

TECHNOLOGICAL INNOVATION AND ECONOMIC PERFORMANCE

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Banking and Financial Intermediation

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11.1. Introduction

Technological improvements in the areas of banking and corporate finance are hard to measure. Inputs and outputs are not well defined, and product quality changes over time in ways that are hard to measure. Are deposits an input or an output of a bank? When more ATMs are added to a bank's network, by how much does that improve the quality of a bank deposit?

When measuring improvements in corporate finance, it is even harder to define productivity gains associated with changes in the financing structure of firms. When does a shift toward a higher or lower equity ratio connote progress (i.e., reduced costs of access to external finance)? How does one measure improvements in the ability of firms to access venture capital finance, and to place their initial public offerings (IPOs) more easily, and how does one translate those gains into productivity improvements comparable to improvements in manufacturing productivity? How does the existence of new derivative contracts (which allow firms to limit various risk exposures) reduce the cost of capital for firms?

Not only is technological change in banking and corporate finance hard to measure; it is also hard to visualize. The image of a Wall Street trader or investment banker, telephone in hand, staring at multiple computer screens amidst the buzz of the trading floor offers a concrete image of technological progress, but that image is only a small part of the picture. Despite the importance of innovations in computing and telecommunications, technolo-

gical improvement in corporate finance and financial intermediation goes far beyond these tangible improvements in physical capital. In the areas of banking and corporate finance, the main sources of increased productivity are improvements in the ability to create and use information. Technological change sometimes reflects new physical technology used to process information (e.g., faster computers), but more often it results from improvements in the organization of the *market's* information processing ability embodied in new kinds of firm-customer relationships, new kinds of financial intermediaries, and new ways to organize purchases and sales of financial instruments, which reduce information cost and enhance productivity. Thus, important technological change occurs outside the confines of innovations in physical capital used by a firm or an intermediary.

The creation of new types of financial institutions and intermediation networks and changes in the extent of competition among financial intermediaries have been extremely important in transforming the shape of the marketplace, and in producing increases in productivity associated with improvements in information creation and dissemination. These issues are the focal point of this chapter. The elimination of limits on U.S. bank branch locations and the expansion of the mix of products U.S. banks are able to offer are prominent examples of such changes. More generally, deregulation of banks and the erosion of limits on capital mobility internationally have been important for the development of efficient financial networks.

At the same time, important information-enhancing changes in industrial organization, competition, and the structure of financial networks have occurred for reasons other than deregulation. The growth of institutional

investors (pension funds and mutual funds) as purchasers of securities in the 1960s and 1970s fundamentally altered the ways primary and secondary markets for securities are organized. These sorts of organizational changes have had dramatic long-term consequences for the cost of information processing in the financial sector. Borrowers and lenders, issuers and purchasers of equity, and the intermediaries that bring them together, have benefited enormously from such organizational changes.

Of course, financial product innovation, and technological progress in telecommunications and computing in general, have spurred deregulation and the growth in new intermediaries by creating greater opportunities for entry into previously protected niches. Thus, it would not be correct to view information-enhancing changes in industrial organization as exogenous to the process of technological change. My central point is, rather, that changes in the structure of intermediaries and financial networks have been important for the full realization of the gains from product and process innovation.

Given the myriad problems of defining financial sector inputs and outputs, adjusting for changes in their quality, and measuring the gains in consumer and producer surplus from financial innovation, no attempt is made to reduce financial progress to a single aggregate measure, or to explain the timing and extent of changes in such a measure. Instead, a broad range of illustrative evidence is reviewed that suggests the importance of organizational changes for producing important technological progress in finance.

Useful measures of technological progress vary according to the aspect of financial sector "production" one is studying. Improvements in financial services technology should be reflected in reductions in financial frictions. For example, if problems of adverse selection limit access to public equity markets, then an increase in the number of firms with access to equity markets is an indicator of a technological improvement in financial services. Similarly, if financial intermediaries help consumers to diversify their portfolios and to allocate savings to its best use, then the ability of capital to move

more easily across borders improves the environment for financial intermediation. In the discussion that follows, the frictions that the financial sector is designed to address are categorized, and observable manifestations of improvements are considered.

The remainder of this chapter is organized as follows: Section 11.2 reviews the financial frictions that technological change should mitigate. Section 11.3 considers evidence that financial technology has improved, and links that evidence with changes in the organization of the financial services industry. Visible improvements include: (1) reductions in the costs of operating banks; (2) a richer menu of contracts and a richer menu of services available to businesses and consumers (i.e., more complete markets); (3) an improvement in the ability of financial contracting to overcome fundamental costs of adverse selection and moral hazard, visible in the ability of firms and their agents to convince outsiders to hold junior (equity-like) positions in their firms more easily; (4) greater risk sharing domestically and internationally, visible especially in increasing international flows of claims, or in new means of broadening the holding of a particular bundle of risks through "asset securitization;" and (5) greater liquidity—that is, improvements in the ability to trade an asset on short notice at a price near its long-run fair market value. Section 11.4 concludes.

11.2. Financial Frictions and Financial Progress

Financial services are a means to mitigate "frictions" that would otherwise prevent desirable transactions from taking place. Financial service providers (1) channel savings to select investments efficiently, (2) improve the liquidity of assets, (3) facilitate portfolio diversification, (4) provide proper corporate governance and the oversight of the management of nonfinancial firms, and (5) enforce the contractual rights of creditors and debtors.

There are three broad categories of frictions that financial intermediaries and financial contract design seek to ameliorate: (1) physical transacting costs (the time and effort necessary

for executing transactions in the literal physical sense, which for an intermediary may entail physical costs of bridging distances); (2) information costs (gaining accurate knowledge about the traits or behavior of clients); and (3) control costs (control presumes the availability of information about debtors, managers, and controlling shareholders on the part of bankers and asset managers, and entails the additional costs of creating and executing the necessary mechanisms to enforce contracts or otherwise control agents' behavior). Note that these three categories of cost can be incurred either at a point of contact between the final issuer and holder of a contract (the firm and its ultimate security holder), or as is more often the case, between either of these parties and an "intermediary."

When intermediaries are involved in financial transactions (as they almost always are) they add a layer of additional costs involving all three categories. Presumably, intermediaries are used because their involvement reduces the overall costs of the transaction relative to what those costs would have been without intermediation (unless intermediaries are able to extract rents from the market because of monopoly power). That is what it means for intermediaries to serve as efficient mechanisms. For example, technological improvements in intermediation that permit intermediaries to mitigate information costs (which are often associated with bank deregulation, changes in competition, and changes in bank industrial structure) should increase the scope of intermediaries and lead to a channeling of more transactions through their hands at lower cost (not necessarily, however, to an increase in their balance sheet assets).

Despite the costs incurred by intermediaries or by ultimate holders of securities from collecting information and enforcing contracts, doing so mitigates two classes of problems. First, collecting information reduces costs associated with adverse selection—the tendency of relatively informed buyers (sellers) to take advantage of relatively less informed sellers (buyers). For example, as Myers and Majluf (1984) showed, adverse-selection costs may discourage the sales of equity because uninformed buyers

impose a "lemons discount" on the purchase of shares. The inability of buyers to gauge the profitability of existing and prospective firm opportunities can be mitigated by the due diligence and marketing efforts of investment bankers, but there are substantial costs associated with those activities, as well. Here, technological improvement would be reflected in an increase in the amount of junior securities placed in the hands of outsiders, and a reduction in the costs investment banks charge for placing these securities.

Second, information and a control technology are necessary for proper enforcement of contracts to prevent moral-hazard problems between contracting parties. Moral-hazard (or agency) problems can occur between debtors and creditors, between managers and stockholders, and between controlling stockholders and minority stockholders. The moral-hazard problem of debtors is sometimes called the asset-substitution problem. After debtors have contracted with creditors they face an incentive to increase the riskiness of assets, which effectively transfers wealth from creditors to debtors (Jensen and Meckling, 1976; Myers, 1977). The agency problem between managers and stockholders revolves around the conflict of interest over several key decisions: corporate financial structure (where managers tend to favor less than optimal leverage), asset profitability and risk (where managers can be excessively risk-averse, and too willing to hold cash), effort (where managers prefer less to more), and expenditures (where managers may spend wastefully in ways that increase their private utility).

The conflict between controlling stockholders and minority stockholders can give rise to similar abuses of power, and especially to "tunneling,"—the process by which revenues are captured or valuable assets are transferred at below market prices to profit shareholders with a controlling interest in the firm at the expense of other shareholders. As in the case of adverse-selection costs, technological improvements in mitigating problems of moral hazard should be reflected in the greater willingness of outsiders to hold risky debt and equity claims on firms, which in turn should be

reflected in a rising quantity of such holdings and lower investment banking costs.

Intermediaries exist primarily to generate and use information (whether they are investment bank underwriters or bank lenders), and to facilitate contractual enforcement to mitigate one or more of these moral hazard problems. Private lenders (banks and finance companies) rely on contractual rights of seniority (collateral and covenants) to use private information to mitigate problems of asset substitution. Pensions, mutuals, and private equity funds (as holders of equity) use private or public information, along with blocks of voting shares, to mitigate conflicts between managers and stockholders, or between minority and controlling stockholders. Intermediaries also mitigate physical costs associated with constructing diversified portfolios (within banks, mutual funds, pension funds, and the like), and physical costs of clearing claims (as in bank clearinghouses, futures clearinghouses, and securities exchanges).

Liquidity refers to the ability to convert a valuable asset into purchasing power. Assets may be illiquid either because of physical factors that limit their transactability (e.g., an inconvenient location, indivisibility, an absence of buyers in the vicinity with a desire to purchase the asset) or because adverse-selection problems limit the marketability of the asset. Intermediaries that provide liquidity (banks, futures exchanges, and stock exchanges) do so by engaging in a combination of activities that together reduce the costs of information production and the physical costs of transacting.

This brief introduction to the productive role of the financial sector shows how the specific frictions that give rise to particular financial contracts, legal protections (creditors' rights and minority shareholders' rights), and financial services translate into quantifiable manifestations that can be used to gauge progress in financial sector technology. The extent to which portfolios can be shown to be globally rather than locally diversified can be used to gauge the degree of success of the financial sector in overcoming a combination of physical transacting costs and delegation costs (e.g., the extent to which banks or mutual funds can be

trusted to properly construct and manage portfolios). The extent to which firms have access to particular markets or intermediaries, the extent to which markets or intermediaries can be shown to properly predict risk, the extent of market liquidity, and the degree of the effectiveness of control over debtors, managers, and controlling stockholders, are all potentially important gauges of the technological achievement of the financial sector.

It is difficult to trace improvements in the five main quantifiable areas of financial performance (lower costs of intermediation, a richer menu of contracts and services, greater marketability of junior claims, greater risk sharing, and greater liquidity) to particular reductions in one or more of the three categories of frictions (physical costs, adverse-selection costs, and moral-hazard costs). That is because the effects of performance along one of the five dimensions will often influence other dimensions of performance. For example, a liquid secondary market in equity may raise equity prices, thus making it more attractive for firms to offer equity, *ceteris paribus*. Positive feedback also occurs among the primary causal influences that drive reductions in frictions (e.g., improvements in physical technology, greater bank competition, and deregulation reinforce one another).

11.3. Financial Progress and its Links to Organizational Change

This section traces recent trends in financial intermediation and corporate finance and considers the extent to which those trends provide evidence of technological progress (improvements in one or more of the five quantifiable areas of financial performance). A detailed discussion is given on the highly visible transformation of the banking industry in the United States, focusing on measuring and interpreting improvements in bank productivity that were associated with those changes in industrial organization. The improvements in securities markets that have taken place in global equity markets (most notably, the increased access of small firms in industrialized countries, and

TABLE 11.1

U.S. Bank Consolidation

Year	No. of banks	No. of banks with branches	No. of unit banks	No. of bank offices	No. of bank employees	No. of new charters	No. of voluntary mergers
1970	13502	3985	9517		946497	178	146
1975	14372	5505	8867		1182791	245	84
1980	14421	6831	7590		1434290	205	126
1985	14402	7012	7390	57372	1553755	330	336
1990	12329	6849	5480	62346	1505684	165	393
1995	9921	6426	3495	65949	1470231	101	609
1999	8563	5830	2733	71664	1641710	231	421

Source: FDIC data on insured commercial banks.

firms in emerging market economies) are then described. Finally, the new financial instruments and techniques that have been developed in recent years for managing and trading risks (derivatives and securitization), and the phenomenon of increasing international capital flows are reviewed.

11.3.1. Banking System Structure and Performance, Within and Outside the United States

Table 11.1 shows that the physical structure of the U.S. banking system has undergone a remarkable transformation over the past decade as the result of consolidation. The number of banks has fallen by nearly a third. Nevertheless, it would be wrong to characterize

banking as a shrinking industry, even in the physical sense of the word. The number of bank offices (headquarters plus branches) has grown substantially over that period, and the number of bank employees has also increased.

In financial terms, Table 11.2 indicates that banks have become increasingly important in the economy (with their share of gross domestic product (GDP) rising substantially over the past thirty years), and increasingly profitable (the last several years have seen very high and relatively stable levels of return on equity). This is worth emphasizing. Despite the substantial new competition in banking, ushered in by the post-1980 era of bank deregulation, the elimination of interstate entry barriers in banking over the past twenty years, and the growth in securities

TABLE 11.2

U.S. Bank Performance

Year	Net income (U.S.\$ million)	Net income (U.S.\$)/ GDP (U.S.\$) (percent)	Return on equity (percent)	Net interest margin/assets (percent)	Non-interest income/assets (percent)	Non-interest expense/assets (percent)
1970	4817	0.46	10.93	3.17	0.74	2.54
1975	7250	0.44	11.35	2.94	0.92	2.52
1980	13950	0.50	12.97	3.03	0.77	2.51
1985	17874	0.42	11.32	3.38	1.32	3.19
1990	15872	0.27	7.31	3.46	1.67	3.49
1995	48447	0.65	14.69	3.72	2.02	3.64
1999	71174	0.77	15.48	3.53	2.66	3.77

Sources: FDIC data on insured commercial banks, and Council of Economic Advisers.

market substitutes for bank assets and liabilities, banks have been able to *increase* their net interest margins, and have seen substantial growth in noninterest income. Interestingly, noninterest expense has risen substantially as a share of assets, too (reflecting new efforts by banks to attract customers through greater convenience and an expanding range of services).

These trends indicate that, while competition has eroded pure "rents" that banks enjoyed when they were protected from competition, bank profitability has not suffered because banks have found ways to create value for their franchises by restructuring their businesses. In part, that has taken the form of introducing new information processing technology and marketing new products and services that help them to attract profitable clients. In large part, however, it has also meant finding new ways of combining existing products and technology, and reorganizing financial intermediaries to make more productive use of information technology.

The competitive pressures U.S. banks have had to face are clearly visible in their changing liability structure, as shown in Table 11.3. From 1970 to 1999, deposits fell as a share of total assets, from 85 percent in 1970 to 67 percent in 1999. Within the category of deposits, domestic demand deposits fell even more rapidly, declining from 51 percent of total domestic deposits in 1970 to only 17 percent by 1999. These demand deposits—whose interest rates were limited by Regulation Q—were an impor-

tant source of captive rents enjoyed by banks in the first two decades after World War II.

As higher inflation eroded the purchasing power of low-interest deposits, consumers and businesses sought means for increasing the real rate of return on savings. Various innovations resulted. Commercial paper offerings (whether placed directly by corporations or issued to finance the activities of finance companies that compete with banks as intermediaries) drew funds out of the banking system, as did money market funds. Banks responded with various new bank products, including repurchase agreements, sweep, NOW, Super NOW, and MMDA accounts, all of which raised the interest cost of bank funds, and put pressure on bank profit margins. Banks, especially large banks, also relied increasingly on high-cost bonds and equity as sources of funds, particularly as new capital requirements, imposed in the 1980s, encouraged increases in those financing components.

Banks also faced new challenges in loan markets. Table 11.4 shows the effects of increasing competition in commercial and industrial lending. C&I loans fell substantially as a share of total loans, from 38 percent of loans in 1970 to 28 percent in 1999.

But rather than suffer long-term reductions in profit from the erosion of rents associated with low-interest deposit funding, and increasing competition in loan markets, banks responded with organizational changes that improved financial technology. Deregulation of entry

TABLE 11.3
U.S. Bank Liability Composition

Year	Total assets (U.S.\$ million)	Deposits/assets (percent)	Domestic demand deposits/domestic deposits (percent)	Subordinated notes/assets (percent)	Fed funds purchased/assets (percent)	Equity/assets (percent)
1970	566500	85.17	51.23	0.37	2.93	7.16
1975	935827	97.87	41.17	0.47	5.58	6.82
1980	1848392	80.13	36.35	0.35	7.21	5.82
1985	2719890	77.87	25.11	0.54	8.16	6.22
1990	3369559	78.65	19.69	0.71	7.28	6.49
1995	4282783	70.69	22.41	1.02	7.62	8.16
1999	5687670	67.35	16.53	1.34	7.83	8.44

Source: FDIC data on insured commercial banks.

TABLE 11.4
U.S. Bank Asset Composition

Year	Total assets	Loans/assets (percent)	C&I loans/loans (percent)	Loans secured by real estate/loans (percent)	Nonfarm, domestic, commercial real estate loans/ domestic, real estate loans (percent)	Investment securities/assets (percent)	Corporate bonds and equity/ investment securities (percent)	Trading account/assets (percent)
1970	566500	52.26	37.65	24.51	31.80	24.90	1.97	1.00
1975	935827	53.20	34.72	26.88	34.42	23.69	4.90	0.61
1980	1848392	54.86	37.68	25.94	38.29	17.46	7.58	0.51
1985	2719890	58.38	35.02	26.61	47.65	16.08	7.57	1.49
1990	3369559	60.53	28.96	39.07	45.37	17.83	15.66	1.42
1995	4282783	58.37	25.35	41.40	34.88	18.70	13.88	5.07
1999	5687670	59.36	27.79	43.20	37.44	18.09	22.48	4.52

Source: FDIC data on insured commercial banks.

barriers, and of limits on bank products, contributed to the ability of surviving banks to find productivity-enhancing strategies for expanding their geographic reach and the bundle of services that they could deliver. Banks expanded into new kinds of lending and investing (particularly into real estate lending, leveraged buyout (LBO) financing, and private equity financing), and came to rely increasingly on trading profits and fee income from other services.

Table 11.5 shows how increases in loan market competition and improvements in technology have increased the average distance between small business borrowers and their lenders, a clear physical measure of technologi-

cal improvement in bank lending. From the 1970s to the 1990s, for all lenders the average distance increased from 51 miles to 161 miles, and for banks average distance rose from 16 miles to 68 miles.

Despite the erosion of pure rents, the newly competitive, deregulated banking industry has seen substantial increases in "quasi rents" from superior use of private information, which is reflected in the rising market-to-book value ratios of universal banks. Table 11.6 reviews the sharply increasing trend in market-to-book values for the national and regional giants that have thrived from the wave of bank consolidation, and the expansion of bank powers that coincided with it.

Table 11.7 compares the number of bank offices and employees in U.S. banking with those of Japan and Western Europe. The conclusion usually drawn from this table is that the superior performance of U.S. banks (e.g., the higher return on assets shown in Table 11.8) is due to lower brick and mortar expenses in the U.S. Tables 11.7 and 11.8, however, show that while the U.S. economizes on bank offices, in comparison with Europe and Japan, U.S. banks actually have higher employment, and higher ratios of noninterest expenses to assets than the banks in other highly industrialized economies. Indeed, one interesting

TABLE 11.5
Average Distance Between Locations of U.S. Small Business Borrowers and Their Lenders

Lender type	Year that lending relationship began			
	1973-9	1980-9	1990-3	1973-3
Banks	15.8	34.0	67.8	42.5
Nonbanks	235.9	221.1	280.5	251.6
Nonfinancial firms	117.3	165.9	209.2	182.5
Total	51.2	92.6	161.3	114.7

Source: Petersen and Rajan (2000: Table 1).

Notes: Distance is measured in miles.

TABLE 11.6
Recent Trends in Market-to-Book Value of Select Large U.S. Banks' Equity

	<i>MVE/BE</i> 1980	<i>MVE/BE</i> 1985	<i>MVE/BE</i> 1990	<i>MVE/BE</i> 1995	<i>MVE/BE</i> 1997	<i>MVE/BE</i> 1999
Chase (Chemical)	0.53	0.89	0.33	1.41	2.30	2.83
(Old) Chase	0.69	0.74	0.36			
Citicorp	0.76	0.98	0.52	1.74	2.97	
Bank America (Nations Bank)	0.74	1.59	0.80	1.50	2.04	1.90
(Old) Bank of America	1.14	0.62	0.97	1.35	2.61	
Bank of New York	0.59	1.21	0.49	1.89	4.33	5.76
Fleet Boston	0.68	1.53	0.62	1.79	2.67	2.18
(Old) Bank Boston	0.61	0.97	0.32	1.60	3.16	
First Union	0.69	1.66	0.66	1.74	2.71	1.95
Keycorp	0.52	1.24	1.05	1.70	2.99	1.54
Mellon	0.69	0.86	0.81	2.05	4.21	4.25
J.P. Morgan	0.92	1.35	1.75	1.51	1.86	1.94
Wachovia	0.72	1.75	1.51	2.07	3.23	2.43
SunTrust	0.94	1.78	1.25	1.82	2.88	2.78
U.S. Bancorp	0.77	1.02	0.98	2.41	4.69	2.39
Comerica	0.53	1.02	0.93	1.76	3.76	2.27

Notes: Values are for the end of the fiscal year, and are taken from Compustat. MVE: market value of equity; BE: book equity.

pattern shown in Table 11.8 is that the three countries with the highest return on assets (United States, United Kingdom, and Spain) also have the highest ratios of operating costs to assets, and the highest net interest margins relative to assets.

Those facts are consistent with the view that investment in quasi rent creation, not contraction in overhead, is the path to greater profitability in banking. Thus, while some noninterest costs (excessive brick and mortar expenses) probably indicate some room for cost cutting in European banking, that is not to say that

European banks need to cut expenses; rather, they need to reallocate their expenses toward more profitable pursuits.

Table 11.9 presents calculations on U.S. bank productivity growth, which indicate that, irrespective of whether bank "production" is defined narrowly or broadly, there has been substantial improvement over time in the ability of banks to provide the same "output" (measured here as quantities of assets) at lower cost. According to these calculations, annual bank productivity growth has averaged more than 0.4 percent during the 1990s.

TABLE 11.7
Cost Structure Differences in Banking Among the United States, Europe, and Japan

	<i>Number of branches per 1,000 people</i>			<i>Number of employees per \$1,000 in assets</i>		
	1990	1995	1998	1990	1995	1998
United States	0.29	0.28	0.29	0.40	0.32	0.29
Japan	0.18	0.19	0.19	0.07	0.06	0.06
Euro Area	0.56	0.55	0.55	0.21	0.15	0.15 ^a

Source: Bank for International Settlements, Annual Report (2000: 135).

^a European data shown in the 1998 column are actually for 1997.

TABLE 11.8
Performance of Large Banks and Mergers for All Banks in Industrialized Countries

Country	Return on assets (percent)		Net interest margin/assets (percent)		Operating costs/ assets (percent)		No. of mergers and acquisitions		Value of M&A (U.S.\$ billions)	
	1994	1998	1994	1998	1994	1998	1993-4	1997-8	1993-4	1997-8
Japan	-0.21	-0.74	0.90	1.07	0.74	1.00	8	28	18.8	4.1
France	0.17	0.27	1.60	0.63	2.04	0.95	71	36	0.5	4.0
Germany	0.52	0.56	1.82	0.98	2.06	1.65	83	45	1.9	23.2
Netherlands	0.69	0.60	2.27	1.90	2.17	2.32	13	9	0.1	0.4
Sweden	0.55	0.93	2.34	1.46	1.76	1.57	23	8	0.4	2.1
Spain	0.70	1.07	2.47	2.76	2.45	2.82	44	30	4.5	5.9
Switzerland	0.63	0.46	1.17	0.80	2.17	1.92	59	22	3.9	24.3
United Kingdom	1.22	1.19	2.45	2.18	3.02	2.41	40	17	3.3	11.0
United States	1.81	1.42	3.57	3.03	3.80	3.93	1477	1052	55.3	362.4

Source: Danthine et al. (2000).

Table 11.10 examines the relationship between scale and productivity improvement over time for U.S. banks. Over time, the advantages from scale economies appear to have risen, particularly for the largest category of banks (those with assets of greater than U.S.\$5 billion). The scale economies of large banks were smaller in 1991 than in 1997, irrespective of which definition of output is used.

This evidence suggests that the consolidation wave in U.S. banking has contributed to recent growth in productivity. One explanation for the increasing advantages from large scale is the role that deregulation of entry played in promoting economies of scale. Prior to branch-

ing deregulation, banks could only grow large locally, which limited the gains from diversification produced by larger size. Furthermore, deregulation of bank products likely added to improvements in scale economies; larger scale makes economies of scope larger by making the expansion of products, and the overhead costs of marketing and selling those products, more cost-effective.

Another possible contributor to productivity improvement for large banks has been their propensity to employ the Internet as a means of attracting customers, expanding sources of revenue, and reducing transacting costs. Table 11.11 shows that the larger a bank is, the more

TABLE 11.9
Productivity Growth in U.S. Banking

	Narrowest definition of bank production ^a	Narrow definition of bank production ^b	Broad definition of bank production ^c
Annual percentage productivity growth of banks over the period 1991-7	0.44	0.42	0.44

Source: This table is adapted from Stiroh (2000).

Notes: Productivity growth is estimated by Stiroh (2000: Table 3) from a pooled regression analysis of total costs, using a translog specification.

^a The "narrowest" definition of output includes the quantity of business loans, consumer loans, and securities.

^b The "narrow" definition of output includes the asset items in the "narrowest" definition and net noninterest income.

^c The "broad" definition of output includes the items in the "narrow" definition and off-balance sheet items as an output.

TABLE 11.10
Increases in Scale Economies Over Time in U.S. Banking^a

Bank size	Narrowest definition of bank production ^b			Narrow definition of bank production ^c			Broad definition of bank production ^d		
	1991	1994	1997	1991	1994	1997	1991	1994	1997
U.S.\$200 million < assets	1.056	1.042	1.069	1.062	1.067	1.065	1.055	1.045	1.076
< U.S.\$300 million									
Assets > U.S.\$5 billion	0.979	0.908	0.942	0.967	0.926	0.954	0.984	0.909	0.937

Source: This table is adapted from Stiroh (2000: Table 5).

Notes: Numbers less than one imply scale economies (increases in cost less than proportional to output), while numbers greater than one imply scale diseconomies.

^a "Expansion path scale economies," as defined originally by Berger et al. (1987), and estimated by Stiroh (2000), measure the proportional change in costs as a bank moves along the observed expansion path from one output bundle to a larger output bundle.

^b The "narrowest" definition of output includes the quantity of business loans, consumer loans, and securities.

^c The "narrow" definition of output includes the asset items in the "narrowest" definition and net noninterest income.

^d The "broad" definition of output includes the items in the "narrow" definition and off-balance sheet items as an output.

likely it is to choose to become an "Internet bank" (defined as those with a transactional web site). Moreover, Internet banks also tend to rely more on fees rather than interest income, within each size category. Although causality cannot be inferred from such simple associations, the connection between noninterest income and Internet banking may indicate that the Internet is a particularly useful tool

for attracting customers for nonlending purposes.

Table 11.12 provides additional insights about the potential gains from Internet banking in the United States, and about the likely growth in Internet banking over the next few years. The average Internet transaction costs the bank only 2 cents, in contrast to a branch transaction, which costs an average of

TABLE 11.11
U.S. Performance in Internet Banking for National Banks

Bank asset size	No. of banks offering internet banking	Internet banks as a percentage of national banks in that size category	Percentage increase in number of banks offering Internet banking from 1998:Q1 to 1999:Q3	Noninterest income/net operating revenue (percent) (non-Internet banks shown in parentheses for comparison)	Return on equity (non-Internet banks shown in parentheses for comparison)
Assets < U.S.\$100 million	85	7.1	226.9	22.0 (14.6)	6.34 (10.13)
U.S.\$100 million < assets < U.S.\$1 billion	265	27.1	258.1	23.1 (16.8)	14.15 (13.03)
U.S.\$1 billion < assets < U.S.\$10 billion	73	61.9	82.5	36.8 (23.0)	18.26 (15.68)
Assets > U.S.\$10 billion	41	100.0	95.2	40.1	15.35
All asset sizes	464	19.9	188.2		

Source: Furst et al. (2000).

Notes: "Internet banks" are defined as banks with a transactional web site.

TABLE 11.12
U.S. Trends in Internet Banking for National Banks

	<i>Actual</i> 1999:Q3	<i>Planned</i> 2000:Q4	<i>Percent</i> <i>increase</i>	<i>Forecast</i> 2001 ^c	<i>Forecast</i> 2003 ^d	<i>Transaction</i> <i>cost</i>
<i>Number of Internet banks</i>	464	1,047	125.6			
<i>Millions of households banking on-line</i>	5			18.3	23-32	
<i>Type of service</i>						
Balance inquiry and fund transactions	412	969	135.2			
Bill payment	363	853	135.0			
Credit applications	269	646	140.1			
Set up new account	170	487	186.5			
Brokerage	100	230	130.0			
Cash management	73	445	509.6			
Fiduciary	55	150	172.7			
Bill presentment	49	258	426.5			
Insurance	25	95	280.0			
Basic ^a	360	836	132.2			
Premium ^b	111	471	324.3			
Branch transaction (U.S.\$)						1.07
Telephone transaction (U.S.\$)						0.55
ATM transaction (U.S.\$)						0.33
PC banking (U.S.\$)						0.13
Internet banking (U.S.\$)						0.02

Sources: For all information other than costs of transacting, see Furst et al. (2000). For costs of transacting, see Claessens et al. (2000), based on information from Goldman Sachs and Boston Consulting Group.

Notes: "Internet banks" are defined as banks with a transactional web site.

^a "Basic" service includes balance inquiry, funds transfer, and bill payment.

^b "Premium" service includes "Basic" plus at least three other services.

^c The forecast for 2001 is by the Gartner Group, cited in Furst et al. (2000: Figure 7).

^d The forecasts for 2003 are from Jupiter Communications (23), Piper Jaffray (25.2), and IDC Research (32), cited in Furst et al. (2000: Figure 7).

U.S.\$1.07. In the year 2000, the number of Internet banks is projected to increase by 126 percent. The growth rate of the number of banks offering an expanded range of "premium" Internet services is expected to grow even faster (by 324 percent). While only 5 million households were banking on line in 1999, by 2003 various analysts forecast that between 23 and 32 million households will be doing so. The Internet is likely to remain a continuing source of expanded revenue and reductions in transacting costs for many years to come.

Whether other countries will share in the productivity boom that has transformed U.S. banking is more controversial. Some countries

(especially the United Kingdom, Spain, and the Netherlands) increasingly are following the example of large U.S. banks, and have developed universal banks, providing retail and wholesale banking services through traditional brick and mortar networks. These banks employ cutting-edge techniques for cross-selling products, diversifying and laying off risk, and economizing on capital. Other countries (especially France and Italy) are still struggling to catch up. The new strategies include novel ways of selling products, the securitization, sale, or syndication of some loans or parts of loans, the internal use of derivatives for hedging, and the ability to supply a broad range of services to

consumers and businesses (derivatives, private equity, insurance, underwriting, cash management, etc.) in addition to traditional lending and deposit taking.

With regard to Internet banking, some countries are likely to be better able to follow the U.S. lead than others. As Table 11.13 shows, Finland, Sweden, Australia, and Denmark are far ahead of other industrialized countries in the number of Internet IP addresses per 10,000 people, as of 1998. This makes Internet banking much more attractive in those countries. For example, even though 90 percent of Spanish banks are offering on-line services, far fewer of their customers are using such services, in comparison with other countries where more of the population is connected to the Internet.

Countries other than the United States are much more dependent on traditional banking as a means of intermediating capital, creating liquidity, and offering investment opportunities to savers. Nevertheless, government control and taxation of the banking sector (which is known as "financial repression") has been a constraining influence on bank development, and therefore, on economic development for nearly all developing countries since World War II (for a review of the literature on financial repression, and its effects on capital allocation and growth, see Beim and Calomiris, 2000: chapters 2–4). The recent trend toward financial liberalization has helped to undo some of the damage of financial repression, although liberalization has not always been pursued properly (Beim and Calomiris, 2000: chapters 3, 7, and 8).

Table 11.14 reviews the major changes in the size of financial intermediation in developing and developed economies since 1960. Countries are grouped according to their average real GDP levels for the period. Three clear patterns are visible in Table 11.14. First, financial depth (measured as private credit, bank credit, or liquid liabilities, relative to GDP) is higher for richer countries. Second, poorer countries tend to have a much greater ratio of central bank assets relative to GDP. Third, over the past four decades, all income classes have seen a substantial rise in credit relative to GDP, although the poorest group of countries saw a slight decline in credit relative to GDP in the 1990s.

TABLE 11.13
Internet Banking Trends Around the World

	<i>Percentage of banks offering on-line banking</i>	<i>Percentage of bank customers using on-line banking</i>	<i>Computers with IP address connected to the Internet, per 10,000 people in 1998</i>
<i>The Americas</i>			
Argentina	4	3	16
Brazil	<50	5	10
Mexico	<10	<1	9
United States	63	4	975
<i>Europe</i>			
Austria	75	4	163
Central Europe	35	<1	54
Denmark	60	5–10	359
Finland	85	29	996
Germany	60	2	141
Greece	40	<1	38
Italy	50	1	56
Spain	90	<2	62
Sweden	90	11	430
Switzerland	75	5	289
United Kingdom	50	2	202
<i>Asia</i>			
Australia	90	4	400
Hong Kong	25	<2	108
India	10	<1	0
Indonesia	0	0	0
South Korea	90	3	38
Malaysia	10	<1	18
Philippines	15	<1	1
Singapore	95	5	187
Taiwan	10	0	48
Thailand	0	0	4

Source: Claessens et al. (2000: Table 5), based on data from Credit Suisse First Boston Global Bank Team (1999) and World Bank (2000a).

This last fact suggests the persistence of a "financial repression divide" separating the poorest countries from others; in other words, the global liberalization in financial

TABLE 11.14
International Trends in Private Credit and Liquidity

	1960	1970	1980	1990	1997	1960s	1970s	1980s	1990s
<i>Liquid liabilities/GDP</i>									
LIG	0.20	0.18	0.24	0.23	0.25	0.18	0.21	0.25	0.24
LMIG	0.21	0.25	0.38	0.46	0.43	0.23	0.30	0.43	0.44
UMIG	0.18	0.40	0.42	0.47	0.58	0.35	0.42	0.57	0.50
HIG	0.48	0.57	0.63	0.77	0.88	0.52	0.60	0.69	0.82
<i>Private bank credit/GDP</i>									
LIG	0.06	0.10	0.15	0.13	0.13	0.10	0.12	0.15	0.13
LMIG	0.13	0.17	0.22	0.28	0.31	0.15	0.19	0.24	0.28
UMIG	0.11	0.20	0.26	0.30	0.39	0.14	0.22	0.33	0.33
HIG	0.33	0.41	0.48	0.66	0.83	0.37	0.44	0.54	0.73
<i>Private credit from all financial institutions/GDP</i>									
LIG	0.07	0.11	0.17	0.15	0.14	0.10	0.13	0.16	0.14
LMIG	0.15	0.20	0.26	0.30	0.35	0.17	0.22	0.28	0.32
UMIG	0.14	0.26	0.31	0.37	0.50	0.18	0.27	0.41	0.42
HIG	0.39	0.52	0.65	0.87	0.99	0.46	0.59	0.72	0.93
<i>Central bank assets/GDP</i>									
LIG	0.10	0.05	0.10	0.12	0.10	0.07	0.07	0.12	0.13
LMIG	0.08	0.09	0.12	0.18	0.06	0.08	0.08	0.17	0.11
UMIG	0.03	0.04	0.06	0.11	0.05	0.04	0.05	0.12	0.07
HIG	0.06	0.05	0.05	0.04	0.03	0.05	0.04	0.05	0.04
<i>Insurance company assets/GDP</i>									
			1980	1990	1996				
LIG			0.08	0.03	0.03				
LMIG			0.04	0.10	0.13				
UMIG			0.08	0.13	0.26				
HIG			0.13	0.24	0.36				

Source: Beck et al. (1999).

Note: LIG, lowest income group; LMIG, lower-middle income group; UMIG, upper-middle income group; HIG, upper income group.

services in the 1990s has not taken root in the poorest countries. This is properly viewed as a failure of policy, not a failure of banks. There is a large body of research (reviewed in Beim and Calomiris, 2000) linking the financial underdevelopment of poor countries to their failure to adopt institutional changes that promote banking sector growth (legal reforms to enhance creditors' rights, liberalization of banking regulations and taxes, etc.). Banking

sector growth happens rapidly when governments permit it.

Table 11.14 also reports insurance company assets relative to GDP for the four country income groups. Its pattern, across time and across country groups, follows that of banking sector development, with one notable exception: the lower-middle income group (LMIG) shows a much faster rate of growth in insurance than in banking during the 1980s. Part of the

explanation for this phenomenon has to do with changes in the demand for life insurance at different phases of economic development. Life insurance is one of the first major financial assets purchased by entrants to the middle class; hence the increase over time in insurance company assets for the LMIG group relative to the lower income group (LIG) may simply reflect a demand-side effect associated with income growth.

11.3.2. The Rise of Equity: Institutional Investors and Technological Progress

Discussions of banking sector developments in the United States and elsewhere emphasize that the banking sector's transformation from a focus on traditional deposit taking and lending to global universal banking was largely a response to competitive pressures from outside banking, which pushed banks (and their regulators) to improve their scale, product mix, risk management, and marketing strategies. The result is a banking sector that serves as a platform for virtually all financial activities: lending of all kinds, private equity investing, asset management, insurance, underwriting, derivatives selling, and cash management. Banks are absorbing underwriting and asset management firms and insurance companies.

Banks have become not so much competitors with securities markets (as they were sometimes seen in the 1980s) but rather a primary means of accessing securities markets (whether in the form of derivatives transactions, securitizations of assets, underwriting, or asset management). These various new banking activities could be broadly defined as the "securitization" of the banking industry—that is, the increasing involvement of banks in a wide range of securities market transactions.

But where did these securities markets come from? Why were they more developed in the United States than elsewhere? How and why has their development accelerated in the past forty years? It is easy today to take for granted the existence of an active securities market, but its origins have a history of their own, and the current universal banking system (which combines financial markets and financial inter-

mediaries in novel ways; Calomiris, 2000: chapter 6) would not have been possible without the parallel development of an improved banking structure and increasingly efficient securities markets.

Just as in the case of banking sector structural change, securities markets have a structure—a set of buyers and sellers. Innovations that improved that structure, along with improvements in information processing technology, have increasingly encouraged entry into public markets by securities issuers, and facilitated the trading of securities at declining costs of transacting.

Securities market development is usefully divided into the development of primary and secondary markets. That is not to say that these developments are unrelated. The growth of primary markets (markets for new issues) and secondary markets (markets for trading existing issues) are related in two ways. First, the same causal factors have helped to spur both primary and secondary market development. For example, the growth of institutional investors (which act both as purchasers of new offerings in the primary wholesale market, and trade actively in the wholesale "upstairs" secondary market) probably was the single greatest contributing influence to the growth of equity markets in the last forty years. Second, primary and secondary market development are related through effects that each has on the other. The trend toward greater liquidity in the secondary market (shown by Steil in chapter 12) reduces the required return on securities (the so-called liquidity premium), and thus reduces the cost of raising funds via public offerings. And, of course, deep secondary markets are not possible without sufficient outstanding securities to be traded. Thus, the development of primary and secondary markets, particularly for equity, have helped to spur each other.

The development of securities markets—especially the relatively new phenomenon of highly active markets for very junior, risky claims like new companies' stock issues and risky junk bond issues—is itself one of the major transformations of the financial sector in the past forty years. It is useful to consider how much the

structure of equity markets has changed over the past decades, and how changes in structure have coincided with increased access to those markets by new classes of issuers and investors.

The growth of equity and junk bond markets has been a major triumph, a clear example of financial innovation. Risky publicly held securities, unlike privately held bank debt and stock, are especially susceptible to adverse-selection and moral-hazard problems. Potential purchasers of these securities face severe problems in identifying firms' ex ante characteristics sufficiently to warrant confidence in the value of their junior claims (the adverse-selection problem). Purchasers also may lack confidence in their ability to protect themselves from abuse ex post (i.e., the extraction of control rents by managers at the expense of minority stockholders, or increases in asset risk by bond issuers, which effectively transfer value from risky bondholders to stockholders).

Beginning in the 1960s, institutional investors have helped to mitigate these problems because they buy in bulk and because they are repeat buyers. They participate directly and repeatedly in "road shows" for stock offerings, providing reactions to the marketing efforts of investment bankers, and thus helping to price shares and to ensure sufficient buying interest for new offerings (for a review of the theoretical literature, see Calomiris and Raff, 1995). Investment bankers benefit from the reactions of institutional buyers during the road show, from their expres-

sions of interest (which reduce the risk of insufficient demand for the offering), and investment bankers face strong incentives to behave honestly with institutional investors, since they anticipate substantial repeat business with them in the future.

Institutional investors (pensions and mutual funds) became important intermediaries (in terms of their share of total assets) in the 1960s, as shown in Table 11.15, and they have grown substantially since then. As of 1999, pensions and mutuals control 37 percent of financial wealth. The involvement of mutual funds and pension funds as holders of corporate equity became significant in the 1960s, as shown in Table 11.17. As of 1999, institutional investors of all kinds held 47 percent of outstanding corporate equity. As recently as 1960, that number was only 12 percent.

The constructive role of institutional investors in primary and secondary equity markets was noted at an early date. Friend et al. (1970: vii) noted that:

These institutions, which first sparked the cult of common stocks, later attracted attention to "growth" stocks and create the fashion for instant performance. Innovative and inventive, institutional money managers have ventured into areas where older and more prudent investment men feared to tread, taking positions in the stocks of unseasoned

TABLE 11.15
Percentage of U.S. Household Assets Held in Various Investments and Intermediaries

	1946	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	1999
Deposits + money market funds	19	17	17	17	19	21	24	23	25	21	15	12
Deposits	19	17	17	17	19	21	24	22	23	19	13	10
Money market funds	0	0	0	0	0	0	0	1	2	2	2	2
Credit market instruments	15	13	12	11	9	8	7	6	8	10	9	7
Corporate equities	17	17	24	26	31	22	13	13	10	12	19	24
Mutual fund shares	0	0	1	1	2	2	1	1	2	3	5	9
Life insurance reserves	7	7	7	6	5	5	5	3	3	3	3	2
Pension fund reserves	2	3	5	7	8	10	13	15	21	23	27	28
Investments in bank trusts	0	0	0	0	0	5	5	4	4	4	4	3
Equity in noncorporate business	38	40	33	29	25	25	31	33	26	22	17	13

Source: Federal Reserve Flow of Funds Data.

TABLE 11.16
Market Values of Various Financial Instruments Held in the United States

	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	1999
Money market	0	0	0	0	0	0	3.7	76.4	242.4	493.3	741.3	1573.8
mutual funds												
Corporate and foreign bonds	26.9	40.9	60.8	91.8	123.1	204.3	336.4	507.6	883.1	1705.7	2848.1	4610.8
Corporate equities	117.7	142.7	281.8	420.3	734.9	841.4	845.7	1494.9	2270.4	3542.0	8495.7	19576.3

Source: Federal Reserve Flow of Funds Data.

companies, setting up hedge funds, devising new types of securities.

The boom in equity issues and the growth of institutional investors were so dramatic in the 1960s that the SEC undertook a multi-volume study, published in 1971, of the role institutional investors had played in the growth of the equity market. The study concluded that, in the market for new common stock, bulk buying by these investors had fundamentally

changed the technology for selling issues. The SEC (1971) found that institutional investors accounted for a large percentage of IPO purchases (24 percent) over the period 1967-70, and that they tended to hold those stocks as long-term investments. The SEC emphasized that, because of their role as wholesale buyers, institutional investors were able to economize on the costs of marketing securities, and that investment bankers' fees and expenses for placing stock had fallen significantly as the

TABLE 11.17
Percentage of Equity Held in the United States by Various Holders of Equity

	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	1999
Households	93	90	88	86	84	68	59	59	47	51	48	44
State and local governments	0	0	0	0	0	0	0	0	0	0	0	1
Depository institutions	0	0	0	0	0	0	1	0	0	0	0	0
Commercial banks	0	0	0	0	0	0	0	0	0	0	0	0
Savings institutions	0	0	0	0	0	0	1	0	0	0	0	0
Institutional investors	5	7	8	12	14	29	37	36	47	41	45	47
Bank trusts and estates	0	0	0	0	0	10	11	9	8	5	3	2
Insurance companies	3	3	3	3	3	4	5	5	6	4	6	6
Life insurance companies	1	1	1	1	1	2	3	3	3	2	4	5
Other insurance companies	2	2	2	2	2	2	2	2	3	2	2	1
Private pensions	0	1	2	4	6	8	13	16	23	17	15	12
State and local government pensions	0	0	0	0	0	1	3	3	5	8	9	10
Mutual funds	2	3	3	5	5	6	5	3	5	7	12	17
Open-end	1	2	2	4	4	5	4	3	5	7	12	17
Closed-end	1	1	1	1	1	1	1	0	0	0	0	0

Source: Federal Reserve Flow of Funds Data.

TABLE 11.18
Percentage of Corporate and Foreign Bonds Held by Various U.S. Holders

	1945	1955	1965	1975	1985	1999
<i>Households</i>	31	8	7	19	9	15
<i>State and local governments</i>	0	0	0	0	1	2
<i>Depository institutions</i>	13	7	3	8	10	7
Commercial banks	10	3	1	3	4	5
Savings institutions	3	4	2	5	6	2
<i>Institutional investors</i>	51	81	86	70	64	54
Bank trusts and estates	0	0	0	3	2	1
Insurance companies	44	63	52	35	36	29
Life insurance companies	42	61	50	31	32	25
Other insurance companies	2	2	2	4	4	4
Private pensions	7	13	18	12	11	6
State and local government pensions	0	4	14	18	12	7
Mutual funds	0	1	2	2	3	11
Money market funds	0	0	0	0	0	3
Other mutual funds	0	1	2	2	3	8

Source: Federal Reserve Flow of Funds Data.

result of the growth of the wholesale market. More formal analyses of changes in underwriting costs (Mendelson, 1967; Calomiris and Raff, 1995) have concluded that costs did indeed decline markedly during the 1960s, and that the most likely explanation for that decline is the increasing importance of institutional inves-

tors. A study of cross-sectional differences in underwriting costs in today's market (Hansen and Torregrossa, 1992) similarly concluded that institutional involvement tends to reduce investment banking costs.

Table 11.20 summarizes the history of U.S. underwriting fees (not including expenses) from 1913 to 1993. Calomiris and Raff (1995) argued that the decline in common stock underwriting costs in the 1940s and 1950s mainly reflected a change in the composition of firms accessing the equity market. The rise of private placements (a new form of corporate debt funding, held primarily by life insurance companies, which grew rapidly in that period) allowed smaller firms to avoid the high-cost equity market. In the 1960s and 1970s, however, equity offerings by small firms rose dramatically, as shown in Table 11.20, but average underwriting costs continued to decline. This average change reflected much larger declines in underwriting costs for smaller firms. Based on regression analysis, Calomiris and Raff esti-

TABLE 11.19
Percentage of Money Market Mutual Fund Shares Held by Various U.S. Holders

	1975	1985	1995	1999
Households	100	80	60	54
Nonfinancial corporations	0	6	10	12
Nonfarm noncorporate businesses	0	0	1	0
Bank trusts and estates	0	5	5	3
Life insurance companies	0	4	3	8
Private pensions	0	4	5	6
Funding corporations	0	2	16	17

Source: Federal Reserve Flow of Funds Data.

TABLE 11.20
U.S. Underwriting Fees on Various Securities as a Percentage of Value Offered

	<i>Percentage fees on bonds</i>	<i>Percentage fees on preferred stock</i>	<i>Percentage fees on common stock</i>	<i>Percentage fees on common stock, small manufacturing</i>	<i>Annual common stock issues, small manufacturing (U.S.\$ million)</i>
Circa 1913	5-10	7.5-10	20-25		
1912-3	4	8-14	>20	>20	
1925-31			9-23	14-23	
1926-9 (large only)	3.1				
1925-9 (small only)	5.2	7.1			
1935-8			16.4	17.4	43
1935-8 (small only)	3.4	8.9			
1938	2.6	10.5	20.0	13.2	28
1939	1.9	8.8	16.6	16.5	42
1940	2.1	7.4	15.9	15.9	42
1951-3, 1955	0.8	3.3	8.8	11.1	15
1963-5		2.4	7.9	10.9	27
1971-2	1.5	1.5	8.4	10.1	206
1992-3	1.5	4.1	6.7	8.7	130

Source: Calomiris and Raff (1995: Table 9).

Notes: Fees are payments to underwriters and do not include expenses. The definition of small offerings varies. For purposes of measuring the annual common stock issues of small manufacturers, issues of less than U.S.\$10 million (in 1991 dollars) are included (see the details in Calomiris and Raff, 1995: Table 9). For underwriting fees measured for 1925-9, and for 1935-8, small is defined as issues less than U.S.\$5 million.

mated that fees for small issuers of common stock declined from 14.2 percent in 1950 to 9.2 percent in 1971.

Since the mid-1970s, institutional investors have also helped to finance private equity

markets, which provide a major source of new IPOs, and thus offer additional stimulus to public equity market development via this channel. Indeed, pension funds are the dominant source of funds for the private equity market.

TABLE 11.21
U.S. Mergers and Acquisitions and Private Equity

	1980	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Dollar value of completed acquisitions (U.S.\$ billions)						137	242	352	460	650	1102	
Cross-border M&A transactions for U.S. firms (U.S.\$ billions)			100	44	33	50	87	182	121	121	310	480
Total funds committed to all types of private equity partnerships (U.S.\$ billions)			7.8	7.9	11.0	13.6	22.8	29.2	37.8	55.1	88.5	28.5
Number of attempted hostile takeovers	5	86	18	9	8	11	37	68	51	29	19	

Source: Boswell (2000), based on data from Securities Data Co., and The Private Equity Analyst.

As such they have also become an important source of funds for LBOs. Table 11.21 summarizes recent trends in these transactions. Although hostile takeovers have declined in importance, in response to new corporate defenses against them, friendly takeovers and private equity have continued to grow in importance in recent years.

Table 11.22 summarizes data on the holdings of pension funds in other industrialized countries. It is clear from this table that pension funds in the United States, the United Kingdom

and Ireland maintain unusually large proportions of their assets in the form of domestic and foreign equity in comparison with other European countries. U.K. pension funds hold 73.7 percent of their assets in equity, Irish pensions hold 59.5 percent of their assets in equity, and U.S. pensions hold 63.1 percent in equity. For other countries in Europe, equity comprises only 30.1 percent of assets. But that low level masks some high growth rates in equity investments in some countries, notably Austria and Spain, and in virtually all countries, the

TABLE 11.22
Asset Allocation of Pension Funds in Various Countries, 1999

	Cash assets (percent)	Domestic bonds (percent)	Domestic equity (percent)	Foreign bonds (percent)	Foreign equity (percent)	Loans and mortgages (percent)	Real estate (percent)	Other (percent)	Total (percent)	Average annual percentage growth in equity 1995-9
Austria	1.6	62.3	17.2	5.3	11.0	1.0	0.5	1.2	100	32.6
Belgium	3.4	23.6	20.1	14.1	32.7	0.0	4.7	1.4	100	11.1
Denmark	0.7	51.5	30.7	0.6	11.0	0.0	3.7	1.7	100	9.8
Finland	6.5	48.6	21.3	0.0	0.8	16.8	6.0	0.0	100	na
France	19.7	46.1	10.0	5.9	2.3	1.9	0.5	13.5	100	2.6
Germany	8.2	33.0	19.4	2.6	5.8	26.2	3.3	1.4	100	2.3
Ireland	6.6	16.4	27.3	7.4	32.2	0.0	5.8	4.4	100	16.9
Italy	16.3	25.4	2.7	3.1	0.3	10.0	42.2	0.0	100	-0.2
Netherlands	1.8	18.6	19.2	16.1	25.5	13.3	5.4	0.0	100	7.8
Norway	3.8	62.7	20.7	0.0	2.2	3.8	1.7	5.2	100	5.8
Portugal	7.0	39.8	22.0	10.0	13.0	0.0	6.5	1.7	100	na
Spain	13.4	44.9	16.9	10.6	8.6	0.0	0.5	5.1	100	20.6
Sweden	1.6	71.6	15.3	4.9	1.8	0.0	4.7	0.1	100	4.5
Switzerland	9.2	16.1	14.4	15.2	14.9	3.1	16.9	10.2	100	8.5
United Kingdom	3.4	10.8	50.6	3.8	23.1	0.2	4.9	3.2	100	12.3
Total	4.9	19.6	34.2	7.3	19.2	4.4	7.0	3.5	100	9.8
Europe Europe, excluding United Kingdom and Ireland	6.7	27.4	16.3	11.6	14.8	9.5	9.8	4.0	100	7.2
United States	4.7	22.7	53.1	1.1	10.0	1.5	1.9	5.0	100	16.1

Notes: Data are taken from *Financial Times*, Special Section on European Pension Provision, November 10 (2000: IV), based on data compiled by Intersec Research.

TABLE 11.23
Various Measures of Equity Market Development across Countries, by Country Income Group

	1980		1985		1990		1995		1997	
	Mean	Frequency	Mean	Frequency	Mean	Frequency	Mean	Frequency	Mean	Frequency
<i>Stock market capitalization (SMC)/GDP</i>										
LIG	0.04	3	0.04	6	0.08	7	0.15	11	0.12	9
LMIG	0.10	6	0.08	10	0.12	13	0.19	26	0.20	25
UMIG	0.28	7	0.24	8	0.32	10	0.45	18	0.55	13
HIG	0.22	20	0.38	26	0.49	26	0.60	30	0.75	26
<i>Stock market turnover ratio (trading volume/SMC)</i>										
LIG	0.01	4	0.01	6	0.01	7	0.01	12	0.03	9
LMIG	0.01	8	0.01	11	0.04	13	0.05	27	0.08	24
UMIG	0.03	8	0.03	8	0.04	12	0.09	18	0.22	13
HIG	0.08	25	0.16	27	0.34	25	0.33	30	0.71	26

Source: Beck et al. (1999).

Note: LIG, lowest income group; LMIG, lower-middle income group; UMIG, upper-middle income group; HIG, upper income group.

portfolio share of equity is rising. Thus, alongside the new global competition in banking, and the trend toward "universal banking American-style" in Europe, Asia, and Latin America, there is every reason to believe that the culture of equity investing and the institutions that facilitate it will spread increasingly throughout the world.

Table 11.23 summarizes global trends in equity markets from 1980 to 1997, measured by the changing ratio of stock market capitalization (SMC) relative to GDP, and the ratio of trading volume to SMC (turnover). Observations are divided into four income classes, as before. High-income countries have shown remarkable increases in both SMC and turnover (an increase from 0.22 SMC and 0.08 turnover in 1980 to 0.75 SMC and 0.71 turnover in 1997). All other country groups have shown pronounced increases in these ratios since 1980. For example, the lower-middle income group in 1997 had reached SMC and turnover ratios comparable to those of the high-income group in 1980. Legal limitations on shareholder protection and severe information problems in many developing economies continue to limit the growth of equity markets worldwide (see the review in Beim and Calomiris, 2000). Nevertheless, there has been remarkable progress in

spreading equity offerings and trading throughout the world in the past twenty years.

A limitation of examining progress in equity markets by focusing on changes in outstanding quantities of equity holdings is that doing so fails to distinguish between growth in equity holdings that results from internally generated equity (retained earnings) and growth that reflects new stock offerings. The distinction is an important one. In the most primitive financial systems (those where banking systems are undeveloped and the issuing of both debt and equity securities in public markets is impossible), equity holdings by insiders will be the sole means of corporate finance. Thus, a rise in outstanding corporate equity, by itself, does not constitute evidence of greater access to equity markets. To examine changes in access to equity markets, it is useful to focus on new offerings of equity.

Table 11.24 summarizes trends in U.S. securities issues of various types from 1980 to 1999. The number of offerings, and the total proceeds of offerings are given for each of the major categories of securities (nonconvertible debt, nonconvertible preferred stock, convertible debt, convertible preferred stock, seasoned common stock offerings, and initial public stock offerings). The high rate of growth of securities

TABLE 11.24

Number and Volume of U.S. Private Sector Securities Issues of Various Types, Adjusted for Inflation

	1980		1984		1988		1992		1994		1996		1998		1999	
	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$	No.	U.S.\$
Non-convertible debt	418	40.9	459	51.2	746	112.6	2136	267.1	3456	306.3	7077	481.2	12689	970.3	12234	938.3
Non-convertible preferred	46	2.1	47	3.0	115	6.6	231	17.8	76	7.9	142	24.2	192	23.5	146	16.3
Convertible debt	98	4.9	66	3.9	36	2.9	65	6.0	36	3.9	62	7.3	37	5.1	52	12.1
Convertible preferred	28	1.4	27	0.9	10	0.5	51	7.2	39	4.9	36	4.4	37	6.9	27	5.6
Common stock	540	14.8	611	9.7	432	28.0	1114	63.8	1129	54.7	1646	91.2	991	93.6	1031	138.6
IPOs	149	1.5	356	3.7	290	22.3	604	33.8	645	28.0	873	39.2	398	35.2	572	56.7
Seasoned equity	391	13.2	255	5.9	142	5.7	510	30.0	484	26.7	773	52.0	593	58.5	459	81.8

Source: Securities Data Co.

Note: The value of proceeds from securities issues are adjusted for inflation by dividing by the producer price index, which has a value of 100 in 1982.

offerings is immediately apparent, particularly in the areas of nonconvertible debt and common stock offerings. Roughly speaking, the number of common stock issues in the 1990s is double that of the 1980s, and the real proceeds from common stock offerings have grown nearly an order of magnitude from 1980 to 1999.

Table 11.25 examines trends in underwriting costs (fees plus expenses) for the same categories of offerings. Consistent with the view that underwriting fees and expenses are a payment to underwriters for helping to mitigate problems of asymmetric information, which increase with the risk of the security being sold, observed costs increase as the riskiness of the security rises (from relatively senior nonconvertible debt and preferred stock to relatively junior common stock).

There is a downward trend in underwriting costs for all categories, particularly for junior securities (common stock, convertible debt and preferred stock). That observation suggests that recent technological improvements in selling securities may have disproportionately

avored the riskiest securities. This observation is consistent with the evidence that Calomiris and Raff (1995) provide for technological improvements in the 1960s, which favored small equity issuers, and likely reflects the fact that these issuers are the ones whose costs of underwriting are most responsive with respect to improvements in information technology.

One could imagine an alternative explanation of the downward trend of underwriting costs, namely that the attributes of issuers have changed since the 1980s to include a greater proportion of firms whose equity is inherently easy to sell. As Table 11.26 shows, it is true that underwriting costs vary significantly across firms, and vary with characteristics of firms that may proxy for differences in the potential for adverse selection problems. Firms that one would expect to be "information-problematic" a priori do tend to have higher underwriting costs. Underwriting costs are relatively high for small firms, firms with large R&D expenditures, riskier firms, and firms whose portfolio and financing behavior indicates high shadow costs of external finance (i.e., firms that pay

TABLE 11.25
Underwriting Costs as a Percentage of Value Offered for Securities Issues of Various Types

	1980		1984		1988		1992		1994		1996		1998		1999	
	No.	Avg	No.	Avg	No.	Avg	No.	Avg	No.	Avg	No.	Avg	No.	Avg	No.	Avg
Non-convertible debt	328	1.9	393	2.0	588	1.7	1108	1.2	630	1.3	858	1.0	911	0.9	1112	0.6
Non-convertible preferred	45	2.4	46	3.1	111	2.4	221	2.4	63	3.2	126	3.2	161	3.5	20	2.2
Convertible debt	86	4.5	65	3.7	33	5.9	63	4.0	32	3.8	48	4.1	19	2.6	7	2.5
Convertible preferred	28	7.8	22	8.0	8	6.3	49	6.3	34	8.4	26	4.8	30	8.3	7	2.5
Common stock	389	10.0	575	13.2	423	11.5	1089	9.5	1037	10.4	1534	9.2	793	8.4	850	7.9
IPOs	125	14.2	356	16.1	285	12.9	597	11.0	619	12.4	843	11.3	373	10.9	496	9.3
Seasoned equity	264	8.0	219	8.6	138	8.6	492	7.6	418	7.5	691	6.6	420	6.1	354	5.9

Source: Securities Data Co.

Note: Underwriting cost is defined as the ratio (in percent) of all underwriting fees and expenses divided by the value of proceeds from securities issues.

TABLE 11.26
Characteristics of Seasoned Equity Issuers By Size Quartiles of Underwriting Cost, 1980-94 Median Values, Standard Errors of Medians in Parentheses

	<3.0 percent	3.0-6.9 percent	6.9-11.4 percent	>11.4 percent
Underwriting cost (as percentage of proceeds)	4.5 (0.05)	6.5 (0.02)	8.5 (0.05)	14.0 (0.22)
Annual sales	718 (46)	146 (8)	61 (4)	16 (1)
Financial working capital/sales	0.11 (0.01)	0.14 (0.01)	0.13 (0.01)	0.14 (0.01)
R&D/sales	0.018 (0.002)	0.024 (0.004)	0.024 (0.010)	0.033 (0.003)
Short-term debt/long-term debt	0.052 (0.003)	0.091 (0.005)	0.113 (0.007)	0.142 (0.009)
Percentage of firms with dividends > 0	64	35	26	15
Percentage of firms with rated debt	25	8	4	2
Standard deviation of equity return	0.023 (0.000)	0.029 (0.000)	0.031 (0.000)	0.036 (0.001)

Source: Calomiris and Himmelberg (2000).

zero dividends, lack access to public debt markets, depend on short-term debt, and maintain large buffers of cash to self-insure against shortfalls in cash flow).

In the event, however, the average changes visible in Table 11.25 are not explained by changes in the composition of borrowers. In fact, smaller and younger firms have been increasingly attracted to the equity market, and so the average changes shown in Table 11.25 likely understate the reductions in the cost of underwriting. Nevertheless, given the importance of cross-sectional heterogeneity, when measuring the extent of technological change through the window of underwriting costs, it is useful to control for basic differences in firm characteristics. Table 11.27 provides a simple approach to doing so, using regression analysis.

The equations estimated in Table 11.27 are intended mainly as descriptive, rather than as a formal structural empirical model of underwriting cost (for the latter, see Calomiris and Himmelberg, 2000). They include the key control variables of firm size (market value of equity) and the size of the offering. Firm size should enter with a negative coefficient, since large firms are more mature, and thus less information problematic. Offering size should enter negatively as well, if there are fixed costs associated with offerings (or alternatively, if small offering size is an endogenous indicator of a bigger information problem).

Technological progress over time in marketing equity offerings (i.e., improvements in

financial intermediaries' ability to credibly transmit information to potential purchasers of equity) is captured in the regressions by the coefficient on "Year" and by the coefficients on the interaction variables that include Year. Interestingly, the coefficient on Year changes sign depending on the inclusion of interactive effects of Year with proceeds and market value of equity. When interaction effects are excluded, the coefficient on Year is positive, indicating an increase in underwriting costs over time. But when interaction effects are included, the sign becomes negative.

The implication of this result is clear: the extent to which firm size and proceeds size affect underwriting cost has changed over time, and unless one takes account of those changes one gets a false impression about technological progress. If one allows for the possibility that the cost penalty on small firm size and small offering size has fallen over time (which the coefficients on the interaction terms indicate they have), then one also finds that, additionally, the general trend in underwriting costs has been toward falling costs over time. In other words, average costs have been falling, but the average size of issues have also been rising, in large part because of the reduction in issuing costs. Imposing a time-invariant coefficient on proceeds biases the estimated time trend coefficient, and produces the wrong (positive) sign for that coefficient. The central conclusion of this exercise is that there has been substantial improvement in the technology of underwrit-

TABLE 11.27

Underwriting Cost Regressions for Seasoned Equity Offerings, 1980-99. Dependent Variable: Log of Underwriting Cost as a Percentage of Proceeds, Coefficient Estimates, Standard Errors in Parentheses

Constant	-22.077 (1.095)	39.500 (2.257)
Year	0.013 (0.001)	-0.018 (0.000)
ln adjusted proceeds	-0.156 (0.005)	-7.208 (1.683)
ln adjusted MVE	-0.148 (0.003)	-7.447 (1.172)
(Year) × (ln adjusted proceeds)		0.0035 (0.0008)
(Year) × (ln adjusted MVE)		0.0037 (0.0006)
Number of observations	7522	7522
Adjusted R-squared	0.71	0.72

Notes: MVE, market value of equity. Proceeds and MVE are adjusted for inflation using the producer price index.

ing, that those improvements have favored small firms, and that they have tended to encourage larger issues.

11.3.3. New Financial Instruments and Increased Global Risk Sharing

Perhaps the most visible changes in the global financial system are the new financial instruments that have been created over the past twenty years, especially over-the-counter (OTC) derivative securities and asset-backed securities. These innovations rely critically on the new infrastructure of computing and telecommunications technologies that have made it possible to carve up and quantify various bits of risk attendant to any financial transaction, and to transmit those bits of risk throughout the world to the party that is most willing and able to absorb them. Carving up risk in new ways has permitted issuers and holders of securities to distribute and manage risk in a way that reduces the cost of raising funds for firms, and increases the risk-adjusted returns to portfolio holders.

Corporate and individual clients, as well as banks, can use customized derivatives to hedge risks and transfer them to other parties who have a comparative advantage in bearing those risks. Financial engineers now produce a variety of sophisticated means for accomplishing this objective (currency swaps, interest rate swaps, equity swaps, collars, options, swaptions, etc.). Hedging risk for corporations (including banks) helps them to economize on equity capital (which, because of adverse-selection costs of raising such capital, is the most expensive component of corporate financing). In essence, derivatives help corporations and individuals conserve on capital by reducing the amount of total asset risk that their capital must absorb, and conserving on capital reduces the overall costs of financing their operations (for a formal treatment, see Calomiris and Wilson, 1998; Froot and Stein, 1998; Brewer et al., 2000).

The securitization of assets expands financing opportunities for firms and permits holders of securities to purchase specific tranches of risk that match their desired portfolio holdings. That process is often embodied in a new set of financial entities, which are mana-

ged by financial intermediaries. Assets are placed into special conduits (which, legally, are trusts, separate from the entities that originate the assets). The conduits then issue various tranches of securities backed only by the assets placed in the trust. Sometimes twenty or more different classes of securities may be issued by the same trust.

Consider, for example, credit card securitization. Prior to the placement of credit card receivables in "master trusts" the banks that originated the receivables held them directly, and had to maintain minimum capital of 8 percent against these receivables, irrespective of their risk. By placing relatively high-quality receivables into trusts, the costs of financing these receivables could be reduced, since the capital needed to absorb the aggregate risk of default on the portfolio was much smaller than 8 percent. Another gain from creating securitization trusts comes from being able to better target various securities holders with customized securities that match their tastes for risk (or that respond to regulations limiting investors' ability to hold high-risk claims—as in the case of insurance company investors).

Derivatives and securitization have also spawned other related process and product changes in the financial system. The payoffs to holders of derivatives, by definition, are determined in other securities markets (e.g., in stock markets for equity derivatives), and suppliers of derivatives (e.g., banks) hedge their derivatives exposures by entering into contracts in those other securities markets. Thus, derivatives not only offer more opportunities for hedging, but they also tend to promote greater depth in securities markets. New techniques for measuring risk have also been encouraged by these financial innovations. In the case of derivatives, complex customized derivative contracts can only be priced using highly sophisticated mathematical models, which translate the risks of underlying securities into the newly constructed bundle of risks from the customized derivatives contract. In the case of securitization, holders of asset-backed securities require that third parties (dealers and rating agencies) act as agents to protect investors from problems of adverse selection and moral hazard. Issuers must

TABLE 11.28
U.S. Public Asset Backed Securities Issuance, 1985-97

	1985	1987	1989	1991	1993	1995	1997
Home equity	5	4	5	10	10	15	47
Credit cards	0	0	6	40	30	55	45
Automobile	0	5	5	20	35	20	30
Manufactured housing	0	0	2	3	3	4	12
Other	0	0	1	2	7	15	30

Source: Flanagan et al. (1998).

provide substantial information about the securities that they place in securitization conduits, and ratings agencies use that information, along with sophisticated new credit scoring techniques, to price asset-backed securities.

Table 11.28 summarizes trends in the growth of public offerings of asset-backed securities (other than government-sponsored offerings) since their origins in the mid-1980s. As the table shows, these markets have grown rapidly in the 1990s. Table 11.29 compares recent trends in securitization across different regions of the globe. While the vast majority of securitization is still confined to North America, the rapid growth that is taking place in Europe, Asia and Australia, and Latin America suggests that a decade from now, the volume of issues for the rest of the world will more than match those of North America.

Table 11.30 traces the progress in two of the new growth areas of the U.S. asset-backed secu-

rities market: commercial mortgage-backed securities and small business loans. These assets have traditionally been viewed as among the most difficult to securitize, since information about their credit risk is relatively difficult to obtain and to quantify. Thus, the rapid growth in these areas in the past four years suggest that technical improvements in securitization, and market confidence in these new instruments (notwithstanding some of the dislocations that occurred in the asset-backed securities market in the aftermath of the Russian crisis of 1998) will continue to propel increasing growth in asset securitization.

Table 11.31 examines growth in derivatives contracts, including both exchange-traded and OTC contracts, from 1988 to 1998. Both sets of contracts have grown by more than ten fold in the past decade, and OTC contracts grew particularly fast in 1998. Table 11.32 summarizes data from a recent study of currency derivatives used by large U.S. corporations. That study found that 59 percent of corporations studied use some kind of derivatives, and 41 percent of them use currency derivatives. The use of currency derivatives (which was the focus of the study that produced these data) is higher for firms with large foreign currency exposures, but also varies positively with the proportion of institutional ownership, firm size and with the number of analysts following the firm. Furthermore, firms that use currency derivatives have substantially lower quick ratios (which measure liquid assets relative to short-term liabilities). These facts suggest that firms with sophisticated outside stockholders, or whose financial affairs are heavily scrutinized, see advantages to

TABLE 11.29
Global Securitization Issuance By Region

Year	North America	Europe	Asia and Australia	Latin America
1994	145	5	1	2
1995	155	9	2	6
1996	234	20	5	14
1997	313	46	13	6
1998	454	47	30	10
1999 (est.)	536	72	43	10

Source: Danthine et al. (2000), based on Moody's Investors Service, except for 1999 values for Europe, which are taken from *Financial Times*, November 3 (2000: 25), based on Merrill Lynch.

TABLE 11.30
High Growth Areas in U.S. Asset Backed Securitization Issuance

	1994	1995	1996	1997	1998	1999
Commercial mortgage-backed securities (U.S.\$ millions)			26365	36798	74332	56571
Securitized small business loans (U.S.\$ millions)	202	241	642	718	1220	2312

Source: Federal Reserve Board (2000).

TABLE 11.31
Global Growth in Derivatives (\$billions)

	1988	1991	1994	1995	1996	1997	1998	1999	2000
Exchange-traded contracts	1306	3523	8863	9189	9880	12202	13549		
Interest rate futures	895	2157	5778	5863	5931	7489	7702		
Interest rate options	279	1073	2624	2742	3278	3640	4603		
Currency futures	12	18	40	38	50	52	38		
Currency options	48	61	56	44	47	33	19		
Stock index futures	28	77	128	172	196	212	321		
Stock index options	44	137	238	329	378	777	867		
Over-the-counter contracts	na	4449	11303	17713	25453	29035	50997		
Interest rate swaps	1010	3065	8816	12811	19171	22291	na		
Currency swaps	320	807	915	1197	1560	1824	na		
Other swap-related	na	577	1573	3705	4723	4920	na		
Credit derivatives	0	0	0	0	10	190	340	440	800 ^a

Sources: Bank for International Settlements (BIS) Annual Reports for all information other than credit risk derivatives. Credit risk derivatives are from *Financial Times*, International Capital Markets, May 19 (2000: v).

^a Estimated by Bank Austria-Creditanstalt, according to *Financial Times*, International Capital Markets, May 19 (2000: v).

TABLE 11.32
The Use of Currency Derivatives By Large U.S. Corporations

	Currency derivatives users (154 firms)		Currency derivatives nonusers (218 firms)	
	Mean	Median	Mean	Median
Pretax foreign income/total sales	0.033	0.027	0.018	0.008
Identifiable foreign assets/total assets	0.346	0.316	0.350	0.240
Foreign loan-term debt/total assets	0.023	0.001	0.005	0.000
Total sales (log U.S.\$ million)	8.24	8.26	7.13	7.13
Institutional ownership percentage	55.46	58.30	48.59	52.00
Number of analyst firms	26.16	25.00	15.43	14.00
Quick ratio	0.25	0.15	0.35	0.19

Source: Geczy et al. (1997).

TABLE 11.33

International Capital Flows to Developing Countries

	1970	1975	1980	1985	1990	1995	1997
<i>Stocks of Outstanding Debt</i>							
Private sector foreign debt/GDP	1.6	1.9	2.9	3.4	1.7	4.2	5.7
Latin America	7.2	6.2	6.5	9.1	2.7	5.5	8.2
East-Central Europe	0.2	0.4	1.5	1.2	0.5	2.2	3.7
East Asia	1.6	3.1	3.8	4.0	3.3	6.3	8.1
Middle East, North Africa	0.1	0.0	0.2	0.3	0.3	0.3	0.3
South Asia	0.7	0.5	0.4	0.9	0.7	1.8	2.1
Sub-Saharan Africa	0.6	0.8	2.0	2.9	2.1	3.6	2.6
Public sector foreign debt/GDP	3.9	5.6	11.7	23.0	23.9	24.2	20.1
Latin America	8.9	11.1	16.8	40.3	30.5	23.3	18.7
East-Central Europe	0.5	0.8	5.5	13.3	13.2	28.0	23.0
East Asia	2.4	5.5	10.1	17.5	20.9	16.6	15.1
Middle East, North Africa	9.2	7.3	11.7	16.6	23.8	23.9	17.4
South Asia	14.1	14.8	16.1	19.1	28.7	25.9	21.4
Sub-Saharan Africa	9.2	12.0	16.5	40.5	52.6	60.1	50.5
<i>Flows of equity investment</i>							
Foreign direct investment net inflows/GDP	0.2	0.4	0.2	0.4	0.6	1.9	2.5
Latin America	0.6	0.8	0.8	0.7	0.8	1.9	3.1
East-Central Europe	0.0	0.0	0.0	0.0	0.1	1.8	1.9
East Asia	0.1	0.4	0.3	0.5	1.2	3.1	3.4
Middle East, North Africa	0.7	1.0	-0.7	0.4	0.6	-0.1	0.8
South Asia	0.1	0.1	0.1	0.1	0.1	0.6	0.8
Sub-Saharan Africa	0.7	0.8	0.0	0.5	0.3	1.2	1.6
Portfolio equity inflows/GDP	0	0	0	0	0.1	0.6	0.5
Latin America	0	0	0	0	0.1	0.5	0.5
East-Central Europe	0	0	0	0	0.0	0.3	0.4
East Asia	0	0	0	0	0.3	1.1	0.5
Middle East, North Africa	0	0	0	0	0.0	0.0	0.3
South Asia	0	0	0	0	0.0	0.5	0.4
Sub-Saharan Africa	0	0	0	0	0.0	1.7	0.5

Source: World Bank (2000b).

hedging their currency risks, and that doing so helps firms to economize on liquid asset holdings (since liquid assets provide an alternative form of self-insurance against cash flow shortages produced by exchange rate swings). There is every reason to believe that the number and amount of derivatives contracts will continue to expand, and that improvements in risk management and risk sharing will continue alongside that expansion.

Finally, consider the evidence of increased global risk sharing. Global risk sharing is visible both in the rising capital being transferred among developed economies, and from developed countries to developing economies. Table 11.33 examines stocks of debt and flows of equity investment, both relative to GDP, from 1970 to 1997, by type of claim (sovereign borrowing, private sector borrowing, foreign direct investment, and portfolio equity flows),

and by region. Several patterns are worth noting. First, flows have increased over time in all categories and to all regions. Second, debt remains the dominant type of flow to emerging market economies. Third, private sector debt is growing relative to public sector debt. Fourth, equity is growing relative to debt—indeed, flows of foreign direct investment and portfolio equity were virtually zero in 1980, and now represent a significant part of capital inflows. In particular, the ability to channel funds from developed countries to private sector firms in developing countries has improved substantially, despite the recent financial crises that have buffeted emerging market economies in 1995, 1997, and 1998.

A recent study by Portes and Rey (2000) of cross-border equity flows concludes that cross-country differences in factors affecting the cost of information are crucial prerequisites for cross-border equity flows among developed economies. Indeed, the authors find that, contrary to the prediction of a simple international version of the standard capital asset pricing model, international diversification opportunities, per se, do not go very far in explaining which countries' issuers gain access to international equity investors. In contrast, institutional and informational indicators are powerful predictors, including the presence of branches of foreign financial institutions, communication linkages (proxied by the frequency of international telephone calls), physical distance from securities purchasers, and the extent of insider trading in the issuing country. This study lends support to the notion that institutional networks are crucial mitigators of information costs relevant to the ability to market equities.

11.4. Conclusion

Technological progress in corporate finance and banking has multiple dimensions. Although physical product and process innovation is a crucial element of technological change, improvements in the organization of financial intermediaries and financial networks also have been important. Organizational

changes have been independent contributors to technological improvement and have also helped to spur successful product and process innovation.

Financial intermediaries (especially banks) have become much more productive over the past thirty years, especially in the United States, as the result of their ability to expand geographically and to enter new product areas. With those changes have come new competition, which has been a driver in the development of new financial services and new techniques of customer relationship management, information production, risk management, and marketing.

Outside of banking, securities markets have also seen substantial improvements, which reflect reductions in physical costs, as well as lower costs that reflect reduced information and control frictions (adverse selection and moral hazard). Those cost reductions have been reflected in improvements in corporations' ability to access markets for equity and junior debt, in the development of new products which offer new means for managing and sharing risk (OTC derivatives and asset-backed securities), and in greater global risk sharing (most notably, a large increase in international capital flows to emerging market countries).

In all these cases, technological change has not been confined to technical improvements, but also reflects new rules governing competition and financial openness, and new institutions that come into being or become transformed because of political or regulatory changes or other exogenous shocks (reductions in government limits via unit banking, demographic and regulatory changes that produce growth in insurance companies, pensions, and venture capitalists). These regulatory and institutional shifters probably have been at least as important as the Internet, credit scoring, financial engineering, improved telecommunications, or other sorts of purely technical improvements for explaining improvements in the technology of banking and corporate finance over the last century.

The regulatory process and technological change are dynamically linked. Costly regula-

tions give incentives for new products, services, and intermediaries to be developed (e.g., commercial paper, money market mutual funds, finance companies, foreign entry), which help to spur deregulation. This can be a very long-run adjustment process, and can depend on exogenous facilitators (high inflation in 1970s) to become important stimuli for

technological improvement. There can be technological regress when bad shocks and bad regulatory policy combine (as during the Great Depression), but there is a certain inevitability to progress that comes from the combination of competitive markets, facilitating shocks, and general improvements in communications technology.