because the intermediaries in these countries are heavily subsidized (either explicitly or implicitly), they lack the internal incentives required to ensure that they properly screen and monitor loans. This allows the potential for abuse by borrowers, resulting in a poor overall performance of the loan portfolio. The reduced return on assets lowers the feasible rate that can be paid to depositors. In turn, the quantity of private funds the intermediary may attract falls.

The experience of many LDCs with state development banks is highly relevant to this discussion. These institutions were introduced to provide a conduit for long-term finance as an initial step toward developing private markets for equity and long-term debt. As we have argued, however, there is a "chicken-and-egg" aspect to this problem. To thrive, private markets for long-term capital require large numbers of quality borrowers - i.e., high net worth borrowers. Unfortunately, because of the incentive problems inherent in the process, a system of publicly managed and subsidized funds is unlikely to create a core of borrowers who would be creditworthy in the absence of government help. Not surprisingly, state development banks have generally failed to produce well-functioning private markets for long-term finance.

A better approach to developing a thriving capital market, in our view, is to concentrate directly on promoting a viable borrowing class. We would recommend direct investment tax credits for borrowers, with borrowers then competing for private funds, as a superior alternative to publicly managed and subsidized credit. Tax credits not only increase the incentive to invest, they also reduce the premium for external finance by raising borrowers' net worth. The overall increase in borrower creditworthiness raises the likelihood of well-functioning private capital market. We of course do not mean to suggest that tax credits alone would suffice. A strong system of contract enforcement and a stable policy environment are also crucial.

#### *IVb. Financial Liberalization*

In the 1970s and 80s, a number of developing countries liberalized their financial markets. In a number of Latin American countries the reforms initially produced chaos.<sup>39</sup> The much desired efficiency gains did not seem to materialize. The Asian countries that liberalized fared somewhat better. In a few countries, such as Korea and Malaysia, the experiment appears to have worked.

In our view, the liberalizations failed to meet expectations for three main reasons. First, accompanying the rise in loan rates -- as an unfortunate side effect -- was a rise in the required external finance premium for a substantial class borrowers. If markets operate perfectly under *laissez-faire*, then the increase in loan rates resulting from deregulation is uniformly desirable. True, some borrowers are chased out of the market. However, these borrowers are inefficient; they cannot function profitably when the price of investment funds reflects their true opportunity cost.

Matters change, however, if the true *laissez-faire* benchmark involves the kind of frictions in the financial process that we have been describing. The rise in interest rates produces a drop in borrower net worth. The market value of collateralizable assets falls. So does the discounted future stream of profits. The drop in net worth forces up the premium for external finance, even for borrowers who could operate profitably if markets were perfect. At least in short run, therefore, deregulation can push investment further below the optimum. We don't mean to suggest that the status quo of financial repression was preferable; rather, only that one must be wary of certain pitfalls when incentive problems hinder the operation of private financial markets.

A second factor involves timing. Typically, it was bad. Many of the

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<sup>39</sup>There are numerous papers which provide excellent descriptions of the financial crisis associated with the liberalizations. Diaz-Alejandro (1983) is a classic reference. See also, for example: Atiyas (1990), Hinds (1988), Tybout (1986), and Veneroso (1986). On the other hand, there is also some evidence of positive effects of liberalizations. See de la Cuadra and Valdes Prieto (1990), who discuss the case of Chile.



liberalizations coincided with aggregate economic downturns. The economic slowdown and high interest rates that plagued industrialized countries in the late 70s and early 80s spilled over to developing countries. The combination of rising interest rates and falling export prices produced a precipitous decline in borrower net worth, forcing up the premium for external finance. The absence of substantial equity markets made borrowers in these developing countries particularly vulnerable. As we mentioned earlier, equity markets help cushion borrowers against adverse economic shocks by forcing creditors to share the risk of the downturn. The buildup of foreign debts during the 1970s also increased vulnerability. The poor macroeconomic climate forced many countries to devalue their currencies. Because many loans were denominated in units of foreign currency, the devaluations redistributed wealth from domestic borrowers to foreign creditors, further reducing domestic borrower net worth.

Overall, macroeconomic conditions were independently pressing up the premium for external finance. The liberalizations, thus, were the second part of a "double whammy" on domestic borrowers. As mentioned, one notable exception was Korea. The Korean liberalization, interestingly enough, happened in good economic times, during an export boom. The lesson seems to be that, because of the importance of borrower net worth to the sound functioning of financial markets, financial policy cannot be conducted independently of macroeconomic considerations. Our message is not that liberalizations should be delayed indefinitely until macroeconomic conditions are perfect, but rather that they should not be pursued independently of policies designed to directly promote growth and stability of the real sector. Liberalizations alone are unlikely to turn an economy around stagnation; and, for the reasons we have discussed, can exacerbate the situation when pursued unilaterally in an environment of economic stagnation.

The third consideration involves the failure in most cases to adequately coordinate liberalization with the design of the financial safety net. In many cases, the government maintained either an explicit or implicit commitment to prevent intermediaries from failing, while at the same time greatly loosening the rein on the kind of investments they could pursue. This

kind of policy only served to increase the incentives of financial institutions to abuse publicly-provided insurance. For this reason, required along with deregulation was increased supervision and monitoring of banks. But as Diaz-Alejandro (1985) noted, the Latin American countries largely failed to anticipate this need. Lax government monitoring permitted an environment of lax lending policies. What emerged was a vicious cycle of government bailouts and inefficient intermediation. In this regard, there is a strong parallel with the savings and loan crisis in the U.S.

## V. Evidence

We have argued that an important aspect of growth is a decline in the premium for external finance. As economies develop, therefore, one should expect an evolution from self-finance to formal credit relationships. Indeed, at least since Gurley and Shaw (1956) and Goldsmith (1968), development economists, have believed that financial deepening was an important aspect of growth. Much of recent growth theory, however, has ignored financial considerations. In this section, we update the evidence on financial deepening. The general motive is to confirm the potential relevance of the kind theories we have been describing. One way our analysis differs from much of the previous work is that we make explicit use of panel data techniques: that is, we exploit information from both the time series and the cross-section.

Our work is non-structural in the sense that we do not estimate a formal statistical model. Further, we do not deal with the all-important question of causality, so that the linkages between the financial system and the real economy are not explicitly identified. Rather, we seek, at least initially, to develop robust generalizations at the level of descriptive statistics. As is true of much non-structural econometric work, our results cannot verify hypotheses, but they are capable of refuting theories. The spirit of our empirical work is to present facts which constitute a benchmark to discriminate between viable and implausible theories.

We take as measures of financial deepening the ratios of various monetary and credit aggregates to income. Our main result -- which confirms the thinking of many development economists and which is compatible with the simple theory we outlined -- is that financial deepening is an important characteristic of the growth process. A one percent increase in real per capita income is typically associated with approximately a 1.5% increase in the various "financial deepening" measures. Further, this result is robust to a wide variety of perturbations. We also find a positive connection between private external borrowing at per capita GNP within the set of developing countries, as our theory predicts.

#### Va. Data

Most of our data is taken from the IMF's International Financial Statistics (the data has been checked for errors and is available upon request). The data is annual, usually spanning 1950 through 1988. We usually focus on a set of 69 developing countries. These countries satisfy the criteria established by Gertler and Rogoff (1990); they are non-communist and have populations over a million.<sup>40</sup> For purposes of comparison, we have also collected data for 21 developed countries. A virtue of restricting attention mainly to LDCs is that the financial data in the IFS statistics summarizes virtually all of the formal credit flows in these countries. Missing are data on stock and bond markets, which are important conduits of credit in many industrialized countries.<sup>41</sup>

Since we are not testing a specific structural model, but rather gathering stylized facts, we take a somewhat eclectic view about our measures

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<sup>40</sup>The countries are (listed in alphabetical order): Algeria; Argentina; Bangladesh; Benin; Bolivia; Botswana; Brazil; Burkina Faso; Burundi; Cameroon; Central African Republic; Chad; Colombia; Congo; Costa Rica; Cote d'Ivoire; Dominican Republic; Ecuador; Egypt; El Salvador; Ethiopia; Gabon; Ghana; Guatemala; Haiti; Honduras; India; Indonesia; Jamaica; Jordan; Kenya; Korea; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Mexico; Morocco; Myanmar; Nepal; Niger; Nigeria; Pakistan; Panama; Papua; New Guinea; Paraguay; Peru; Philippines; Portugal; Rwanda; Senegal; Sierra Leone; Somalia; Sri Lanka; Sudan; Syria; Tanzania; Thailand; Togo; Tunisia; Turkey; Uganda; Uruguay; Venezuela; Yemen Arab Republic; Zaire; and Zambia.

<sup>41</sup>Listed in alphabetical order, the developed countries are as follows: Australia; Austria; Belgium; Canada; Denmark; Finland; France; Germany; Greece; Iceland; Ireland; Italy; Japan; Luxembourg; Netherlands; New Zealand; Norway; Spain; Sweden; Switzerland; UK; and USA.

of financial depth. We focus on two measures of credit, but also use a variety of other measures to ensure that our statistical generalizations are robust. Given that our theoretical analysis applies to private credit flows (and that publicly provided credit contains a strong subsidy element) the measure of greatest interest is private domestic credit. Combining the claims on the private sector by the monetary authorities and the deposit money banks (IFS line 32d); we usually refer to this variable as "credit". We also concentrate on "quasi-money" (IFS line 35), the difference between M2 and M1. This variable may be viewed as an indicator of the depth of financial intermediation, since it reflects the component of intermediation that is more likely to be driven by lending and borrowing and borrowing considerations, than by the demand for a transactions medium. To check our conclusions, we often use variables such as total domestic credit (including claims on central and local governments as well as other banking institutions, IFS line 32) and M2 (the sum of IFS lines 34 and 35) for credit and quasi-money respectively. We also experiment with broader measures of money and credit, but do not report them here since the results are largely unchanged. Finally, we obtained measures of external borrowing from the world debt tables.

We usually convert our variables to real per capita data measured in American dollars. To do this, we use the country-specific period average (nominal bilateral) market exchange rate (IFS series "rf") to convert data into dollars, and subsequently divide the data by the product of the domestic population and the American GNP price deflator. We usually transform all variables by taking natural logarithms.

#### *Vb. Results*

We attempt to establish a broad empirical characterization of relationship between financial depth and real per capita income. To do so we examine correlations between the (log of the) level of (real per capita dollar income), and the (log of the) ratio of credit to GDP. We find strong evidence of a positive correlation: countries with higher income have deeper financial systems. Again, we stress that our work is descriptive, so that the causal

interpretation of this finding is unclear; in future work we hope to clarify the interpretation of this finding further.

Our empirical results are presented in Table I. As is true of most of our empirical work, the coefficients are estimated in a simple regression of the log of the ratio of credit (or quasi-money) on a constant and the log of real per capita income measured in American dollars. Throughout, our focus is on the slope coefficient. The actual data is displayed in scatterplots of the log of the credit/income ratio against the log of real income per capita (with bordering univariate distributions and box-and-whiskers plots) in the accompanying figure. The data is displayed in three ways: 1) pooled across all years and developing countries; 2) pooled only across regions; and 3) pooled only across specific years. Pooled data for the ratio of quasi-money to income is also displayed in the figure.

The first six rows of Table I describe our benchmark results. The slopes are positive and significantly so, in both economic and statistical terms. We estimate that a one percent increase in real per capita income is associated with an increase in the ratio of private credit to GDP of 0.42%; the comparable increase in the ratio of quasi-money to GDP is similar, 0.56%.<sup>42</sup> The intercepts of both equations are significantly negative at conventional significance levels (this is also true in virtually all perturbations of the basic equations).

These results are quite robust to a variety of perturbations of the basic framework; some of the sensitivity analysis is explicitly tabulated in Table I. For instance, the finding of a positive and significant slope is robust to: the exact measure of credit used; sub-sampling by region or year; accounting for country-specific "fixed effect" means; and inclusion of year-specific time dummies, a linear trend, or inflation. We have also taken non-overlapping five year averages of our data to smooth out business cycle

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<sup>42</sup>The results here are consistent with Hanson and Neal (1986), who found in a cross-section study of 36 LDCs that the quantity of liquid assets relative to GDP varied positively with GDP. Our interpretation of this relationship -- which emphasizes the development of intermediation -- is somewhat different though. For this reason, we restricted attention to the non-M1 component of M2.

fluctuations and focus on longer-term secular trends, without altering our basic results. In a related check, our results are also insensitive to dividing the sample into high-growth and no-growth observations (a country is said to have experienced high growth if its real per capita dollar income rose by over 3%).

We have also searched extensively for non-linearities in the relationship between credit and income, using three different types of techniques. First, we tested for threshold effects by allowing the slopes of the relationship between the (log of the) credit/income ratio and (the log of) real per capita GNP to vary at discretely at intervals corresponding to \$1000 increments in real income. Second, we incorporated higher polynomials terms in our regressions. Finally, we used more general non-parametric techniques to allow for non-linearities of a very arbitrary nature. However, while we found results of mixed statistical significance (which seems hardly surprising given the nature of the sample size), we almost never found economically significant or interesting evidence of non-linearities. That is, a linear relationship between the (logs of the) credit/income ratio and real income appears to be quite consistent with the data. The reason for this is clear from the accompanying scatterplot graph, which portrays the data along with fits from a simple linear regression and a non-parametric data smoother (which can accommodate arbitrarily threshold effects and the like.) The two fitted lines are quite close and never differ by as much as a single standard error in the span of the data.

Our finding of a positive relationship between real income and the credit/income ratio is robust with one exception. When we take first-differences of the data, we find a strong negative relationship between the variables of interest. First differencing emphasizes short-run variation in the data and may be inappropriate in our case, since the theory we offer is about the low frequency relationship between credit and output. That is, our story has little to say about the sign of the high frequency sign of credit/output correlation (e.g., borrowing might rise to smooth out the impact of a temporary downturn.) Simply put, since level variables are likely to be

better proxies for the true underlying low frequency variables than are first differences, we view the "level" regressions as the appropriate representation of the data.

With the short sample size (spanning a maximum of thirty-nine years) it is perhaps unsurprising that one cannot reject the hypotheses that typically the variables are individually integrated but not jointly co-integrated, at conventional significance levels (the test statistics are computed on a country by country basis; the signs of the co-integrating slope coefficients linking the levels of income and the credit/income ratio are positive in two-thirds of the cases). Nevertheless, there are no indications of a positive relationship between the growth rate of the credit/income ratio and real income, even if the co-integrating residual is included in a regression of the first-difference of the log of the credit/income ratio on the first-difference of real income. The slope coefficient is significantly negative, indicating that growth in income is correlated with a decline in the growth rate of the credit/income ratio; the co-integrating residual typically has a positive coefficient (consistent with a negative steady state relationship between the credit/income ratio and real income). We believe that there are two lessons to be learned from this. First, using excessively high-frequency data is potentially misleading, especially in the presence of developing country data which may be measured with error. Second, there may be significant mean-reversion in the relationship between credit and income, so that growing countries experience growth in the credit/income ratio at a declining rate. Both interpretations are corroborated by the fact that there is typically no economically or statistically significant relationship between the growth rates of income and credit/income ratios for developed countries. In the future, we plan to explore our hypotheses further with non-linear methods. In the meantime, we view this finding as consistent with our essential result of a strong positive relationship between income and financial depth.

Finally, we examined the relation between (the log of) the ratio of private external debt to GDP -- call this ratio "external debt" -- and per

capita GDP. We found that over the entire sample, each percentage point increase in per capita GDP was associated with a .12 percentage increase in "external debt". The cross-sectional evidence suggested that the relation was strongest in the 1970s and weakest in the late 1980s (i.e., the coefficient on per capita GNP was .36 in a cross-sectional regression in 1970 and .15 in 1988). These results reflect the fact that debt overhang became a problem in the 1980s; everything else equal, a rise in net foreign indebtedness reduces domestic borrower net worth, thus placing downward pressure on investment and GDP (see Gertler and Rogoff 1990).

## VI. Concluding Remarks

We have sketched a general framework intended to be useful for thinking about the process of financial reform. Many economists have stressed how problems of asymmetric information and contract enforcement impede the functioning of financial markets in developing countries. Our goal here was to flesh out the broad empirical implications of these theories, so as to enhance their relevance to policy. We demonstrated how these theories may be organized around the simple idea that informational and enforcement frictions introduce a premium in the cost of external funds. Factors such as the financial health of borrowers, the efficiency of financial intermediation and the ease of enforcing private financial contracts govern the size of this premium. How financial factors contribute to development may be understood along these lines. One may think also about financial structure: ideally, financial contracts and institutions ought to be designed to minimize this premium.

What are the practical implications for policy-makers? As usual, the answers are easiest for the long term. A largely decentralized capital market is optimal. While incentive problems may inhibit the functioning of financial markets, the most direct way for the government mitigate them is to provide an efficient system of contract enforcement. As we have argued, because of incentive problems inherent in non-market credit allocation, publicly managing credit flows is only likely to further reduce the efficiency of investment.



To the extent certain sectors merit public assistance, tax credits or subsidies in conjunction with private allocation of credit is preferable to directly regulating credit flows. Other than acting as a lender-of-last resort in times of a widespread financial crisis, the government should ideally refrain from active involvement in the credit business.

The transition to the long-term? Our approach suggests that liberalization alone is not a panacea. Financial and real development are a joint product. While liberalization can ultimately enhance growth, a successful liberalization in turn requires a viable borrowing class, i.e., a sufficiently large cohort of borrowers for whom the premium for external finance is not prohibitive. That is, a thriving private capital market depends not only a prudent regulatory regime, but also on having a thick core of creditworthy borrowers. In this regard, real sector policies - macro, public finance, and trade policies - which directly stimulate growth and stability should be pursued in concert with financial reform.

Table 1

(standard errors in parentheses)

	Private Credit	Quasi-Money
<b>Benchmark Case:</b>		
<b>Slope</b>	.42	.56
	(.02)	(.03)
<b>Intercept</b>	-4.68	-6.57
	(.11)	(.18)
<b>N</b>	2050	2028
<b>e</b>	.686	1.087
<b>Robustness Checks on Slopes:</b>		
<b>Aggregate Credit</b>	.24	
	(.02)	
<b>M2</b>		.19
		(.01)
<b>Africa</b>	.42	.47
	(.03)	(.05)
<b>Latin America</b>	.51	.55
	(.04)	(.06)
<b>Asia</b>	.72	.63
	(.06)	(.08)
<b>Developed Countries</b>	.29	.31
	(.03)	(.04)
<b>With Time Dummies</b>	.42	.52
	(.02)	(.02)
<b>With Linear Trend</b>	.41	.63
	(.02)	(.01)
<b>5 year Averages</b>	.40	.57
	(.04)	(.06)
<b>1950 (N=15)</b>	.33	.12
	(.19)	(.24)
<b>1960</b>	.55	.78
	(.15)	(.21)
<b>1970</b>	.45	.75
	(.09)	(.15)
<b>1980</b>	.29	.29
	(.09)	(.11)
<b>1988</b>	.54	.36
	(.11)	(.12)
<b>Growth &gt; 3%</b>	.41	.63
	(.03)	(.04)
<b>Growth &lt; 0</b>	.44	.52
	(.03)	(.04)
<b>Without Country Means</b>	.35	.87
	(.03)	(.05)
<b>With Inflation</b>	.40	.54
	(.02)	(.03)

First Difference Slope  
(in ECM)

-.17  
(.03)

-.09  
(.04)

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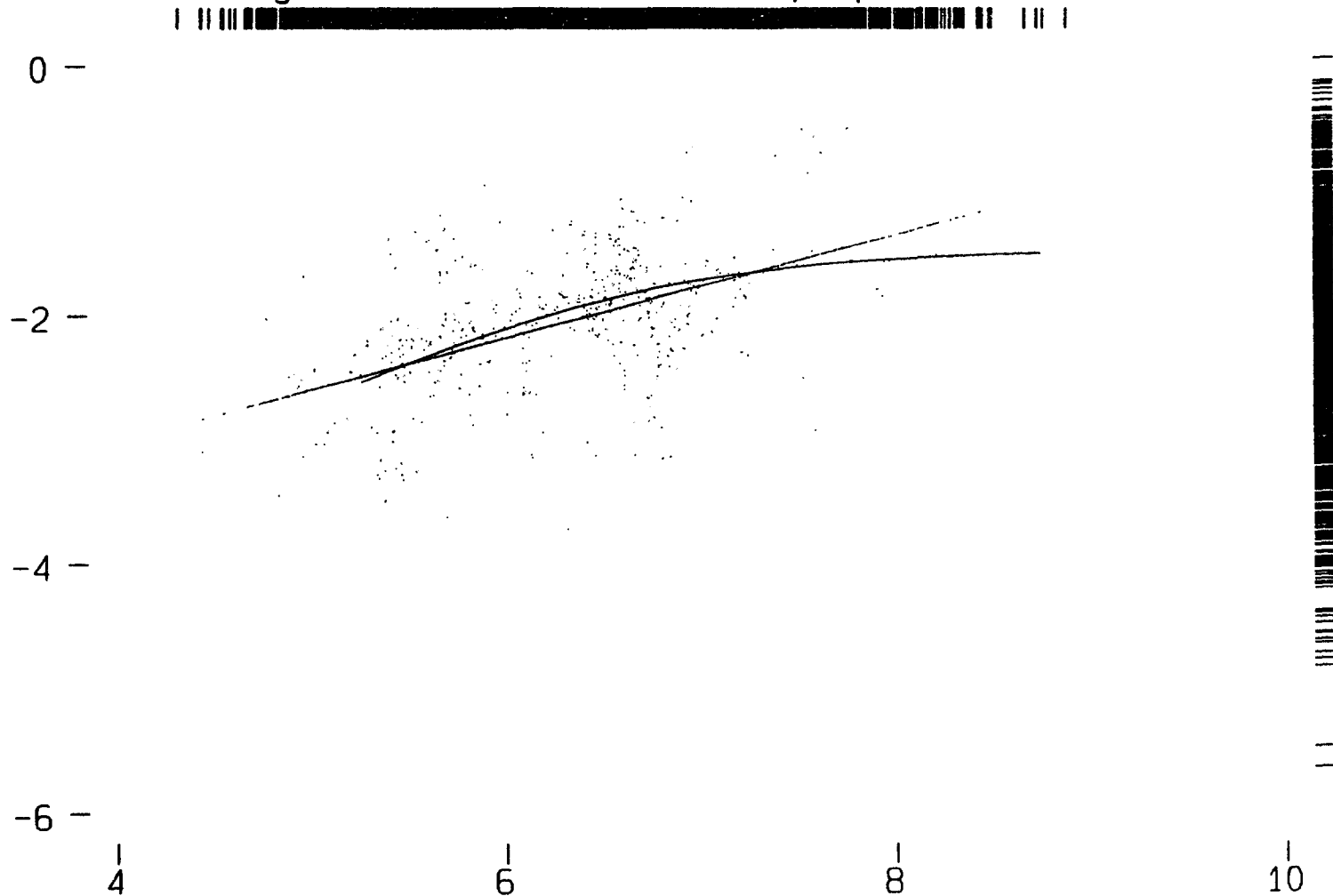
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Ratio of Credit to Income against Real Per Capita Dollar GNP  
Natural Logarithms of Pooled LDC Data; Equation RMSE=.69



Linear and Non-Parametric (Non-linear) Regressions

The Nature of the Relationship between Credit and Income



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