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Financial Development and Economic Growth: Views and Agenda

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Does finance make a difference . . .? Raymond Goldsmith (1969, p. 408)

I. *Introduction: Goals and Boundaries*

ECONOMISTS HOLD startlingly different opinions regarding the importance of the financial system for economic growth. Walter Bagehot (1873) and John Hicks (1969) argue that it played a critical role in igniting industrialization in England by facilitating the mobilization of capital for "immense works." Joseph Schumpeter (1912) contends that well-functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best chances of successfully implementing innovative products and production processes. In contrast, Joan Robinson (1952, p. 86) declares that "where enterprise leads finance follows." According to this view, economic development creates demands for particular types of financial arrangements, and the financial system responds automatically to these demands. Moreover, some economists just do not believe that the finance-growth relationship is important. Robert Lucas (1988, p. 6) asserts that economists "badly over-stress" the role of financial factors in economic growth, while development economists frequently express their skepticism about the role of the financial system by ignoring it (Anand Chandavarkar 1992). For example, a collection of essays by the "pioneers of development economics," including three Nobel Laureates, does not mention finance (Gerald Meir and Dudley Seers 1984). Furthermore, Nicholas Stern's (1989) review of development economics does not discuss the financial system, even in a section that lists omitted topics. In light of these conflicting views, this paper uses existing theory to organize an analytical framework of the finance-growth nexus and then assesses the quantitative importance of the financial system in economic growth.

Although conclusions must be stated hesitantly and with ample qualifications, the preponderance of theoretical reasoning and empirical evidence suggests a positive, first-order relationship between financial development and economic growth. A growing body of work would push even most skeptics toward the be-

lief that the development of financial markets and institutions is a critical and inextricable part of the growth process and away from the view that the financial system is an inconsequential side show, responding passively to economic growth and industrialization. There is even evidence that the level of financial development is a good predictor of future rates of economic growth, capital accumulation, and technological change. Moreover, cross country, case study, industry- and firm-level analyses document extensive periods when financial development—or the lack thereof—crucially affects the speed and pattern of economic development.

To arrive at these conclusions and to highlight areas in acute need of additional research, I organize the remainder of this paper as follows. Section II explains what the financial system does and how it affects—and is affected by—economic growth. Theory suggests that financial instruments, markets, and institutions arise to mitigate the effects of information and transaction costs.[1] Furthermore, a growing literature shows that differences in how well financial systems reduce information and transaction costs influence saving rates, investment decisions, technological innovation, and long-run growth rates. Also, a comparatively less developed theoretical literature demonstrates how changes in economic activity can influence financial systems.

Section II also advocates the functional approach to understanding the role of financial systems in economic growth. This approach focuses on the ties between growth and the quality of the functions provided by the financial system. These functions include facilitating the trading of risk, allocating capital, monitoring managers, mobilizing savings, and easing the trading of goods, services, and financial contracts.[2] The basic functions remain constant through time and across countries. There are large differences across countries and time, however, in the quality of financial services and in the types of financial instruments, markets, and institutions that arise to provide these services. While focusing on functions, this approach does not diminish the role of institutions. Indeed, the functional approach highlights the importance of examining an underresearched topic: the relationship between financial structure—the mix of financial instruments, markets, and institutions—and the provision of financial services. Thus, this approach discourages a narrow focus on one financial instrument, like money, or a particular institution, like banks. Instead, the functional approach prompts a more comprehensive—and more difficult—question: what is the relationship between financial structure and the functioning of the financial system?[3]

Part III then turns to the evidence. While many gaps remain, broad cross-country comparisons, individual country studies, industry-level analyses, and firm-level investigations point in the

[1] These frictions include the costs of acquiring information, enforcing contracts, and exchanging goods and financial claims.

[2] For different ways of categorizing financial functions, see Cole and Betty Slade (1991) and Robert C. Merton and Zvi Bodie (1995).

[3] The major alternative approach to studying finance and economic growth is based on the seminal contributions of John Gurley and Edward Shaw (1955), James Tobin (1965), and Ronald McKinnon (1973). In their mathematical models, as distinct from their narratives, they focus on money. This narrow focus can restrict the analysis of the finance-growth nexus, and lead to a misleading distinction between the "real" and financial sectors. In contrast, the functional approach highlights the value added of the financial sector. The financial system is a "real" sector: it researches firms and managers, exerts corporate control, and facilitates risk management, exchange, and resource mobilization.

same direction: the functioning of financial systems is vitally linked to economic growth. Specifically, countries with larger banks and more active stock markets grow faster over subsequent decades even after controlling for many other factors underlying economic growth. Industries and firms that rely heavily on external financing grow disproportionately faster in countries with well-developed banks and securities markets than in countries with poorly developed financial systems. Moreover, ample country studies suggest that differences in financial development have, in some countries over extensive periods, critically influenced economic development. Yet, these results do not imply that finance is everywhere and always exogenous to economic growth. Economic activity and technological innovation undoubtedly affect the structure and quality of financial systems. Innovations in telecommunications and computing have undeniably affected the financial services industry. Moreover, "third factors," such as a country's legal system and political institutions certainly drive both financial and economic development at critical junctures during the growth process. Nevertheless, the weight of evidence suggests that financial systems are a fundamental feature of the process of economic development and that a satisfactory understanding of the factors underlying economic growth requires a greater understanding of the evolution and structure of financial systems.

As in any critique, I omit or treat cursorily important issues. Here I highlight two.[4] First, I do not discuss the relationship between international finance and growth. This paper narrows its conceptual focus by studying the financial services available to an economy regardless of the geographic source of those services. In measuring financial development, however, researchers often do not account sufficiently for international trade in financial services. Second, the paper does not discuss policy. Given the links between the functioning of the financial system and economic growth, designing optimal financial sector policies is critically important. A rigorous discussion of these policies, however, would require a long article or book by itself.[5] Instead, this paper seeks to pull together a diverse and active literature into a coherent view of the financial system in economic growth.

II. *The Functions of the Financial System*

A. *Functional Approach: Introduction*

The costs of acquiring information and making transactions create incentives for the emergence of financial markets and institutions. Put differently, in a Kenneth Arrow (1964)-Gerard Debreu (1959) state-contingent claim framework with no information or transaction costs, there is no need for a financial system that expends resources researching projects, scrutinizing managers, or designing arrangements to ease risk management and facilitate transactions. Thus, any theory of the role of the financial system in economic growth (implicitly or explicitly) adds specific frictions to the Arrow-Debreu model. Financial markets and institutions may arise to ameliorate the problems created by information and transactions frictions. Different types and combinations of information and transaction costs motivate distinct financial contracts, markets, and institutions.

[4] Also, the theoretical review focuses on purely real economies and essentially ignores work on finance and growth in monetary economies.

[5] The financial policy literature is immense. See, for example, Philip Brock (1992), Alberto Giovannini and Martha De Melo (1993), Caprio, Isak Atiyas, and James Hanson (1994), and Maxwell Fry (1995).

In arising to ameliorate transaction and information costs, financial systems serve one primary function: they facilitate the allocation of resources, across space and time, in an uncertain environment (Merton and Bodie 1995, p. 12). To organize the vast literature on finance and economic activity, I break this primary function into five basic functions.

Specifically, financial systems

- facilitate the trading, hedging, diversifying, and pooling of risk,
- allocate resources,
- monitor managers and exert corporate control,
- mobililize savings, and
- facilitate the exchange of goods and services.

This section explains how particular market frictions motivate the emergence of financial markets and intermediaries that provide these five functions, and explains how they affect economic growth. I examine two channels through which *each* financial function may affect economic growth: capital accumulation and technological innovation. On capital accumulation, one class of growth models uses either capital externalities or capital goods produced using constant returns to scale but without the use of nonreproducible factors to generate steady-state per capita growth (Paul Romer 1986; Lucas 1988; Sergio Rebelo 1991). In these models, the functions performed by the financial system affect steady-state growth by influencing the rate of capital formation. The financial system affects capital accumulation either by altering the savings rate or by reallocating savings among different capital producing technologies. On technological innovation, a second class of growth models focuses on the invention of new production processes and goods (Romer 1990; Gene Grossman and Elhanan Helpman 1991; and Philippe Aghion and Peter Howitt 1992). In these models, the functions performed by the financial system affect steady-state growth by altering the rate of technological innovation. Thus, as sketched in Figure 1, the remainder of this section discusses how specific market frictions motivate the emergence of financial contracts, markets, and intermediaries and how these financial arrangements provide five financial functions that affect saving and allocations decisions in ways that influence economic growth.

Figure 1. A Theoretical Approach to Finance and Growth

B. *Facilitating Risk Amelioration*

In the presence of specific information and transaction costs, financial markets and institutions may arise to ease the trading, hedging, and pooling of risk. This subsection considers two types of risk: liquidity and idiosyncratic risk.

Liquidity is the ease and speed with which agents can convert assets into purchasing power at agreed prices. Thus, real estate is typically less liquid than equities, and equities in the United States are typically more liquid than those traded on the Nigerian Stock Exchange. Liquidity risk arises due to the uncertainties associated with converting assets into a medium of exchange. Informational asymmetries and transaction costs may inhibit liquidity and intensify liquidity risk. These frictions create incentives for the emergence of financial markets and institutions that augment liquidity. Liquid capital markets, therefore, are markets where it is relatively inexpensive to trade financial instruments and where there is little uncertainty about the timing and settlement of those trades.

Before delving into formal models of liquidity and economic activity, some intuition and history may help motivate the discussion. The link between liquidity and economic development arises because some high-return projects require a long-run commitment of capital, but savers do not like to relinquish control of their savings for long periods. Thus, if the financial system does not augment the liquidity of long-term investments, less investment is likely to occur in the high-return projects. Indeed, Sir John Hicks (1969, pp. 143–45) argues that the capital market improvements that mitigated liquidity risk were primary *causes* of the industrial revolution in England. According to Hicks, the products manufactured during the first decades of the industrial revolution had been invented much earlier. Thus, technological innovation did not spark sustained growth. Many of these existing inventions, however, required large injections and long-run commitments of capital. The critical *new* ingredient that ignited growth in eighteenth century England was capital market liquidity. With liquid capital markets, savers can hold assets—like equity, bonds, or demand deposits—that they can sell quickly and easily if they seek access to their savings. Simultaneously, capital markets transform these liquid financial instruments into long-term capital investments in illiquid production processes. Because the industrial revolution required large commitments of capital for long periods, the industrial revolution may not have occurred without this liquidity transformation. "The industrial revolution therefore had to wait for the financial revolution" (Valerie Bencivenga, Bruce Smith, and Ross Starr 1966, p. 243).[6]

Economists have recently modeled the emergence of financial markets in response to liquidity risk and examined how these financial markets affect economic growth. For example, in Douglas Diamond and Philip Dybvig's (1983) seminal model of liquidity, a fraction of savers receive shocks after choosing between two investments: an illiquid, high-return project and a liquid, low-return project. Those receiving shocks want access to their savings before the illiquid project produces. This risk creates incentives for investing in the liquid, low-return projects. The model assumes that it is prohibitively costly to verify whether another individual has received a shock or not. This information cost assumption rules out state-contingent insurance contracts and creates an incentive for financial markets—*markets where individuals issue and trade securities*—to emerge. In Levine (1991), savers receiving shocks

[6] The financial revolution included the emergence of joint-stock companies with nonredeemable capital. The Dutch East India Company made capital permanent in 1609, and Cromwell made the English East India Company capital permanent in 1650. These financial innovations formed the basis of liquid equity markets (Larry Neal 1990).

can sell their equity claims on the profits of the illiquid production technology to others. Market participants do not verify whether other agents received shocks or not; participants simply trade in impersonal stock exchanges. Thus, with liquid stock markets, equity holders can readily sell their shares, while firms have permanent access to the capital invested by the initial shareholders. By facilitating trade, stock markets reduce liquidity risk.[7] As stock market transaction costs fall, more investment occurs in the illiquid, high-return project. If illiquid projects enjoy sufficiently large externalities, then greater stock market liquidity induces faster steady-state growth.

Thus far, information costs—the costs of verifying whether savers have received a shock—have motivated the existence of stock markets. Trading costs can also highlight the role of liquidity. For example, different production technologies may have a wide array of gestation periods for converting current output into future capital, where longer-run technologies enjoy greater returns. Investors, however, may be reluctant to relinquish control of their savings for very long periods. Thus, long-gestation production technologies require that ownership be transferred throughout the life of the production process in secondary securities markets (Bencivenga, B. Smith, and Starr 1995). If exchanging ownership claims is costly, then longer-run production technologies will be less attractive. Thus, liquidity—as measured by secondary market trading costs—affects production decisions. Greater liquidity will induce a shift to longer-gestation, higher- return technologies.

Besides stock markets, financial intermediaries—*coalitions of agents that combine to provide financial services*—may also enhance liquidity and reduce liquidity risk. As discussed above, Diamond and Dybvig's (1983) model assumes it is prohibitively costly to observe shocks to individuals, so it is impossible to write incentive compatible state-contingent insurance contracts. Under these conditions, banks can offer liquid deposits to savers and undertake a mixture of liquid, low-return investments to satisfy demands on deposits and illiquid, high-return investments. By providing demand deposits and choosing an appropriate mixture of liquid and illiquid investments, banks provide complete insurance to savers against liquidity risk while simultaneously facilitating long-run investments in high-return projects. Banks replicate the equilibrium allocation of capital that exists with observable shocks. By eliminating liquidity risk, banks can increase investment in the high-return, illiquid asset and accelerate growth (Bencivenga and B. Smith 1991). There is a problem, however, with this description of the role of banks as reducing liquidity risk. The banking equilibrium is not incentive compatible if agents can trade in liquid equity markets; if equity markets exist, all agents will use equities; none will use banks (Charles Jacklin 1987). Thus, in this context, banks will only emerge to provide liquidity if there are sufficiently large impediments to trading in securities markets (Gary Gorton and George Pennacchi 1990).[8]

[7] Frictionless stock markets, however, do not eliminate liquidity risk. That is, stock markets do not replicate the equilibrium that exists when insurance contracts can be written contingent on observing whether an agent receives a shock or not.

[8] Goldsmith (1969, p. 396) notes that "Claims against financial institutions are generally easier to liquidate (i.e., to turn into cash without or with only insignificant delay, formality, and cost) than are primary debt securities. They have the additional great advantage of being completely divisible, whereas primary securities are usually issued in fixed amounts and often in amounts that make them very inconvenient for purchase and sale when lenders have small resources and when numerous individual purchase and sale transactions are involved."

Theory, however, suggests that enhanced liquidity has an ambiguous affect on saving rates and economic growth.[9] In most models, greater liquidity (a) increases investment returns and (b) lowers uncertainty. Higher returns ambiguously affect saving rates due to well-known income and substitution effects. Further, lower uncertainty ambiguously affects savings rates (David Levhari and T. N. Srinivasan 1969). Thus, saving rates may rise or fall as liquidity rises. Indeed, in a model with physical capital externalities, saving rates could fall enough, so that growth actually decelerates with greater liquidity (Tullio Jappelli and Marco Pagano 1994).[10]

Besides reducing liquidity risk, financial systems may also mitigate the risks associated with individual projects, firms, industries, regions, countries, etc. Banks, mutual funds, and securities markets all provide vehicles for trading, pooling, and diversifying risk.[11] The financial system's ability to provide risk diversification services can affect long-run economic growth by altering resource allocation and the saving rates. The basic intuition is straightforward. While savers generally do not like risk, high-return projects tend to be riskier than low-return projects. Thus, financial markets that ease risk diversification tend to induce a portfolio shift toward projects with higher expected returns (Gilles Saint-Paul 1992; Michael Devereux and Gregor Smith 1994; and Maurice Obstfeld 1994). Greater risk sharing and more efficient capital allocation, however, have theoretically ambiguous effects on saving rates as noted above. The savings rate could fall enough so that, when coupled with an externality-based or linear growth model, overall economic growth falls. With externalities, growth could fall sufficiently so that overall welfare falls with greater risk diversification.

Besides the link between risk diversification and capital accumulation, risk diversification can also affect technological change. Agents are continuously trying to make technological advances to gain a profitable market niche. Besides yielding profits to the innovator, successful innovation accelerates technological change. Engaging in innovation is risky, however. The ability to hold a diversified portfolio of innovative projects reduces risk and promotes investment in growth-enhancing innovative activities (with sufficiently risk averse agents). Thus, financial systems that ease risk diversification can accelerate technological change and economic growth (Robert King and Levine 1993c).

C. *Acquiring Information About Investments and Allocating Resources*

It is difficult and costly to evaluate firms, managers, and market conditions as discussed by Vincent Carosso (1970). Individual savers may not have the time, capacity, or means to collect and process information on a wide array of enterprises, managers, and economic conditions. Savers will be reluctant to invest in activities about which there is little reli-

[9] The analyses described thus far focus on the links between liquidity and capital accumulation. Yet, liquidity may also affect the rate of technological change if long-run commitments of resources to research and development promote technological innovation.

[10] Similarly, although greater liquidity unambiguously raises the real return on savings, more liquidity may induce a reallocation of investment out of initiating new capital investments and into purchasing claims on ongoing projects. This may lower the rate of real investment enough to decelerate growth (Bencivenga, B. Smith, and Starr 1995).

[11] Although the recent uses of options and futures contracts to hedge risk have been well publicized, the development of these financial contracts is by no means recent. Josef Penso de la Vega published a treatise on options contracts, futures contracts, and securities market speculation, *Confusion de Confusiones*, in 1688!

able information. Consequently, high information costs may keep capital from flowing to its highest value use.

Information acquisition costs create incentives for financial intermediaries to emerge (Diamond 1984; and John Boyd and Edward Prescott 1986). Assume, for example, that there is a fixed cost to acquiring information about a production technology. Without intermediaries, each investor must pay the fixed cost. In response to this information cost structure, however, groups of individuals may form (or join or use) financial intermediaries to economize on the costs of acquiring and processing information about investments. Instead of each individual acquiring evaluation skills and then conducting evaluations, an intermediary can do it for all its members. Economizing on information acquisition costs facilitates the acquisition of information about investment opportunities and thereby improves resource allocation.

The ability to acquire and process information may have important growth implications. Because many firms and entrepreneurs will solicit capital, financial intermediaries, and markets that are better at selecting the most promising firms and managers will induce a more efficient allocation of capital and faster growth (Jeremy Greenwood and Boyan Jovanovic 1990). Bagehot (1873, p. 53) expressed this view over 120 years ago.

> [England's financial] organization is so useful because it is so easily adjusted. Political economists say that capital sets towards the most profitable trades, and that it rapidly leaves the less profitable non-paying trades. But in ordinary countries this is a slow process, . . . In England, however, . . . capital runs as surely and instantly where it is most wanted, and where there is most to be made of it, as water runs to find its level.

England's financial system did a better job at identifying and funding profitable ventures than most countries in the mid-1800s, which helped it enjoy comparatively greater economic success.[12]

Besides identifying the best production technologies, financial intermediaries may also boost the rate of technological innovation by identifying those entrepreneurs with the best chances of successfully initiating new goods and production processes (King and Levine 1993c). As eloquently stated by Schumpeter (1912, p. 74),

> The banker, therefore, is not so much primarily a middleman, . . . He authorises people, in the name of society as it were, . . . [to innovate].

Stock markets may also influence the acquisition and dissemination of information about firms. As stock markets become larger (Sanford Grossman and Joseph Stiglitz 1980) and more liquid (Albert Kyle 1984; and Bengt Holmstrom and Jean Tirole 1993), market participants may have greater incentives to acquire information about firms. Intuitively, with larger more liquid markets, it is easier for an agent who has acquired information to disguise this private information and make money. Thus, large, liquid stock markets can stimulate the acquisition of information. Moreover, this improved information about firms should improve resource allocation substantially with corresponding implications for economic growth (Merton 1987). However, existing theories have not yet assembled the links of the chain from the functioning of stock markets, to information acquisition, and finally to aggregate long-run economic growth.

[12] Indeed, England's advanced financial system also did a good job at identifying profitable ventures in other countries, such as Canada, the United States, and Australia during the 19th century. England was able to "export" financial services (as well as financial capital) to many economies with underdeveloped financial systems (Lance Davis and Robert Huttenback 1986).

Debate still exists over the importance of large, liquid, efficient stock markets in enhancing the creation and distribution information about firms. Stock markets aggregate and disseminate information through published prices. Even agents that do not undertake the costly processes of evaluating firms, managers, and market conditions can observe stock prices that reflect the information obtained by others. This public goods aspect of acquiring information can cause society to devote too few resources to information acquisition. The public goods feature of the information thus disclosed may be sufficiently large, that information gains from large, liquid stock markets are small. Stiglitz (1985) argues that, because stock markets quickly reveal information through posted prices, there will be few incentives for spending private resources to acquire information that is almost immediately publicly available.

D. *Monitoring Managers and Exerting Corporate Control*

Besides reducing the costs of acquiring information ex ante, financial contracts, markets, and intermediaries may arise to mitigate the information acquisition and enforcement costs of monitoring firm managers and exerting corporate control ex post, i.e., after financing the activity. For example, firm owners will create financial arrangements that compel firm managers to manage the firm in the best interests of the owners. Also, "outside" creditors—banks, equity, and bond holders—that do not manage firms on a day-to-day basis will create financial arrangements to compel inside owners and managers to run firms in accordance with the interests of outside creditors. The absence of financial arrangements that enhance corporate control may impede the mobilization of savings from disparate agents and thereby keep capital from flowing to profitable investments (Stiglitz and Andrew Weiss 1981, 1983). Because this vast literature has been carefully reviewed (Gertler 1988; and Andrei Shleifer and Robert Vishny, forthcoming), this subsection (1) notes a few ways in which financial contracts, markets, and institutions improve monitoring and corporate control, and (2) reviews how these financial arrangements for monitoring influence capital accumulation, resource allocation, and long-run growth.

Consider, for example, the simple assumption that it is costly for outsider investors in a project to verify project returns. This creates important frictions that can motivate financial development. Insiders have incentives to misrepresent project returns to outsiders. Given verification costs, however, it is socially inefficient for outsiders to monitor in all circumstances. With "costly state verification" (and other assumptions including risk-neutral borrowers and verification costs that are independent of project quality), the optimal contract between outsiders and insiders is a debt contract (Robert Townsend 1979; and Douglas Gale and Martin Hellwig 1985). Specifically, there is an equilibrium interest rate, r, such that when the project return is sufficiently high, insiders pay r to outsiders and outsiders do not monitor. When project returns are insufficient, the borrower defaults and the lenders pay the monitoring costs to verify the project's return. These verification costs impede investment decisions and reduce economic efficiency. Verification costs imply that outsiders constrain firms from borrowing to expand investment because higher leverage implies greater risk of default and higher verification expenditures by lenders. Thus, collateral and financial contracts that lower monitoring and enforcement costs reduce impediments to efficient investment (Stephen Williamson 1987b; Ben Bernanke and

Gertler 1989, 1990; Ernst-Ludwig von Thadden 1995).[13]

Besides particular types of financial contracts, financial intermediaries can reduce information costs even further. If borrowers must obtain funds from many outsiders, financial intermediaries can economize on monitoring costs. The financial intermediary mobilizes the savings of many individuals and lends these resources to project owners. This "delegated monitor" arrangement economizes on aggregate monitoring costs because a borrower is monitored only by the intermediary, not all individual savers (Diamond 1984). Besides reducing duplicate monitoring, a financial system that facilitates corporate control "also makes possible the efficient separation of ownership from management of the firm. This in turn makes feasible efficient specialization in production according to the principle of comparative advantage" (Merton and Bodie 1995, p. 14). The delegated monitor arrangement, however, creates a potential problem: who will monitor the monitor (Stefan Krasa and Anne Villamil 1992)? Savers, however, do not have to monitor the intermediary if the intermediary holds a diversified portfolio (and agents can easily verify that the intermediary's portfolio is well diversified). With a well-diversified portfolio, the intermediary can always meet its promise to pay the deposit interest rate to depositors, so that depositors never have to monitor the bank. Thus, well-diversified financial intermediaries can foster efficient investment by lowering monitoring costs.[14] Furthermore, as financial intermediaries and firms develop long-run relationships, this can further lower information acquisition costs. The reduction in information asymmetries can in turn ease external funding constraints and facilitate better resource allocation (Sharpe 1990).[15] In terms of long-run growth, financial arrangements that improve corporate control tend to promote faster capital accumulation and growth by improving the allocation of capital (Bencivenga and B. Smith 1993).

Besides debt contracts and banks, stock markets may also promote corporate control (Michael Jensen and William Meckling 1976). For example, public trading of shares in stock markets that efficiently reflect information about firms allows owners to link managerial compensation to stock prices. Linking stock performance to manager compensation helps align the interests of managers with those of owners (Diamond and Robert Verrecchia 1982; and Jensen and Kevin Murphy 1990). Similarly, if takeovers are easier in well-developed stock markets and if managers of under-performing firms are fired following a takeover, then better stock markets can promote better corporate control by easing takeovers of poorly managed firms. The threat of a takeover will help align managerial incentives with those of the own-

[13] Costly state verification can produce credit rationing. Because higher interest rates are linked with a higher probability of default and monitoring costs, intermediaries may keep rates low and ration credit using non-price mechanisms (Williamson 1986, 1987a).

[14] Diamond (1984) assumes that intermediaries exist and shows that the intermediary arrangement economizes on monitoring costs. Williamson (1986) shows how intermediaries arise endogenously. Furthermore, I have only discussed models in which state verification proceeds nonstochastically: if borrowers default, lenders verify. Stochastic monitoring, however, may further reduce verification costs (Bernanke and Gertler 1989; and Boyd and B. Smith 1994).

[15] The long-run relationships between a banker and client may impose a cost on the client. Because the bank is well informed about the firm, the bank may have bargaining power over the firm's profits. If the bank breaks its ties to the firm, other investors will be reluctant to invest in the firm. Firms may therefore diversify out of bank financing to reduce their vulnerability (Raghurman Rajan 1992).

ers (David Scharfstein 1988; and Jeremy Stein 1988). I am not aware of models that directly link the role of stock markets in improving corporate governance with long-run economic growth.

There are disagreements, however, about the importance of stock markets in corporate control. Inside investors probably have better information about the corporation than outsiders. Thus, if well-informed owners are willing to sell their company, less well informed outsiders may demand a premium to purchase the firm due to the information asymmetry (Stewart Myers and Nicholas Majluf 1984). Thus, asymmetric information may reduce the efficacy of corporate takeovers as a mechanism for exerting corporate control. Stiglitz (1985) makes three additional arguments about takeovers. First, if an acquiring firm expends lots of resources obtaining information, the results of this research will be observed by other market participants when the acquiring firm bids for shares. This will induce others to bid for shares, so that the price rises. The firm that expended resources obtaining information must, therefore, pay a higher price than it would have to pay if "free-riding" firms could not observe its bid. Thus, the rapid public dissemination of costly information will reduce incentives for obtaining information and making effective takeover bids. Second, there is a public good nature to takeovers that may decrease the incentives for takeovers. If the takeover succeeds, and the share price rises, then those original equity holders who did not sell make a big profit without expending resources. This creates an incentive for existing shareholders to not sell if they think the value of the firm will rise following the takeover. Thus, value-increasing takeovers may fail because the acquiring firm will have to pay a high price, which will reduce incentives for researching firms in the hopes of taking them over. Third, current managers often can take strategic actions to deter takeovers and maintain their positions. This argues against an important role for liquid stock markets in promoting sound corporate governance.

Moreover, liquid equity markets that facilitate takeovers may hurt resource allocation (Shleifer and Lawrence Summers 1988; and Randall Morck, Shleifer, and Vishny 1990). A takeover typically involves a change in management. Existing implicit contracts between former managers and workers, suppliers, and other stakeholders in the firms do not bind new owners and managers to the same extent that they bound the original managers. Thus, a takeover allows new owners and managers to break implicit agreements and transfer wealth from firm stakeholders to themselves. While new owners may profit, there may be a deterioration in the efficiency of resource allocation. Overall welfare may fall. To the extent that well-functioning equity markets help takeovers, this may allow hostile takeovers that lead to a fall in the efficiency of resource allocation. Furthermore, liquid stock markets may reduce incentives for owners to monitor managers (Amar Bhide 1993). By reducing exit costs, stock market liquidity encourages more diffuse ownership with fewer incentives and greater impediments to actively overseeing managers (Shleifer and Vishny 1986). Thus, the theoretical signs on the links in the chain from improvements in stock markets to better corporate control to faster economic growth are still ambiguous.[16]

E. *Mobilizing Savings*

Mobilization—*pooling*—involves the agglomeration of capital from disparate

[16] Some research also suggests that excessive stock trading can induce "noise" into the market and hinder efficient resource allocation (Bradford De Long et al. 1989).

savers for investment. Without access to multiple investors, many production processes would be constrained to economically inefficient scales (Erik Sirri and Peter Tufano 1995). Furthermore, mobilization involves the creation of small denomination instruments. These instruments provide opportunities for households to hold diversified portfolios, invest in efficient scale firms, and to increase asset liquidity. Without pooling, household's would have to buy and sell entire firms. By enhancing risk diversification, liquidity, and the size of feasible firms, therefore, mobilization improves resource allocation (Sirri and Tufano 1995).

Mobilizing the savings of many disparate savers is costly, however. It involves (a) overcoming the transaction costs associated with collecting savings from different individuals and (b) overcoming the informational asymmetries associated with making savers feel comfortable in relinquishing control of their savings. Indeed, much of Carosso's (1970) history of *Investment Banking in America* is a description of the diverse and elaborate means employed by investment banks to raise capital. As early as the mid-1880s, some investment banks used their European connections to raise capital abroad for investment in the United States. Other investment banks established close connections with major banks and industrialists in the United States to mobilize capital. And, still others used newspaper advertisements, pamphlets, and a vast sales force that traveled through every state and territory selling securities to individual households. Thus, mobilizing resources involved a range of transaction costs. Moreover, "mobilizers" had to convince savers of the soundness of the investments. Toward this end, intermediaries are generally concerned about establishing stellar reputations or government backing, so that savers feel comfortable about entrusting their savings to the intermediary (De Long 1991; and Naomi Lamoreaux 1994).

In light of the transaction and information costs associated with mobilizing savings from many agents, numerous financial arrangements may arise to mitigate these frictions and facilitate pooling.[17] Specifically, mobilization may involve multiple bilateral contracts between productive units raising capital and agents with surplus resources. The joint stock company in which many individuals invest in a new legal entity, the firm, represents a prime example of multiple bilateral mobilization. To economize on the transaction and information costs associated with multiple bilateral contracts, pooling may also occur through intermediaries as discussed above, where thousands of investors entrust their wealth to intermediaries that invest in hundreds of firms (Sirri and Tufano 1995, p. 83).

Financial systems that are more effective at pooling the savings of individuals can profoundly affect economic development. Besides the direct effect of better savings mobilization on capital accumulation, better savings mobilization can improve resource allocation and boost technological innovation (Bagehot 1873, pp. 3–4):

> We have entirely lost the idea that any undertaking likely to pay, and seen to be likely, can perish for want of money; yet no idea was more familiar to our ancestors, or is more common in most countries. A citizen of Long in Queen Elizabeth's time . . . would have thought that it was no use inventing railways (if he could have understood what a railway meant), for you would have not been able to collect the capital with which to make them. At this moment, in colonies and all rude countries, there is no large sum of transferable money; there is not fund from which you can borrow, and out of which you can make immense works.

[17] See Sections II.C and II.D for citations on the emergence of financial intermediaries.

Thus, by effectively mobilizing resources for projects, the financial system may play a crucial role in permitting the adoption of better technologies and thereby encouraging growth. This intuition was clarified 100 years later by McKinnon (1973, p. 13):

> The farmer could provide his own savings to increase slightly the commercial fertilizer that he is now using, and the return on this marginal new investment could be calculated.
>
> The important point, however, is the virtual impossibility of a poor farmer's financing from his current savings the whole of the balanced investment needed to adopt the new technology. Access to external financial resources is likely to be necessary over the one or two years when the change takes place. Without this access, the constraint of self-finance sharply biases investment strategy toward marginal variations within the traditional technology.

F. *Facilitating Exchange*

Besides easing savings mobilization and thereby expanding the of set production technologies available to an economy, financial arrangements that lower transaction costs can promote specialization, technological innovation, and growth. The links between facilitating transactions, specialization, innovation, and economic growth were core elements of Adam Smith's (1776) *Wealth of Nations*. Smith (1776, p. 7) argued that division of labor—specialization—is the principal factor underlying productivity improvements. With greater specialization, workers are more likely to invent better machines or production processes.

> I shall only observe, therefore, that the invention of all those machines by which labour is so much facilitated and abridged, seems to have been originally owing to the division of labour. Men are much more likely to discover easier and readier methods of attaining any object, when the whole attention of their minds is directed towards that single object, than when it is dissipated among a great variety of things. (Smith 1776, p. 3)

The critical issue for our purposes is that the financial system can promote specialization. Adam Smith argued that lower transaction costs would permit greater specialization because specialization requires more transactions than an autarkic environment. Smith phrased his argument about the lowering of transaction costs and technological innovation in terms of the advantages of money over barter (pp. 26–27). Information costs, however, may also motivate the emergence of money. Because it is costly to evaluate the attributes of goods, barter exchange is very costly. Thus, an easily recognizable medium of exchange may arise to facilitate exchange (King and Charles Plosser 1986; and Williamson and Randall Wright 1994).[18]

The drop in transaction and information costs is not necessarily a one-time fall when economies move to money, however. For example, in the 1800s, " it was primarily the development of institutions that facilitated the exchange of technology in the market that enabled creative individuals to specialize in and become more productive at invention" (Lamoreaux and Sokoloff 1996, p. 17). Thus, transaction and information costs may continue to fall through a variety of mechanisms, so that financial and institutional development continually boost specialization and innovation via the same channels illuminated over 200 years ago by Adam Smith.[19]

[18] This focus on money as a medium of exchange that lowers transaction and information costs by overcoming the "double coincidence of wants problem" and by acting as an easily recognizable medium of exchange enjoys a long history in monetary theory, from Adam Smith (1776), to Stanley Jevons (1875), to Karl Brunner and Allan Meltzer (1971), to more formal models as reviewed by Joseph Ostroy and Starr (1990).

[19] Financial systems can also promote the accumulation of human capital by lowering the costs of intertemporal trade, i.e., by facilitating borrowing for the accumulation of skills (Thomas Cooley and B. Smith 1992; and Jose De Gregorio 1996). If human capital accumulation is not subject to di-

Modern theorists have attempted to illuminate more precisely the ties between exchange, specialization, and innovation (Greenwood and B. Smith 1997). More specialization requires more transactions. Because each transaction is costly, financial arrangements that lower transaction costs will facilitate greater specialization. In this way, markets that promote exchange encourage productivity gains. There may also be feedback from these productivity gains to financial market development. If there are fixed costs associated with establishing markets, then higher income per capita implies that these fixed costs are less burdensome as a share of per capita income. Thus, economic development can spur the development of financial markets.

This approach to linking financial markets with specialization has not yet formally completed Adam Smith's story of innovation. That is, a better market—a market with lower transactions costs—does not stimulate the invention of new and better production technologies in Greenwood and B. Smith's (1997) model. Instead, lower transaction costs expand the set of "on the shelf" production processes that are economically attractive. Also, the model defines better "market" as a system for supporting more specialized production processes. This does not explain the emergence of financial instruments or institutions that lower transaction costs and thereby produce an environment that naturally promotes specialized production technologies. This is important because we want to understand the two links of the chain: what about the economic environment creates incentives for financial arrangements to arise and to function well or poorly, and what are the implications for economic activity of the emerging financial arrangements?

G. *A Parable*

Thus far, I have discussed each financial function in isolation. This, however, may encourage an excessively narrow focus on individual functions and impede the synthesis of these distinct functions into a coherent understanding of the financial system's role in economic development. This is not a necessary implication. In fact, by identifying the individual functions performed by the financial system, the functional approach can foster a more complete understanding of finance and growth.

Earlier authors often provided illustrative stories of the ties between finance and development. For example Schumpeter (1912, pp. 58–74) and McKinnon (1973, pp. 5–18) provide broad descriptions—parables—of the roles of the financial system in economic development. Just as Smith (1776) used the pin factory to illustrate the importance of specialization, Schumpeter used the relationship between banker and industrialist to illustrate the importance of the financial system in choosing and adopting new technologies, and McKinnon highlighted its importance in promoting the use of better agricultural techniques. However, even Schumpeter and McKinnon did not amalgamate all of the financial functions into their stories of finance and development. Consequently, this subsection synthesizes the individual financial functions into a simple parable about how the financial system affects economic growth.

Consider Fred, who has just developed a design for a new truck that extracts rocks from a quarry better than existing trucks. His idea for manufacturing trucks requires an intricate assembly line with specialized labor and capital.

minishing returns on a social level, financial arrangements that ease human capital creation help accelerate economic growth.

Highly specialized production processes would be difficult without a medium of exchange. He would find it prohibitively costly to pay his workers and suppliers using barter exchange. Financial instruments and markets that *facilitate transactions* will allow and promote specialization and thereby permit him to organize his truck assembly line. Moreover, the increased specialization induced by easier transactions may foster learning-by-doing and innovation by the workers specializing on their individual tasks.

Production requires capital. Even if Fred had the savings, he would not wish to put all of his savings in one risky investment. Also, he wants ready access to savings for unplanned events; he is reluctant to tie up his savings in the truck project, which will not yield profits, if it does yield profits, for a long time. His distaste for risk and desire for liquidity create incentives for him to (a) diversify the family's investments and (b) not commit too much of his savings to an illiquid project, like producing a new truck. In fact, if Fred must invest disproportionately in his illiquid truck project, he may forgo his plan. Without a mechanism for managing risk, the project may die. Thus, *liquidity, risk pooling, and diversification* will help him start his innovative project.

Moreover, Fred will require outside funding if he has insufficient savings to initiate his truck project. There are problems, however, in mobilizing savings for Fred's truck company. First, it is very costly and time consuming to collect savings from individual savers. Fred does not have the time, connections, and information to collect savings from everyone in his town and neighboring communities even though his idea is sound. Banks and investment banks, however, can mobilize savings more cheaply than Fred due to economies of scale, economies of scope, and experience. Thus, Fred may seek the help of a financial intermediary to *mobilize savings* for his new truck plant.

Two additional problems ("frictions") may keep savings from flowing to Fred's project. To fund the truck plant, the financial intermediaries—and savers in financial intermediaries—require information about the truck design, Fred's ability to implement the design, and whether there is a sufficient demand for better quarry trucks. This information is difficult to obtain and analyze. Thus, the financial system must be able to acquire *reliable information* about Fred's idea before funding the truck plant. Furthermore, if potential investors feel that Fred may steal the funds, or run the plant poorly, or misrepresent profits, they will not provide funding. To finance Fred's idea, outside creditors must have confidence that Fred will run the truck plant well. Thus, for Fred to receive funding, the financial system must monitor *managers and exert corporate control*.

While this parable does not contain all aspects of the discussion of financial functions, it provides one cohesive story of how the five financial functions may interact to promote economic development.

H. *The Theory of Finance and Economic Growth: Agenda*

In describing the conceptual links between the functioning of the financial system and economic growth, I highlighted areas needing additional research. Two more areas are worth emphasizing. First, we do not have a sufficiently rigorous understanding of the emergence, development, and economic implications of different financial structures. Financial structure—the mix of financial contracts, markets, and institutions—varies across countries and

changes as countries develop (Boyd and B. Smith 1996). Yet, we do not have adequate theories of why different financial structures emerge or why financial structures change. Differences in legal tradition (Rafael LaPorta et al. 1996) and differences in national resource endowments that produce different political and institutional structures (Stanley Engerman and Sokoloff 1996) might be incorporated into future models of financial development. Furthermore, economists need to develop an analytical basis for making comparisons of financial structures; we need models that elucidate the conditions, if any, under which different financial structures are better at mitigating information and transaction costs.

A second area needing additional research involves the influence of the level and growth rate of the economy on the financial system. Some models assume that there is a fixed cost to joining financial intermediaries. Economic growth then reduces the importance of this fixed cost and more people join. Thus, economic growth provides the means for the formation of growth-promoting financial intermediaries, while the formation of financial intermediaries accelerates growth by enhancing the allocation of capital. In this way, financial and economic development are jointly determined (Greenwood and Jovanovic 1990). Economic development may affect the financial system in other ways that have not yet been formally modeled. For example, the costs and skills required to evaluate production technologies and monitor managers may be very different in a service-oriented economy from that of a manufacturing-based economy or an agricultural-based economy. Building on Hugh Patrick (1966), Greenwood and Jovanovic (1990), and Greenwood and Smith (1997), future research may improve our understanding of the impact of growth on financial systems.

III. *Evidence*

A. *The Questions*

Are differences in financial development and structure importantly associated with differences in economic growth rates? To assess the nature of the finance-growth relationship, I first describe research on the links between the functioning of the financial system and economic growth, capital accumulation, and technological change. Then, I evaluate existing evidence on the ties between financial structure—the *mix of financial markets and intermediaries*—and the functioning of the financial system. A growing body of work demonstrates a strong, positive link between financial development and economic growth, and there is even evidence that the level of financial development is a good predictor of future economic development. Evidence on the relationship between financial structure and the functioning of the financial system, however, is more inconclusive.

B. *The Level of Financial Development and Growth: Cross-Country Studies*

Consider first the relationship between economic growth and aggregate measures of how well the financial system functions. The seminal work in this area is by Goldsmith (1969). He uses the value of financial intermediary assets divided by GNP to gauge financial development under the assumption that the size of the financial system is positively correlated with the provision and quality of financial services. Using data on 35 countries from 1860 to 1963 (when available) Goldsmith (1969, p. 48) finds:

> (1) a rough parallelism can be observed between economic and financial development if periods of several decades are considered; [and]
> (2) there are even indications in the few countries for which the data are available that

periods of more rapid economic growth have been accompanied, though not without exception, by an above-average rate of financial development.

Goldsmith's work, however, has several weaknesses: (a) the investigation involves limited observations on only 35 countries; (b) it does not systematically control for other factors influencing economic growth (Levine and David Renelt 1992); (c) it does not examine whether financial development is associated with productivity growth and capital accumulation; (d) the size of financial intermediaries may not accurately measure the functioning of the financial system; and (e) the close association between the size of the financial system and economic growth does not identify the direction of causality.[20]

Recently, researchers have taken steps to address some of these weaknesses. For example, King and Levine (1993a, 1993b, 1993c) study 80 countries over the period 1960–1989, systematically control for other factors affecting long-run growth, examine the capital accumulation and productivity growth channels, construct additional measures of the level of financial development, and analyze whether the level of financial development predicts long-run economic growth, capital accumulation, and productivity growth. (Also, see Alan Gelb 1989; Gertler and Andrew Rose 1994; Nouriel Roubini and Xavier Sala-i-Martin 1992; Easterly 1993; and the overview by Pagano 1993.) They use four measures of "the level of financial development" to more precisely measure the functioning of the financial system than Goldsmith's size measure. Table 1 summarizes the values of these measures relative to real per capita GDP (RGDP) in 1985. The first measure, DEPTH, measures the size of financial intermediaries and equals liquid liabilities of the financial system (currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries) divided by GDP. As shown, citizens of the richest countries—the top 25 percent on the basis of income per capita—held about two-thirds of a year's income in liquid assets in formal financial intermediaries, while citizens of the poorest countries—the bottom 25 percent—held only a quarter of a year's income in liquid assets. There is a strong correlation between real per capita GDP and DEPTH. The second measure of financial development, BANK, measures the degree to which the central bank versus commercial banks are allocating credit. BANK equals the ratio of bank credit divided by bank credit plus central bank domestic assets. The intuition underlying this measure is that banks are more likely to provide the five financial functions than central banks. There are two notable weaknesses with this measure, however. Banks are not the only financial intermediaries providing valuable financial functions and banks may simply lend to the government or public enterprises. BANK is greater than 90 percent in the richest quartile of countries. In contrast, commercial banks and central banks allocate about the same amount of credit in the poorest quartile of countries. The third and fourth measures partially address concerns about the allocation of credit. The third measures, PRIVATE, equals the ratio of credit allocated to private enterprises to total domestic credit (excluding credit to banks). The fourth measure, PRIVY, equals credit to private enterprises divided by

[20] Goldsmith (1969) recognized these weaknesses, e.g., "there is no possibility, however, of establishing with confidence the direction of the causal mechanisms, i.e., of deciding whether financial factors were responsible for the acceleration of economic development or whether financial development reflected economic growth whose mainsprings must be sought elsewhere" (p. 48).

TABLE 1
FINANCIAL DEVELOPMENT AND REAL PER CAPITA GDP IN 1985

Indictors	Very rich	Rich	Poor	Very poor	Correlation with Real per Capita GDP in 1985	(P-value)
DEPTH	0.67	0.51	0.39	0.26	0.51	(0.0001)
BANK	0.91	0.73	0.57	0.52	0.58	(0.0001)
PRIVATE	0.71	0.58	0.47	0.37	0.51	(0.0001)
PRIVY	0.53	0.31	0.20	0.13	0.70	(0.0001)
RGDP85	13053	2376	754	241		
Observations	29	29	29	29		

Source: King and Levine (1993a)
Very rich: Real GDP per Capita > 4998
Rich: Real GDP per Capita > 1161 and < 4998
Poor: Real GDP per Capita > 391 and < 1161
Very poor: Real GDP per Capita < 391

DEPTH = Liquid liabilities to GDP
BANK = Deposit money bank domestic credit divided by deposit money bank + central bank domestic credit
PRIVATE = Claims on the non-financial private sector to domestic credit
PRIVY = Gross claims on private sector to GDP
RGDP85 = Real per capita GDP in 1985 (in constant 1987 dollars)

GDP. The assumption underlying these measures is that financial systems that allocate more credit to private firms are more engaged in researching firms, exerting corporate control, providing risk management services, mobilizing savings, and facilitating transactions than financial systems that simply funnel credit to the government or state owned enterprises. As depicted in Table 1, there is a positive, statistically significant correlation between real per capita GDP and the extent to which loans are directed to the private sector.

King and Levine (1993b, 1993c) then assess the strength of the empirical relationship between each of these four indicators of the level of financial development averaged over the 1960–1989 period, *F*, and three growth indicators also averaged over the 1960–1989 period, *G*. The three growth indicators are as follows: (1) the average rate of real per capita GDP growth, (2) the average rate of growth in the capital stock per person, and (3) total productivity growth, which is a "Solow residual" defined as real per capita GDP growth minus (0.3) times the growth rate of the capital stock per person. In other words, if $F(i)$ represents the value of the ith indicator of financial development (DEPTH, BANK, PRIVY, PRIVATE) averaged over the period 1960–1989, $G(j)$ represents the value of the jth growth indicator (per capita GDP growth, per capita capital stock growth, or productivity growth) averaged over the period 1960–1989, and X represents a matrix of conditioning information to control for other factors associated with economic growth (e.g., income per capita, education, political stability, indicators of exchange rate, trade, fiscal, and monetary policy),

TABLE 2
GROWTH AND CONTEMPORANEOUS FINANCIAL INDICATORS, 1960–1989

Dependant Variable	DEPTH	BANK	PRIVATE	PRIVY
Real Per Capita GDP Growth	0.024***	0.032***	0.034***	0.032***
	[0.007]	[0.005]	[0.002]	[0.002]
R^2	0.5	0.5	0.52	0.52
Real Per Capita Capital Stock Growth	0.022***	0.022**	0.020**	0.025***
	[0.001]	[0.012]	[0.011]	[0.001]
R^2	0.65	0.62	0.62	0.64
Productivity Growth	0.018**	0.026**	0.027***	0.025***
	[0.026]	[0.010]	[0.003]	[0.006]
R^2	0.42	0.43	0.45	0.44

Source: King and Levine (1993b)
* significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.
[p-values in brackets]
Observations = 77

DEPTH = Liquid liabilities to GDP
BANK = Deposit bank domestic credit divided by deposit money bank + central bank domestic credit
PRIVATE = Claims on the non-financial private sector to total claims
PRIVY = Gross claims on private sector to GDP
Productivity Growth = Real Per Capita GDP Growth - (0.3)*Real Per Capita Capital Stock Growth

Other explanatory variables included in each of the 12 regressions: log of initial income, log of initial secondary school enrollment rate, ratio of government consumption expenditures to GDP, inflation rate, and ratio of export plus imports to GDP.

then the following 12 regressions are run on a cross-section of 77 countries:

$$G(j) = \alpha + \beta F(i) + \gamma X + \varepsilon. \qquad (1)$$

There is a strong positive relationship between each of the four financial development indicators, $F(i)$, and the three growth indicators $G(i)$, long-run real per capita growth rates, capital accumulation, and productivity growth. Table 2 summarizes the results on the 12 β's. Not only are *all* the financial development coefficients statistically significant, the sizes of the coefficients imply an economically important relationship. Ignoring causality, the coefficient of 0.024 on DEPTH implies that a country that increased DEPTH from the mean of the slowest growing quartile of countries (0.2) to the mean of the fastest growing quartile of countries (0.6) would have increased its per capita growth rate by almost one percent per year. This is large. The difference between the slowest growing 25 percent of countries and the fastest growing quartile of countries is about five percent per annum over this 30 year period. Thus, the rise in DEPTH alone eliminates 20 percent of this growth difference.

Finally, to examine whether finance simply follows growth, King and Levine (1993b) study whether the value of financial depth in 1960 predicts the rate of economic growth, capital accumulation, and productivity improvements over the next 30 years. Table 3 summarizes some of the results. In the three regressions reported in Table 3, the dependent variable is, respectively, real per

TABLE 3
GROWTH AND INITIAL FINANCIAL DEPTH, 1960–1989

	Per Capita GDP Growth, 1960–1989	Per Capita Capital Growth, 1960–1989	Per Capita Productivity Growth, 1960–1989
Constant	0.035***	0.002	0.034***
	[0.001]	[0.682]	[0.001]
Log (Real GDP per Person in 1960)	–0.016***	–0.004*	–0.015***
	[0.001]	[0.068]	[0.001]
Log (Secondary school enrollment in 1960)	0.013***	0.007***	0.011***
	[0.001]	[0.001]	[0.001]
Government consumption/GDP in 1960	0.07*	0.049*	0.056*
	[0.051]	[0.064]	[0.076]
Inflation in 1960	0.037	0.02	0.029
	[0.239]	[0.238]	[0.292]
(Imports plus Exports)/GDP in 1960	–0.003	–0.001	–0.003
	[0.604]	[0.767]	[0.603]
DEPTH (liquid liabilities) in 1960	0.028***	0.019***	0.022***
	[0.001]	[0.001]	[0.001]
R^2	0.61	0.63	0.58

Source: King and Levine (1993b)
* significant at the 0.10 level, **significant at the 0.05 level, *** significant at the 0.01 level.
[p-values in brackets]
Observations = 57

capita GDP growth, real per capita capital stock growth, and productivity growth averaged over the period 1960–1989. The financial indicator in each of these regressions is the value of DEPTH in 1960. The regressions indicate that financial depth in 1960 is significantly correlated with each of the growth indicators averaged over the period 1960–1989.[21] These results, plus those from more sophisticated time series studies, suggest that the initial level of financial development is a good predictor of subsequent rates of economic growth, physical capital accumulation, and economic efficiency improvements over the next 30 years even after controlling for income, education, political stability, and measures of monetary, trade, and fiscal policy.[22]

[21] There is an insufficient number of observations on BANK, PRIVATE, and PRIVY in 1960 to extend the analysis in Table 3 to these variables. Thus, King and Levine (1993b) use pooled, cross section, time series data. For each country, data permitting, they use data averaged over the 1960s, 1970s, and 1980s; thus, there are potentially three observations per country. They then relate the value of growth averaged over the 1960s with the value of, for example, BANK in 1960 and so on for the other two decades. They restrict the coefficients to be the same across decades. They find that the initial level of financial development is a good predictor of subsequent rates of economic growth, capital accumulation, and economic efficiency improvements over the next ten years after controlling for many other factors associated with long-run growth.

[22] These broad cross-country results hold even when using instrumental variables—primarily indicators of the legal treatment of creditors taken from LaPorta et al. 1996—to extract the exogenous component of financial development (Levine 1997). Furthermore, though disagreement exists (Woo Jung 1986 and Philip Arestis and Panicos Demetriades 1995), many time-series investigations find that financial sector development Granger-causes economic performance (Paul Wachtel Rousseau 1995). These results are particularly strong when using measures of the value-added provided by the financial system instead of measures of the size of the financial system (Klaus Neusser and Maurice Kugler 1996).

The relationship between the initial level of financial development and growth is large. For example, the estimated coefficients suggest that if in 1960 Bolivia had increased its financial depth from 10 percent of GDP to the mean value for developing countries in 1960 (23 percent), then Bolivia would have grown about 0.4 percent faster per annum, so that by 1990 real per capita GDP would have been about 13 percent larger than it was.[23] Thus, finance does not merely follow economic activity. The strong link between the level of financial development and the rate of long-run economic growth does not simply reflect contemporaneous shocks that affect both financial development and economic performance. There is a statistically significant and economically large empirical relationship between the initial level of financial development and future rates of long-run growth, capital accumulation, and productivity improvements. Furthermore, insufficient financial development has sometimes created a "poverty trap" and thus become a severe obstacle to growth even when a country has established other conditions (macroeconomic stability, openness to trade, educational attainment, etc.) for sustained economic development (Jean-Claude Berthelemy and Aristomene Varoudakis 1996).

Some recent work has extended our knowledge about the causal relationships between financial development and economic growth. For example, Rajan and Luigi Zingales (1996) assume that financial markets in the United States are relatively frictionless. This benchmark country then defines each industry's efficient demand for external finance (investment minus internal cash flow). They then examine industries across a large sample of countries and test whether the industries that are more dependent on external finance (in the United States) grow relatively faster in countries that begin the sample period with better developed financial systems. They find that industries that rely heavily on external funding grow comparatively faster in countries with well-developed intermediaries (as measured by PRIVY) and stock markets (as measured by stock market capitalization) than they do in countries that start with relatively weak financial systems. Similarly, using firm-level data from 30 countries, Asli Demirguç-Kunt and Vojislav Maksimovic (1996b) argue that firms with access to more developed stock markets grow at faster rates than they could have grown without this access. Furthermore, when individual states of the United States relaxed intrastate branching restrictions, this boosted bank lending quality and accelerated real per capita growth rates even after controlling for other growth determinants (Jith Jayaratne and Philip Strahan 1996). Thus, using firm- and industrial-level data for a broad cross-section of countries and data on individual states of the United States, recent research presents evidence consistent with the view that the level of financial development materially affects the rate and structure of economic development.

Not surprisingly, these empirical studies do not unambiguously resolve the issue of causality. Financial development may predict growth simply because financial systems develop in anticipation of future economic growth. Furthermore, differences in political systems, legal traditions (LaPorta et al. 1996), or institutions (Engerman and Sokoloff 1996; Douglass North 1981) may be driving both financial development and economic growth rates. Nevertheless, the body of evidence would tend to push

[23] These examples do not consider causal issues or how to increase financial development.

many skeptics toward the view that the finance-growth link is a first-order relationship and that difference in financial development can alter economic growth rates over ample time horizons.

C. *Country-Case Studies*

Country-case studies provide a rich complement to cross-country comparisons. For example, Rondo Cameron et al. (1967) dissect the historical relationships between banking development and the early stages of industrialization for England (1750–1844), Scotland (1750–1845), France (1800–1870), Belgium (1800–1875), Germany (1815–1870), Russia (1860–1914), and Japan (1868–1914). These country-case studies do not use formal statistical analysis. Instead, the researchers carefully examine the legal, economic, and financial linkages between banks and industry during the industrialization of these seven countries. Typically, the case studies start by describing the political system, economic conditions, and financial structure at the start of the period of analysis. Then, they provide a detailed description of the evolution of the financial system during a period of rapid economic development. Finally, they document critical interactions among financial intermediaries, financial markets, government policies, and the financing of industrialization. While providing an informative complement to broad cross country comparisons, country-case studies rely heavily on subjective evaluations of banking system performance and fail to systematically control for other elements determining economic development. While emphasizing the analytical limitations of country-case studies, Cameron (1967b) concludes that especially in Scotland and Japan, but also in Belgium, Germany, England, and Russia, the banking system played a positive, growth-inducing role.

Debate exists, however. Consider the case of Scotland between 1750 and 1845. Scotland began the period with per capita income of less than one-half of England's. By 1845, however, per capita income was about the same. While recognizing that the "dominant political event affecting Scotland's potentialities for economic development was the Union of 1707, which made Scotland an integral part of the United Kingdom," Cameron (1967a, p. 60), argues that Scotland's superior banking system is one of the few noteworthy features that can help explain its comparatively rapid growth.[24] Other analysts disagree with the "facts" underlying this conclusion. Some researchers suggest that England did not suffer from a dearth of financial services because nonfinancial enterprises provided financial services in England that Cameron's (1967a) measures of formal financial intermediation omit. Others argue that Scotland had rich natural resources, a well-educated work force, access to British colonial markets, and started from a much lower level of income per capita than England. Consequently, it is not surprising that Scotland enjoyed a period of rapid convergence toward England's income per capita level. Finally, still other researchers disagree with the premise that Scotland had a well-functioning financial system and emphasize the deficiencies in the Scottish system (Sidney Pollard and Dieter Ziegler 1992). Thus, although Andrew Kerr first argued in 1884 that Scotland enjoyed a better banking system than England from 1750 until 1844, the debate about whether Scottish banking explains its faster economic growth over the period 1750–1845 continues today.

[24] It is also worth noting that Scottish banking was comparatively stable over this period, suffering fewer and less severe panics than its southern neighbor. For more on Scottish banking, see Sydney Checkland (1975) and Tyler Cowen and Randall Kroszner (1989).

The relationship between financial and economic development has been carefully analyzed for many other countries. For example, Stephen Haber (1991, 1996) compares industrial and capital market development in Brazil, Mexico, and the United States between 1830 and 1930. He finds that capital market development affected industrial composition and national economic performance. Specifically, Haber shows that when Brazil overthrew the monarchy in 1889 and formed the First Republic, it also dramatically liberalized restrictions on Brazilian financial markets. The liberalization gave more firms easier access to external finance. Industrial concentration fell and industrial production boomed. While Mexico also liberalized financial sector policies, the liberalization was much more mild under the Diaz dictatorship (1877–1911), which "relied on the financial and political support of a small in-group of powerful financial capitalists" (p. 561). As a result, the decline in concentration and the increase in economic growth was much weaker in Mexico than it was in Brazil. Haber (1996, p. 40) concludes that "differences in capital market development had a significant impact on the rate of growth of industry. . . . [and that a] lack of access to institutional sources of capital because of poorly developed capital markets was a non-negligible obstacle to industrial development in the nineteenth century."[25]

Finally, but perhaps most influentially, McKinnon's (1973) seminal book *Money and Capital in Economic Development* studies the relationship between the financial system and economic development in Argentina, Brazil, Chile, Germany, Korea, Indonesia, and Taiwan in the post World War II period. McKinnon interprets the mass of evidence emerging from these country-case studies as strongly suggesting that better functioning financial systems support faster economic growth. Disagreement exists over many of these individual cases, and it is extremely difficult to isolate the importance of any single factor in the process of economic growth.[26] Thus, any statements about causality are—and will remain—largely impressionistic and specific to particular countries and specific periods. Nonetheless, the body of country-studies suggests that, while the financial system responds to demands from the nonfinancial sector, well-functioning financial systems have, in some cases during some time periods, greatly spurred economic growth.

D. *Financial Functions and Growth: Liquidity and Risk*

I now turn to evidence on the ties between measures of the individual financial functions and economic growth. First, consider liquidity. Deposit-taking banks can provide liquidity by issuing liquid demand deposits and making illiquid, long-term investments. Isolating this liquidity function from the other financial functions performed by banks, however, has proven prohibitively difficult. In contrast, economists have studied extensively the effects of the liquidity of an individual security on its price. Substantial evidence suggests a positive correlation between the liquidity of an asset

[25] Interestingly, these political and legal impediments to financial development are apparently difficult to change. In Mexico, the largest three banks control the same fraction of commercial banking activity today, about two-thirds, as they did 100 years ago. Also, Mexico has the lowest ranking of the legal protection of minority shareholder rights of any country in La Porta et al.'s (1996) detailed comparison of 49 countries, which may facilitate the concentration of economic decision making.

[26] For more on Mexico see Robert Bennett (1963). For more on Asia, see Cole and Yung Park (1983), Park (1993), and Patrick and Park (1994). Fry (1995) provides additional citations.

TABLE 4
STOCK MARKET LIQUIDITY MEASURES: SELECTED COUNTRIES, ANNUAL AVERAGES 1976–1993

	Turnover Ratio	Value Traded Ratio	Per Capita GDP Growth
Low-income			
Bangladesh	0.015	0.000	1.89%
Cote d'Ivoire	0.028	0.001	–2.50%
Egypt	0.060	0.030	3.56%
India	0.537	0.036	2.43%
Nigeria	0.006	0.000	–0.11%
Pakistan	0.105	0.008	3.13%
Zimbabwe	0.059	0.010	–0.97%
Lower-middle -income			
Colombia	0.087	0.004	1.95%
Costa Rica	0.013	0.001	0.89%
Indonesia	0.193	0.010	4.18%
Jordan	0.154	0.085	3.01%
Philippines	0.250	0.026	0.21%
Thailand	0.739	0.144	5.90%
Turkey	0.207	0.026	2.32%
Upper-middle-income			
Argentina	0.266	0.013	0.22%
Brazil	0.355	0.041	0.65%
Chile	0.060	0.021	3.61%
Korea	0.832	0.186	9.67%
Malaysia	0.230	0.243	4.27%
Mauritius	0.059	0.003	1.76%
Mexico	0.498	0.044	0.85%
Portugal	0.108	0.014	2.85%
High-income			
Australia	0.256	0.124	1.57%
Germany	0.704	0.156	0.95%
Great Britian	0.349	0.253	1.75%
Hong Kong	0.372	0.471	6.20%
Israel	0.669	0.144	1.72%
Italy	0.253	0.028	2.68%
Japan	0.469	0.406	3.42%
Netherlands	0.490	0.123	1.43%
Norway	0.318	0.059	2.48%
Spain	0.216	0.045	1.75%
Switzerland	0.467	0.442	1.16%
United States	0.493	0.299	1.67%

Sources: International Finance Corporation, and Morgan Stanley Capital International
Turnover Ratio = Value of Domestic Equities Traded on Domestic Exchanges Divided by Market Capitalization
Value Traded Ratio = Value of Domestic Equities Traded on Domestic Exchanges Divided by GDP Income
classifications from the World Bank's 1995 World Development Report
Low-income economies = average GNP per capita of $380 in 1993
Lower-middle-income economies = average GNP per capita of $1,590 in 1993
Upper-middle-income economies = average GNP per capita of $4,370 in 1993
High-income economies = average GNP per capita of $23,090 in 1993

and its price (e.g., Yakov Amihud and Haim Mendelson 1989; and Gregory Kadlec and John McConnell 1994). Put differently, agents must be compensated with a lower price for purchasing an asset that is difficult to sell. These security-level studies of the relationship between the liquidity of individual securities and their prices, however, do not link liquidity with national long run growth rates.

To evaluate the relationship between stock market liquidity and national growth rates, capital accumulation rates, and rates of technological change, Levine and Sara Zervos (1996) build on Raymond Atje and Jovanovic's (1993) study and focus on two measures of liquidity for a broad cross-section of 49 countries over the period 1976–1993. The first liquidity indicator, the value traded ratio, equals the total value of shares traded on a country's stock exchanges divided by GDP. The value traded ratio measures trading relative to the size of the economy. While not a direct measure of trading costs or the uncertainty associated with trading and settling equity transactions, theoretical models of liquidity and growth directly motivate the value traded ratio (Bencivenga, B. Smith, and Starr 1995). As shown in Table 4, the value traded ratio varies considerably across countries. For example, the United States had an average annual value traded ratio of 0.3 during the 1976–1993 period, while for Mexico and India it was about 0.04. The second indicator, the turnover ratio, equals the total value of shares traded on a country's stock exchanges divided by stock market capitalization (the value of listed shares on the country's exchanges). The turnover ratio measures trading relative to the size of the market. It also exhibits substantial cross-country variability. Very active markets such as Japan and the United States have turnover ratios of almost 0.5, while for less liquid markets, such as Bangladesh, Chile, and Egypt they are 0.06 or less.[27] The turnover ratio may differ from the value traded ratio because a small, liquid market will have high turnover ratio but a small value traded ratio. For example, India's average turnover ratio of 0.5 over the 1976–1993 is greater than the United States', but India's value traded ratio is about one-tenth the size of the United States'. These measures seek to measure liquidity on a macroeconomic scale: the objective is to measure the degree to which agents can cheaply, quickly, and confidently trade ownership claims of a large percentage of the economy's productive technologies.[28]

The researchers then assess the strength of the empirical relationship between each liquidity measure and the three growth indicators: economic growth, capital accumulation, and productivity growth. They conduct a cross-country analysis with one observation per country. Namely, six basic regressions are run: economic growth, capital accumulation, and productivity growth averaged over the 1976–1993 period are regressed first on the value traded ratio in 1976 and then on the turnover ratio in 1976 while controlling for various factors associated with economic growth (initial income per capita, education, political stability, indicators of exchange rate, trade, fiscal, and monetary policy) to see whether stock market liquidity predicts subsequent economic growth. Importantly, the level of banking sector development (bank credit to private enterprises divided by GDP) measured in

[27] Note, Germany's very large turnover ratio (0.7) reflects the explosion in stock market transactions during unification.

[28] Levine and Zervos (1996) also construct and examine two measures of stock trading relative to stock price movements: (1) the value traded ratio divided by stock return volatility, and (2) the turnover ratio divided by stock return volatility.

TABLE 5
GROWTH AND INITIAL STOCK MARKET LIQUIDITY, 1976–1993

Dependant Variable	Value Traded Ratio	Turnover Ratio
Real Per Capita GDP Growth	0.098***	0.027***
	[0.003]	[0.006]
Adjusted R^2	0.33	0.34
Real Per Capita Capital Stock Growth	0.093***	0.022***
	[0.005]	[0.023]
Adjusted R^2	0.38	0.35
Productivity Growth	0.075***	0.020**
	[0.001]	[0.030]
Adjusted R^2	0.21	0.21

Source: Levine and Zervos (1996)
* significant at the 0.10 level, ** significant at the 0.05 level, *** significant at the 0.01 level.
[p-values in brackets]
Observations = 42

Value Traded Ratio = Value of domestic equity transactions on domestic stock exchanges divided by GDP
Turnover Ratio = Value of domestic equity transactions on domestic stock exchanges divided by domestic market capitalization.

Other explanatory variables included in each of the six regressions:
log of initial income, log of initial secondary school enrollment, initial ratio of government expenditures to GDP, initial inflation rate, initial black market exchange rate premium, initial ratio of commercial bank lending to private enterprises divided by GDP.

1976 is included in the regressions to assess the independent link between stock market liquidity and growth after controlling for other aspects of financial development. The results are summarized in Table 5. The initial level of stock market liquidity—measured either by the turnover ratio or the value traded ratio—is a statistically significant predictor of economic growth, capital accumulation, and productivity growth over the next 18 years. The sizes of the coefficients also suggest an economically meaningful relationship. For example, the results imply that if Mexico had had the sample average value traded ratio in 1976 (0.044) instead of its realized 1976 value (0.004), per capita GDP would have grown at a 0.4 percent faster rate (0.04*0.098). Accumulating over the 18 year period, this implies each Mexican would have enjoyed an almost 8 percent higher income in 1994. The results are consistent with the views that the liquidity services provided by stock markets are independently important for long-run growth and that stock markets provide different financial services from those provided by financial intermediaries (or else they would not both enter the growth regressions significantly).[29]

Besides the difficulty of assigning a causal role to stock market liquidity, there are important limitations to measuring it accurately (Sanford Grossman and Merton Miller 1988; and Stephen

[29] Stock market size, as measured by market capitalization divided by GDP, is not robustly correlated with growth, capital accumulation, and productivity improvements.

Wells 1994). Theory suggests that economies will benefit from the ability to trade ownership of an economy's productive technologies easily. Stock markets, however, are only one mechanism for providing liquidity. Banks and bond markets may also provide liquidity. Thus, measures of stock market liquidity might omit important financial arrangements for providing liquidity. Moreover, the liquidity indicators measure stock transactions on a country's national stock exchanges. The physical location of the stock market, however, should not necessarily matter. That is, Californian savers and firms would probably not have greater access to liquidity if the New York Stock Exchange were to move to Los Angeles. Thus, measures of the trading of equities on a country's exchanges may not gauge fully the degree of stock market liquidity available to the economy. This measurement problem will increase over time if economies become more financially integrated and firms list and issue shares on foreign exchanges.

Besides liquidity risk, the financial system also provides mechanisms for hedging and trading the idiosyncratic risk associated with individual projects, firms, industries, sectors, and countries. While a vast literature examines the pricing of risk, there exists very little empirical evidence that directly links risk diversification services with long-run economic growth. Moreover, the only study of the relationship between economic growth and the ability of investors to diversify risk internationally through equity markets yields inconclusive results (Levine and Zervos 1996).

One common weakness in empirical work on liquidity, idiosyncratic risk, and economic growth is that it focuses on equity markets. Bond markets and financial intermediaries may also provide mechanisms for diversifying risk. Indeed, technological, regulatory, and tax differences across countries may imply that different financial structures arise to provide liquidity and risk diversification vehicles. For example, in one economy the costs of establishing an intermediary may be high while the costs of conducting equity transactions are low. The reverse may hold in a second economy. The first economy may provide liquidity and risk diversification services primarily through equity markets, while the second does it through financial intermediaries. The first economy has an active stock exchange, so that existing empirical studies would classify it as providing substantial liquidity and risk diversification services. In contrast, existing studies would classify the second economy as financially underdeveloped. Thus, measuring the performance of one part of the financial system may generate a misleading indicator of the functioning of the whole financial system.

E. *Financial Functions and Growth: Information*

Theory strongly suggests that financial intermediaries play an important role in researching productive technologies before investment and monitoring managers and projects after funneling capital to those projects. Although it is very difficult to measure whether a country's financial system is comparatively adept at reducing information acquisition costs firm level studies provide insights into the role played by financial intermediaries in easing information asymmetries (Schiantarelli 1995). Theory suggests that as the costs to outsiders of acquiring information about a firm rise, a firm's investment decisions become more tightly constrained by retained earnings and current cash flow. Thus, studies test whether the investment decisions of firms with particular traits that proxy for the costs to outsiders of acquiring infor-

mation are more sensitive to cash flow than firms without those traits. The sample selection criterion varies across studies.

The empirical evidence suggests that the investment decisions of firms with more severe asymmetric information problems are more sensitive to cash flow than those where it is less expensive for outsiders to monitor. This conclusion holds when firms are classified according to whether they have received bond ratings (Toni Whited 1992; Charles Calomiris, Charles Himmelberg, and Wachtel 1995), whether they are issuing large or small dividends (Steven Fazzari, Glen Hubbard, and Bruce Peterson 1988; Hubbard, Anil Kashyap, and Whited 1995), whether they are large or small (James Tybout 1983; Gertler and Simon Gilchrist 1994), whether they place a relatively high or low shadow value on internal funds based on their response to taxes (Calomiris and Hubbard 1995), and whether regulations restrict bank credit allocation (Fidel Jaramillo, Schiantarelli, Weiss 1996; John Harris, Schiantarelli, and Miranda Siregar 1994). In sum, when outsiders find it expensive to evaluate and fund particular firms, those firms find it relatively difficult to raise capital for investment and rely disproportionately on internal sources of finance. Thus, financial innovations or policies that lower information asymmetries ease firm financing constraints on more efficient firms.

More relevant for this section, a large body of work shows that when firms have close ties to financial intermediaries, this reduces information costs and eases firm financing constraints. Specifically, firms with close ties to banks tend to be less constrained in their investment decisions than those with less intimate, less mature banking relationships as shown for Japan (Takeo Hoshi, Kashyap, and Scharfstein 1990), Italy (Schiantarelli and Alessandro Sembenelli 1996), and the United States (Petersen and Rajan 1994). Furthermore, borrowers with longer banking relationships pay lower interest rates and are less likely to pledge collateral than those with less mature banking relationships (Petersen and Rajan 1994; and Allen Berger and Gregory Udell 1995). Finally, stock price evidence also indicates that banks produce valuable, private information about borrowers. When banks sign loan agreements with borrowers, borrower-firm stock prices respond positively (Christopher James 1987; Scott Lummar and McConnell 1989; and James and Peggy Weir 1990). The value of the information obtained by banks about firms can also be exemplified by Continental Illinois' troubles in the mid-1980s. Myron Slovin, Marie Sushka, and John Polonchek (1993) show that the banks' impending insolvency negatively affected the stock prices of its client firms and that the FDIC's rescue efforts positively affected the stock prices of those same clients. These findings are consistent with the view that the durability of bank-borrower relationship is valuable. The evidence directly indicates an important role for financial intermediaries in reducing informational asymmetries between firm insiders and outside investors. Indirectly, the evidence suggests that countries with financial institutions that are effective at relieving information barriers will promote faster economic growth through more investment than countries with financial systems that are less effective at obtaining and processing information.

F. *Patterns of Financial Development*

I now turn to the question: Does financial structure change as countries develop and does it differ across countries? Again, Goldsmith pioneered the cross-

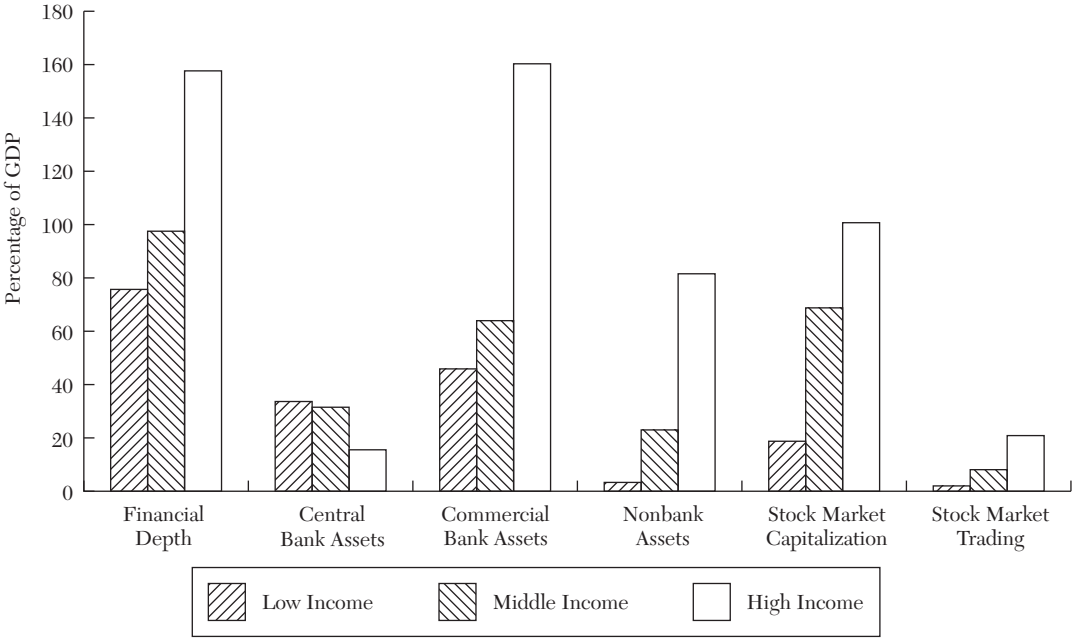

Figure 2. Financial Structure in Low-, Middle-, and High-Income Economies, 1990

Sources: IMF (*International Financial Statistics*), IFC (*Emerging Markets Data Base*), and individual country reports by central banks, banking commissions, and stock exchanges.

Notes: (1) The data are for 12 low-income economies (Bangladesh, Egypt, Ghana, Guyana, India, Indonesia, Kenya, Nigeria, Pakistan, Zaire, Zambia, and Zimbabwe), 22 middle-income economies (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, El Salvador, Greece, Guatemala, Jamaica, the Republic of Korea, Malaysia, Mexico, Paraguay, The Philippines, Taiwan, Thailand, Tunisia, Turkey, Uruguay, and Venezuela), and 14 high-income economies (Australia, Canada, Denmark, Finland, Germany, Italy, Japan, The Netherlands, Singapore, Spain, Sweden, the United Kingdom, and the United States) data permitting. In 1990, low-income economies had an average GDP per capita of $490; middle-income economies, $2,740; and high-income economies, $20,457.
(2) Non-bank financial institutions include insurance companies, pension funds, mutual funds, brokerage houses, and investment banks.
(3) Financial depth is measured by currency held outside financial institutions plus demand deposits and interest-bearing liabilities of banks and nonbank financial intermediaries.
(4) For stock market trading as a percentage of GDP, Taiwan is omitted because its trading/GDP ratio in 1990 was almost ten times larger than the next highest trading/GDP ratio (Singapore). With Taiwan included, the middle-income stock trading ratio becomes 37.3 percent.

country work in this area. He traced the relationship between the mix of financial intermediaries and economic development for 35 countries over the period 1860–1963. The World Bank (1989) and Demirguç-Kunt and Levine (1996b) recently extended Goldsmith's work by examining the association between the mix of financial intermediaries, markets, and economic development for approximately 50 countries over the period 1970–1993. This work finds that financial structure differs considerably across countries and changes as countries develop economically.

Four basic findings emerge from these studies, which are illustrated in Figure 2. As countries get richer over

time or as one shifts from poor to richer countries,

(1) financial intermediaries get larger as measured by the total assets or liabilities of financial intermediaries relative to GDP;

(2) banks grow relative to the central bank in allocating credit;

(3) non-banks—such as insurance companies, investment banks, finance companies, and private pension funds—grow in importance; and

(4) stock markets become larger, as measured by market capitalization relative to GDP, and more liquid, as measured by trading relative to GDP, market capitalization, and stock price variability.

While these "patterns" pose a challenge to financial theorists, they must be treated cautiously because the data suffer from numerous problems. For example, it is difficult to distinguish private from public banks and development banks from commercial banks in many countries. Similarly, the definition of a bank and of a non-bank are not always consistent across countries. Furthermore, there is nothing causal about these relationships. These patterns alone do not suggest that poor countries can accelerate their growth rates by changing the structure of their financial systems. Finally, many differences exist across countries at similar stages of economic development (World Bank 1989). For example, the assets of deposit banks composed 56 percent of financial system assets in France, while the comparable number in the United Kingdom was 35 percent. The assets of contractual savings institutions composed 26 percent of total financial system assets in the United Kingdom, while in France the figure was only 7 percent in 1985. Thus, while there is a general trend involving financial structure and the level of GDP per capita, there are important exceptions and differences within income groups. While one must be hesitant in drawing conclusions about patterns of financial development, an even greater degree of hesitancy is called for in linking financial structure to economic growth.

G. *Financial Structure and Economic Growth*

There exists considerable debate, with sparse evidence and insufficient theory, about the relationship between financial structure and economic growth. After briefly outlining the major examples used in discussions of financial structure, I describe the major analytical limitations impeding research on financial structure and economic growth. The classic controversy involves the comparison between Germany and the United Kingdom. Starting early in this century, economists argued that differences in the financial structure of the two countries help explain Germany's more rapid economic growth rate during the latter half of the 19th century and the first decade of the 20th century (Alexander Gerschenkron 1962). The premise is as follows. Germany's bank-based financial system, where banks have close ties to industry, reduces the costs of acquiring information about firms. This makes it easier for the financial system to identify good investments, exert corporate control, and mobilize savings for promising investments than in England's more securities market oriented financial system, where the ties between banks and industry are less intimate. Indeed, quite a bit of evidence suggests that German bankers were more closely tied to industry than British bankers. Unlike England, nearly all German bankers started as merchants. The evolution from entrepreneur to banker may explain the com-

paratively close bonds between bankers and industrialists. For example, German bankers frequently "mapped out a firm's paths of growth, conceived farsighted plans, decided on major technological innovations, and arranged for mergers and capital increases" (Gerschenkron 1968, p. 137). Private German bankers also organized and promoted an impressive array of major manufacturing companies during the mid-19th century (Richard Tilly 1967, p. 179). Besides this entrepreneurial role, some evidence suggests that German bankers tended to be more committed to the long-term funding of their clients than English bankers. Short-term credits could be transformed into longer-term securities more easily in Germany (Tilly 1967, pp. 178–81). Thus, various pieces of evidence suggest a closer relationship between banker and industrialist in Germany. While bank-industry relationships may have been closer in Germany, this does not imply that the German financial system was better at risk management, providing liquidity, or facilitating exchange. Furthermore, economists disagree over whether the growth differential between the two was really very large. Although German manufacturing production grew noticeably faster than Britain's in the six decades before World War I, Germany's overall per capita GNP growth rate was 1.55 while the U.K.'s was 1.35 over the period 1850 to 1913 (Goldsmith 1969, pp. 406–07). Thus, aggregate growth differences are not very large, the significant differences that do exist are industry specific, and other factors besides differences in financial structure may explain industry specific growth differentials over this period.

The debate concerning bank-based versus market-based systems eventually expanded to include comparisons with the United States. German banks are larger as a share of GDP than U.S. banks and German bankers tend to be more intricately involved in the management of industry than U.S. bankers (Randall Pozdena and Volbert Alexander 1992; Franklin Allen and Gale 1995; and Demirguç-Kunt and Levine 1996a). Furthermore, historical evidence suggests that German universal banks were more efficient (lower cost of capital) than U.S. banks over the 1870–1914 period and suffered less systemic problems than the U.S. banking system (Calomiris 1995). In contrast, the U.S. financial system is typically characterized as having a comparatively larger, more active securities markets with more equities held by households. These observations suggest that the German bank-based system may reduce information asymmetries and thereby allow banks to allocate capital more efficiently and to exert corporate control more effectively. In contrast, the United States' securities market-based financial system may offer advantages in terms of boosting risk sharing opportunities (Allen and Gale 1995). While this functional approach highlights the relevant issues, substantially more research is needed before drawing conclusions about the dominance of one financial structure over another.[30]

Many of the arguments involving bank-based versus securities market-based financial systems have been used to compare Japan and the United States. For example, research suggests that Japanese bankers are more closely tied to industrial clients than U.S. bankers. This closer connection may mitigate information asymmetries (Hoshi, Kasyap, and Sharfstein 1990), which may foster better investment and faster growth. Thus, the structure of the Japanese financial system is sometimes viewed as superior to the financial structure of the

[30] Park (1993) compares the structure and functioning of the financial systems of Korea and Taiwan in relation to their industrial composition.

United States and an important factor in Japan's faster growth rate over the last four decades. Interestingly, however, the recent banking problems and slower growth in Japan have led some to argue that the absence of a credible takeover threat through efficient stock markets has impeded proper corporate governance and competitiveness. These conflicting analyses highlight the need for better empirical measures of financial structure and the functions provided by financial systems.

There are severe analytical problems with linking financial structure to economic performance. First, existing research on financial structure does not quantify the structure of financial systems or how well different financial systems function overall. For example, German bankers may have been more closely connected to industrialists than their British counterparts, but less capable at providing liquidity and facilitating transactions. Similarly, while Japanese Keiretsu may lower information acquisition costs between banks and firms, this does not necessarily imply that the Japanese financial system provides greater risk sharing mechanisms or more accurately spot promising new lines of business. Furthermore, while Japan is sometimes viewed as a bank-based system, it has one of the best developed stock markets in the world (Demirguç-Kunt and Levine 1996a). Thus, the lack of quantitative measures of financial structure and the functioning of financial systems make it difficult to compare financial structures.

Second, given the array of factors influencing growth in Germany, Japan, the United Kingdom, and the United States, it is analytically difficult—and perhaps reckless—to attribute differences in growth rates to differences in the financial sector. Moreover, over the post World War II period, the devastated Axis powers may simply have been converging to the income levels of the United States, such that observed growth rate differentials have little to do with financial structure. Thus, before linking financial structure with economic growth, researchers need to control for other factors influencing long-run growth.

A third factor that complicates the analysis of financial structure and economic growth is more fundamental. The current debate focuses on bank-based systems versus market-based systems. Some aggregate and firm level evidence, however, suggest that this dichotomy is inappropriate. The data indicate that both stock market liquidity—as measured by stock trading relative to GDP and market capitalization—and the level of banking development—as measured by bank credits to private firms divided by GDP predict economic growth over subsequent decades (Levine and Zervos 1996). Thus, it is not banks or stock markets; bank and stock market development indicators both predict economic growth. Perhaps, the debate should not focus on bank-based versus market-based systems because these two components of the financial system enter the growth regression significantly and predict future economic growth. It may be that stock markets provide a different bundle of financial functions from those provided by financial intermediaries. For example, stock markets may primarily offer vehicles for trading risk and boosting liquidity. In contrast, banks may focus on ameliorating information acquisition costs and enhancing corporate governance of major corporations. This is merely a conjecture, however. There are important overlaps between the services provided by banks and stock markets. As noted above, well-functioning stock markets may ameliorate information acquisition costs, and banks may

provide instruments for diversifying risk and enhancing liquidity. Thus, to understand the relationship between financial structure and economic growth, we need theories of the simultaneous emergence of stock markets and banks and we need empirical proxies of the functions performed by the different components of financial systems.

A fourth factor limiting our understanding of the links between financial structure and economic growth is that researchers have focused on a few industrialized countries due to data limitations. The United States, Germany, Japan, and the United Kingdom have basically the same standard of living. Averaged over a sufficiently long time period, they must also have very similar growth rates. Thus, comparisons of financial structure and economic development using only these countries will tend to suggest that financial structure is unrelated to the level and growth rate of economic development. Future studies will need to incorporate a more diverse selection of countries to have even a chance of identifying patterns between financial structure and economic development.

Finally, there are important interactions between stock markets and banks during economic development that have not been the focus of bank-based versus market-based comparisons. As noted, greater stock market liquidity is associated with faster rates of capital formation. Nonetheless, new equity sales do not finance much of this new investment (Colin Mayer 1988), though important differences exist across countries (Ajit Singh and Javed Hamid 1992). Most new corporate investment is financed by retained earnings and debt. This raises a quandary: stock market liquidity is positively associated with investment, but equity sales do not finance much of this investment. This quandary is confirmed by firm-level studies. In relatively poor countries, enhanced stock market liquidity actually tends to boost corporate debt-equity ratios; stock market liquidity does not induce a substitution out of debt and into equity finance (Demirguç-Kunt and Maksimovic 1996a). However, for industrialized countries, debt-equity ratios fall as stock market liquidity rises; stock market liquidity induces a substitution out of debt finance. The evidence suggests complex interactions between the functioning of stock markets and corporate decisions to borrow from banks that depend on the overall level of economic development. Thus, we need considerably more research into the links among stock markets, banks, and corporate financing decisions to understand the relationship between financial structure and economic growth.

IV. *Conclusions*

Since Goldsmith (1969) documented the relationship between financial and economic development 30 years ago, the profession has made important progress. Rigorous theoretical work carefully illuminates many of the channels through which the emergence of financial markets and institutions affect—and are affected by—economic development. A growing body of empirical analyses, including firm-level studies, industry-level studies, individual country-studies, and broad cross country comparisons, demonstrate a strong positive link between the functioning of the financial system and long-run economic growth. Theory and evidence make it difficult to conclude that the financial system merely—and automatically—responds to industrialization and economic activity, or that financial development is an inconsequential addendum to the process of economic growth. I believe that we will

not have a sufficient understanding of long-run economic growth until we understand the evolution and functioning of financial systems. This conclusion about financial development and long-run growth has an important corollary: although financial panics and recessions are critical issues, the finance-growth link goes beyond the relationship between finance and shorter-term fluctuations.

Undoubtedly, the financial system is shaped by nonfinancial developments. Changes in telecommunications, computers, nonfinancial sector policies, institutions, and economic growth itself influence the quality of financial services and the structure of the financial system. Technological improvements lower transaction costs and affect financial arrangements (Merton 1992). Monetary and fiscal policies affect the taxation of financial intermediaries and the provision of financial services (Bencivenga and B. Smith 1992; Roubini and Sala-i-Martin 1995). Legal systems affect financial systems (LaPorta et al. 1996), and political changes and national institutions critically influence financial development (Haber 1991, 1996). Furthermore, economic growth alters the willingness of savers and investors to pay the costs associated with participating in the financial system (Greenwood and Jovanovic 1990). While economists have made important advances, we need much more research on financial development. Why does financial structure change as countries grow? Why do countries at similar stages of economic development have different looking financial systems? Are there long-run economic growth advantages to adopting legal and policy changes that create one type of financial structure vis-à-vis another? Much more information about the determinants and implications of financial structure will move us closer to a comprehensive view of financial development and economic growth.

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