THE WORLD BANK ECONOMIC REVIEW, VOL. 10, NO. 2: 291–321

Stock Market Development and Financial Intermediaries: Stylized Facts

Aslı Demirgüç-Kunt and Ross Levine

World stock markets are booming, and emerging stock markets account for a disproportionate share of this growth. Yet economists lack a common concept or measure of stock market development. This article collects and compares a broad array of indicators of stock market and financial intermediary development, using data from forty-four developing and industrial countries during the period from 1986 to 1993. The empirical results exhibit wide cross-country differences for each indicator as well as intuitively appealing correlations between various indicators. The article constructs aggregate indexes and analyzes them to document the relationship between the emergence of stock markets and the growth of financial intermediaries. It produces a set of stylized facts that facilitates and stimulates research into the links among stock markets, economic development, and corporate financing decisions.

The growth and globalization of emerging stock markets are impressive. In 1994, emerging market capitalization was $1.9 trillion, compared to $0.2 trillion in 1985. Similarly, $39 billion flowed into emerging equity markets from abroad in 1994, compared with $0.1 billion in 1985.[1] These developments have attracted the attention of academics, practitioners, and policymakers. Several studies focus on measuring the benefits of holding a globally diversified portfolio (for example, see Harvey 1995 and De Santis 1993); and many countries are reforming regulations and laws to foster capital market development and attract foreign portfolio flows. Yet, economists have neither a common concept nor a common measure of stock market development.

This article gives empirical content to the phrase "stock market development" by collecting and comparing a broader array of empirical indicators of stock market development than any previous study. Using data on forty-four developing and industrial countries from 1986 to 1993, we examine different measures of stock market size, market liquidity, market concentration, market volatility, institutional development, and integration with world capital markets. Since each indicator suffers from statistical and conceptual shortcomings, we use a variety of indicators, which provide a more accurate depiction of stock markets

1. One billion is 1,000 million; one trillion is 1,000 billion.

Aslı Demirgüç-Kunt and Ross Levine are with the Policy Research Department at the World Bank. This article was originally prepared for the World Bank conference on Stock Markets, Corporate Finance, and Economic Growth, held in Washington, D.C., February 16–17, 1995.

than any single measure. Furthermore, stock market development—like the level of economic development—is a complex and multifaceted concept. No single measure will capture all aspects of stock market development. Thus, our goal is to produce a set of stylized facts about various indicators of stock market development that facilitates and stimulates research into the links among stock markets, economic development, and corporate financing decisions.

After describing each of the stock market development indicators, we examine the relationships among them. We find enormous cross-country variation in the stock market indicators. For example, five countries have market capitalization to gross domestic product (GDP) ratios greater than 1, and five countries have market capitalization to GDP ratios less than 0.10. We find attractive correlations among the indicators. For example, large stock markets are more liquid, less volatile, and more internationally integrated than smaller markets; countries with strong information disclosure laws, internationally accepted accounting standards, and unrestricted international capital flows tend to have larger and more liquid markets; countries with markets concentrated in a few stocks tend to have smaller, less liquid, and less internationally integrated markets; and internationally integrated markets are less volatile.

Although many stock market development indicators are significantly correlated in an intuitively plausible fashion, the individual indicators produce different country rankings. Thus, to produce an assessment of the overall level of stock market development across countries, we produce indexes of stock market development that average together the information contained in the individual indicators. Developing aggregate indexes that summarize the extent of a country's stock market development in a single figure is especially helpful for analysts who are interested in making comparisons across countries. These indexes can be used in empirical studies linking stock market development and other economic phenomena, as in Levine and Zervos (1996) and Demirgüç-Kunt and Maksimovic (1996). We find that from 1986 to 1993 the most developed stock markets in the world are in Japan, the United States, and the United Kingdom, and the most underdeveloped markets are in Colombia, Venezuela, Nigeria, and Zimbabwe. The data suggest that Hong Kong, Singapore, the Republic of Korea, Switzerland, and Malaysia have highly developed stock markets; Turkey, Greece, Argentina, and Pakistan have underdeveloped markets. Furthermore, although richer countries generally have more developed stock markets than poorer countries, many markets labeled emerging are more developed than those in France, the Netherlands, Australia, Canada, Sweden, and Norway.

We use the assortment of stock market indicators to evaluate which stock markets have been developing fastest over the last eight years. Using measures of size, liquidity, and international integration, Indonesia, Turkey, Portugal, and Venezuela stand out as the most rapidly developing markets in the world.

This article documents the relationship between the various stock market indicators and measures of financial intermediary development. Since debt and

equity are frequently viewed as alternative sources of corporate finance, stock markets and banks are sometimes viewed as alternative vehicles for financing corporate investments (see Demirgüç-Kunt and Maksimovic 1996). Consequently, we document the cross-country ties between stock market development and financial intermediary development. We use measures of the size of the banking system, the amount of credit going to private firms, the size of nonbank financial corporations, and the size of private insurance and pension companies. We find that most stock market indicators are highly correlated with the development and efficient functioning of banks, nonbank financial corporations, and private insurance companies and pension funds. Countries with well-developed stock markets tend to have well-developed financial intermediaries.

Section I presents indicators of stock market development and describes their theoretical relevance. Section II ranks countries using the different indicators of stock market development and studies the correlations among the indicators. Section III examines which countries have the fastest-developing stock markets. Section IV analyzes the links between stock market development and financial intermediary development. Section V summarizes the results.

I. Indicators of Stock Market Development

A growing theoretical literature examines the relationship between particular attributes of stock markets and both economic growth and firms' financing decisions. For example, Devereux and Smith (1994) and Obstfeld (1994) show that by facilitating risk sharing, internationally integrated stock markets affect saving decisions, the allocation of capital, and long-run economic growth rates. Greater risk diversification and liquidity have theoretically ambiguous effects on saving rates, however, because saving rates could fall sufficiently for enhanced liquidity and risk diversification to lead to slower economic growth. Levine (1991) and Bencivenga, Smith, and Starr (1996) emphasize that stock market liquidity—the ability to easily trade securities—facilitates investments in longer-run, higher-return projects that involve more transactions. On stock market size, Pagano (1993) studies the increased risk-sharing benefits of larger stock markets due to thick market externalities. Besides stock market size, liquidity, and integration with world capital markets, theorists have examined stock return volatility. For example, DeLong and others (1989) argue that excess volatility in the stock market can hinder investment, and therefore growth, although there is considerable disagreement over the existence of excess volatility in stock returns (see Shiller 1981). In terms of corporate finance, some theories link stock market functioning with firms' financing and investment decisions. Pagano (1993) models the ties between risk-diversification and corporate financing decisions, while Boyd and Smith (1996) analyze complementarities between debt and equity financing for capital investments. Yet, as Demirgüç-Kunt and Maksimovic (1996) discuss, the effect of stock market development

on firms' financing decisions is theoretically inconclusive. Thus, theory provides a rich array of channels through which stock markets—market size, liquidity, integration with world capital markets, and volatility—may be linked to economic growth and corporate financing decisions.

There is very little empirical evidence on the links among stock markets, economic development, and firms' corporate financing decisions. To facilitate empirical research, this article collects and compares a broad array of stock market indicators motivated by the above theoretical studies and constructs aggregate indexes of overall stock market development. Demirgüç-Kunt and Maksimovic (1996) and Levine and Zervos (1996) use these indexes to examine the empirical relationship among stock market development, firms' financing decisions, and long-run economic growth.

The rest of this section presents and discusses an array of stock market development indicators. We focus on indicators identified by existing theoretical studies. We describe measures of market size, market liquidity, market volatility, market concentration, asset pricing efficiency, regulatory and institutional development, and conglomerate indexes that aggregate the information contained in the individual measures. For developing countries, we use data from the International Finance Corporation's (IFC's)Emerging Markets Data Base. For industrial countries, data are from Morgan Stanley Capital International (MSCI). We also use macroeconomic data from IMF (various issues). The data cover the period from 1986 to 1993 for up to forty-four developing and industrial countries. The appendix provides details of data construction and discusses cross-country comparability issues.

Stock Market Size

The *market capitalization ratio* equals the value of listed shares divided by GDP. Analysts frequently use the ratio as a measure of stock market size. In the rest of the article, we refer to this measure as market capitalization. In terms of economic significance, the assumption behind market capitalization is that market size is positively correlated with the ability to mobilize capital and diversify risk. For example, Pagano (1993) motivates his theoretical model by observing the great variation in market capitalization and in the number of listed companies in different economies. As indicated in table 1, South Africa, Hong Kong, Malaysia, Japan, and Singapore all had market capitalization ratios greater than 1 from 1986 to 1993, while Nigeria, Argentina, Indonesia, Colombia, and Turkey all had market capitalization ratios of less than 0.10 during the same period.

We include statistics on the *number of listed companies* as an additional measure of market size. Although marginal differences in the number of listed companies are uninformative, extreme values can be useful. It is not very interesting that Australia averaged 1,184 listed companies and Canada averaged 1,118 listed companies during the period from 1986 to 1993. But the fewer than 70 listed companies for Finland and Zimbabwe suggest that these countries have very limited markets (table 1). Similarly, the fact that in Indonesia, Turkey, and Por-

tugal the number of listed companies grew at over 20 percent a year from 1986 to 1993 suggests rapid stock market development (see table 3 in section III).

Liquidity

Although economists advance many theoretical definitions of liquidity, analysts generally use the term to refer to the ability to easily buy and sell securities. Since liquidity allows investors to alter their portfolios quickly and cheaply, it makes investment less risky and facilitates longer-term, more profitable investments. Liquidity is an important attribute of stock market development because theoretically liquid markets improve the allocation of capital and enhance prospects of long-term economic growth. A comprehensive measure of liquidity would quantify all the costs associated with trading, including the time costs and uncertainty of finding a counterpart and settling the trade. Because we want to compare liquidity across countries and because data are very limited, we simply use two measures of realized stock trading.

Total value traded/GDP equals total shares traded on the stock market exchange divided by GDP. The total value traded ratio measures the organized trading of equities as a share of national output, and should therefore positively reflect liquidity on an economywide basis. Japan, Hong Kong, Malaysia, the United States, and the United Kingdom all had total value traded/GDP ratios above 0.40, while in Pakistan, Zimbabwe, Colombia, and Nigeria, the total value traded/GDP ratio was about 0.01 from 1986 to 1993. The total value traded/GDP ratio complements the market capitalization ratio. Although market capitalization may be large, there may be little trading. For example, South Africa and Chile had above-average market capitalization but below-average total value traded/GDP (table 1). Together, market capitalization and total value traded/GDP inform us about market size and liquidity.

A second measure of liquidity is the turnover ratio. *Turnover* equals the value of total shares traded divided by market capitalization. High turnover is often used as an indicator of low transactions costs. Korea and Germany (largely reflecting massive trading around reunification) had turnover ratios above 0.90, while Nigeria, Zimbabwe, and South Africa had turnover ratios below 0.05. The turnover ratio complements market capitalization. A small but active market will have small market capitalization but high turnover. For example, Norway and India had below-average market capitalization but above-average turnover (table 1). Alternatively, South Africa's market capitalization to GDP ratio was the highest in the world, but its turnover ratio was one of the smallest.

Turnover also complements total value traded/GDP. Although total value traded/GDP captures trading compared with the size of the economy, turnover measures trading relative to the size of the stock market. Put differently, a small, liquid market will have a high turnover ratio but a small total value traded/GDP ratio. For example, there was not much equity trading in Brazil relative to the size of its economy, but Brazil's turnover ratio was high, reflecting a small but active stock market. By contrast, Malaysia had the third-highest market capitalization

Table 1. *Indicators of Stock Market Development, 1986–93*
(annual average)

Economy	Market capitalization[a]		Total value traded/GDP[b]		Number of listed companies[c]		Turnover[d]		Volatility[e]		Market concentration[f]		Institutional development[g]		APT pricing error[h]		ICAPM pricing error[h]	
	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
Argentina	40	0.06	34	0.02	26	187	19	0.34	37	0.34	25	0.64	10	1.16	14	4.98	24	11.58
Australia	10	0.54	12	0.17	5	1,184	21	0.31	11	0.04					13	4.94	12	4.14
Austria	35	0.10	22	0.07	39	90	5	0.69	14	0.05								
Belgium	18	0.36	28	0.04	27	182	35	0.12	6	0.04								
Brazil	34	0.11	26	0.05	9	579	11	0.48	36	0.25	7	0.26	4	1.54	24	7.26	23	6.92
Canada	13	0.48	13	0.15	6	1,118	20	0.31	5	0.04	8	0.27						
Chile	11	0.52	30	0.04	21	225	37	0.08	25	0.06	19	0.50	5	1.52	17	5.56	13	4.25
Colombia	38	0.07	40	0.01	40	87	38	0.07	23	0.06	26	0.74	11	1.16	19	5.62	15	4.82
Denmark	19	0.28	23	0.07	17	267	23	0.24										
Finland	26	0.19	27	0.04	42	62	30	0.21	13	0.05								
France	20	0.27	18	0.09	8	641	16	0.35	15	0.05	6	0.26						
Germany	22	0.24	8	0.35	11	551	1	1.47	10	0.04	15	0.41						
Greece	32	0.12	37	0.02	34	126	34	0.13	31	0.10	17	0.47	18	0.77	16	5.29	19	5.23
Hong Kong	2	1.36	2	0.59	14	318	12	0.44										
India	31	0.16	25	0.06	2	4,614	9	0.50	24	0.06	3	0.22	8	1.34	7	3.33	7	2.89
Indonesia	39	0.06	36	0.02	38	91	27	0.23					17	0.96	9	3.68	8	3.03
Ireland									21	0.06								
Israel	25	0.21	15	0.11	15	312	3	0.72	18	0.06								
Italy	29	0.16	29	0.04	19	227	24	0.24	20	0.06								
Japan	4	1.08	1	0.62	3	2,027	8	0.54	12	0.04	2	0.19			1	2.39	4	2.26
Jordan	9	0.57	14	0.13	36	103	29	0.22	7	0.04	23	0.59	12	1.16	2	2.55	1	2.05
Korea, Rep. of	15	0.40	6	0.37	10	576	2	0.93	30	0.08	9	0.28	3	1.55	10	3.73	9	3.18
Luxembourg					23	205												
Malaysia	3	1.28	3	0.46	16	291	26	0.24	17	0.05	12	0.36	1	1.63	11	3.90	5	2.45
Mexico	24	0.22	19	0.09	25	193	7	0.56	32	0.10	10	0.36	2	1.61	21	5.94	21	5.77
Netherlands	12	0.49	11	0.21	18	239	14	0.41	3	0.03								
New Zealand	16	0.39	24	0.06	20	226	32	0.17	16	0.05								
Nigeria	41	0.04	41	0.00	33	127	41	0.01			21	0.51	20	0.64	8	3.66	11	3.72
Norway	27	0.19	17	0.09	35	126	10	0.48	27	0.07								
Pakistan	33	0.11	38	0.01	12	487	36	0.08	1	0.03	5	0.25	13	1.09	3	2.59	2	2.15
Philippines	23	0.24	31	0.04	30	152	28	0.23	29	0.08	22	0.52	9	1.32	15	5.26	16	4.90
Portugal	30	0.16	32	0.03	29	162	31	0.20	4	0.03	14	0.41	6	1.37	12	4.03	20	7.16

Luxembourg					23	205												
Malaysia	3	1.28	3	0.46	16	291	26	0.24	17	0.05	12	0.36	1	1.63	11	3.90	5	2.45
Mexico	24	0.22	19	0.09	25	193	7	0.56	32	0.10	10	0.36	2	1.61	21	5.94	21	5.77
Netherlands	12	0.49	11	0.21	18	239	14	0.41	3	0.03								
New Zealand	16	0.39	24	0.06	20	226	32	0.17	16	0.05								
Nigeria	41	0.04	41	0.00	33	127	41	0.01			21	0.51	20	0.64	8	3.66	11	3.72
Norway	27	0.19	17	0.09	35	126	10	0.48	27	0.07								
Pakistan	33	0.11	38	0.01	12	487	36	0.08	1	0.03	5	0.25	13	1.09	3	2.59	2	2.15
Philippines	23	0.24	31	0.04	30	152	28	0.23	29	0.08	22	0.52	9	1.32	15	5.26	16	4.90
Portugal	30	0.16	32	0.03	29	162	31	0.20	4	0.03	14	0.41	6	1.37	12	4.02	20	5.28
Singapore	5	1.04	7	0.35	31	147	18	0.34										
South Africa	1	1.54	21	0.08	7	700	39	0.05										
Spain	21	0.25	20	0.08	13	383	17	0.35	19	0.06								
Sweden	14	0.46	16	0.10	32	133	25	0.24	22	0.06								
Switzerland	7	0.77	9	0.31	28	176	15	0.39	8	0.04	20	0.50						
Taiwan (China)					24	197			34	0.15	13	0.40	16	0.98	20	5.68	14	4.54
Thailand	17	0.36	10	0.22	22	210	4	0.70	26	0.07	11	0.36	7	1.36	6	3.12	10	3.18
Turkey	37	0.08	33	0.03	37	91	22	0.28	35	0.17	18	0.50	14	1.06	22	6.38	22	6.66
United Kingdom	6	0.92	5	0.41	4	1,932	13	0.44	9	0.04	4	0.24			5	2.94	6	2.56
United States	8	0.64	4	0.41	1	7,087	6	0.65	2	0.03	1	0.14			4	2.71	3	2.24
Venezuela	36	0.10	35	0.02	41	82	33	0.15	33	0.13	24	0.63	15	1.00	23	6.67	17	5.15
Zimbabwe	28	0.18	39	0.01	43	57	40	0.03	28	0.07	16	0.44	19	0.66	18	5.57	18	5.18
Average		0.41		0.15		627		0.36		0.08		0.40		1.19		4.49		4.34
Number of economies	41		41		43		41		37		26		20		24		24	

Note: For each indicator, the stock market development of each economy is ranked from high to low. Thus, for market capitalization, total value traded/GDP, number of listed companies, turnover, and institutional development, the ranking by value of the indicator is from high to low. For volatility, market concentration, APT pricing error, and ICAPM pricing error, the ranking by value of the indicator is from low to high.

a. Market capitalization is the value of stocks divided by GDP.
b. Total value traded/GDP is total value of traded shares divided by GDP.
c. Number of companies listed represents the number of shares listed on the exchange.
d. Turnover is given by total value traded divided by market capitalization.
e. Volatility is the twelve-month rolling standard deviation estimate based on market returns.
f. Market concentration is the share of market capitalization held by the ten largest stocks.
g. Institutional development is an average of institutional indicators as described in the text.
h. APT and ICAPM pricing errors are obtained from Korajczyk (1994).
Source: Authors' calculations and Korajczyk (1994).

and total value traded/GDP ratios from 1986 to 1993, but it had below-average turnover (table 1). Thus, incorporating information on market capitalization, total value traded/GDP, and turnover provides a more comprehensive picture of development than any single indicator can provide.

Concentration

In some countries a few companies dominate the market. High concentration is not desirable because it may adversely affect the liquidity of the market. To measure the degree of market concentration, we compute the share of market capitalization accounted for by the ten largest stocks and call this measure *concentration*. The United States and Japan have very low concentration. The ten largest stocks account for less than 20 percent of the markets. In Venezuela, Argentina, and Colombia, where the concentration ratio averaged above 0.60 in the period from 1986 to 1993 (table 1), concentration is three times larger than that in the United States and Japan.

Volatility

We include a measure of stock market *volatility*, because volatility of stock returns is another attribute that has received significant attention in the literature and is of great interest to practitioners. This indicator is a twelve-month, rolling, standard-deviation estimate based on market returns. We cleanse the return series of monthly means and twelve months of autocorrelations using a procedure defined by Schwert (1989). Greater volatility is not necessarily a sign of more or less stock market development. Indeed, high volatility could be an indicator of development, so far as revelation of information implies volatility in a well-functioning market (see, for example, Bekaert and Harvey 1995). Here we refer to "less volatility" as reflecting "greater stock market development" for simplicity. As with the other indicators, there are great cross-country differences in volatility. Volatility in Pakistan, the United States, and the Netherlands averaged about 0.03 from 1986 to 1993; volatility in Brazil and Argentina was above 0.25.

Asset Pricing

Academic researchers and market practitioners have devoted prodigious resources to measuring the degree of integration between national stock markets and the world market and to gauging whether markets price risk efficiently (see Bonser-Neal and others 1990; Cho, Eun, and Senbet 1986; Claessens, Dasgupta, and Glen 1995; Errunza and Losq 1989, 1985a, 1985b; Errunza and Senbet 1981; Errunza, Losq, and Padmanabhan 1992; Gultekin, Gultekin, and Penati 1989; Jorion and Schwartz 1986; Korajczyk and Viallet 1989; Solnik 1974; Stehle 1977; and Wheatley 1988). Although a market need not be integrated into the world capital markets to be developed, analysts generally refer to countries that are more integrated and that price risk more efficiently as more developed.

To measure asset pricing efficiency, we use estimates of asset pricing errors computed by Korajczyk (1994, 1996). Unfortunately, the data only permit computation of these pricing errors for twenty-four countries. As argued in Korajczyk and Viallet (1989), the capital asset pricing model (CAPM) and arbitrage pricing model imply that the expected return on each asset is linearly related to a benchmark portfolio or linear combination of benchmark portfolios. In domestic versions of these asset pricing models the benchmark portfolios include only securities traded on the local exchange, but in the international versions the portfolios include all securities. If the models are correct, then the benchmark portfolio, or combination of portfolios, should explain all of the systematic expected returns on assets above the risk-free interest rate.[2] Thus, we term systematic deviations of expected returns as pricing errors under the maintained hypothesis that the model is correct. Using different asset pricing models, Korajczyk (1994) computes the systematic deviation between actual returns and those implied by the models.

The asset pricing theory (APT) and international capital asset pricing model (ICAPM) compute pricing errors using an international arbitrage pricing model and international capital asset pricing model, respectively. Korajczyk (1994) computes the extent of pricing error under the maintained hypothesis that the models are correct. We take the average of the absolute value of the pricing errors for the stocks in a country as a measure of capital market integration. Thus, under the maintained hypothesis, greater values of the APT and ICAPM measures reflect less international integration. Greater pricing errors may reflect poor information about firms, high transactions costs, and official barriers to international asset trading. We refer to greater pricing errors as indicating less stock market development. The APT and ICAPM pricing errors give similar country rankings. Brazil, Turkey, and Mexico had relatively large pricing errors, but the United States, Japan, Jordan, and Pakistan yielded lower pricing errors, which suggest a high level of international integration.

These two pricing-error estimates—APT and ICAPM—rely on the success of equilibrium models of asset pricing that investigators sometimes have rejected as good representations of the pricing of risk. However, these measures allow us to incorporate indicators, albeit imperfect indicators, of the ability of agents to diversify risk domestically and internationally. Furthermore, we analyze the evolution of the degree of integration between each domestic market and the world market over time.

Regulatory and Institutional Indicators

Regulatory and institutional factors may influence the functioning of stock markets (see Pagano 1993). For example, mandatory disclosure of reliable information about firms and financial intermediaries may enhance investor par-

2. Since no asset is riskless in real terms, Korajczyk and Viallet (1989) test the restrictions implied by a zero-beta asset.

ticipation in equity markets. Regulations that instill investor confidence in brokers and other capital-market intermediaries should encourage investment and trading in the stock market.

To measure the *institutional development* of emerging stock markets, we use information provided by the IFC and construct seven regulatory-institutional indicators. The first indicator shows whether the firms that are listed in a stock market publish price-earnings information. We give a value of 0 or 1, where 1 indicates that the information is comprehensive and published internationally. The second indicator measures accounting standards. We assign values of 0, 1, or 2, for countries with poor, adequate, or good (internationally accepted) accounting standards. The third indicator measures the quality of investor protection laws as judged by the IFC, where 0, 1, and 2 are used to indicate poor, adequate, or good investor protection laws. The fourth indicator shows whether the country has a securities and exchange commission. The fifth, sixth, and seventh indicators measure restrictions on dividend repatriation by foreign investors, capital repatriation by foreign investors, and domestic investments by foreigners. We assign values of 0, 1, and 2, indicating whether capital flows are restricted, have some restrictions, or are free, respectively. We compute an average institutional development indicator, which simply averages the seven regulatory-institutional indicators. These indicators are available on an annual basis from 1986 to 1993 for twenty developing countries.

There is substantial variation across countries and indicators. For example, Jordan freely allowed international capital flows to cross its borders, but did not publish regular price-earnings information and had poor accounting standards. India had accounting standards of internationally accepted quality, but restricted capital inflows and the repatriation of capital and dividends. Nigeria tightly restricted capital flows over most of the period and did not publish price-earnings information on firms in a comprehensive and internationally accepted manner. In contrast, Malaysia, Mexico, Korea, Brazil, and Chile had very high institutional development indicators overall (table 1).

Correlations between Various Indicators of Stock Market Development

Many stock market indicators are significantly correlated in an intuitively plausible fashion.[3] First, market size is significantly positively correlated with total value traded/GDP and the average institutional indicator, and significantly negatively correlated with pricing error and volatility. Countries with big stock markets have less volatile, more efficient stock markets with a high volume of trading relative to GDP. Second, countries with highly concentrated markets have markets that are underdeveloped. Market concentration is significantly negatively correlated with market size and market liquidity, and significantly positively correlated with pricing error. Third, countries that have stock markets which are more integrated internationally—as measured by low APT and ICAPM

3. We do not report the actual values here due to space constraints. For these and for more detailed statistics throughout the article, see Demirgüç-Kunt and Levine (1995).

values—have less volatile stock returns. Fourth, countries with well-developed regulatory and institutional systems, as defined by the IFC, tend to have large, liquid stock markets.

Although many stock market development indicators are significantly correlated in intuitively attractive ways, the correlation coefficients are frequently below 0.60. The correlations suggest that the different indicators capture different aspects of stock market development. For example, the correlation between the two measures of market liquidity, total value traded/GDP and turnover is only 0.50. Thus, although the degree of trading relative to the size of the economy is significantly correlated with the degree of trading relative to the size of the market, the two liquidity measures do not move one for one. Instead, they provide complementary information about stock market liquidity. Therefore, to measure how well stock markets function in general, that is, to compute an index of overall stock market development, we need to incorporate the information contained in a broad selection of these indicators.

II. Which Stock Markets Are Most Developed?

Which stock markets are most developed overall? To answer this question, we construct four conglomerate indexes of stock market development that aggregate the information contained in the individual indicators. We then use these conglomerate indexes to rank countries in terms of overall stock market development.

The Indexes

To compute the conglomerate indexes of stock market development, we average the means-removed values of particular stock market development indicators. To construct each index, we follow a two-step procedure. INDEX1 aggregates information on market capitalization, total value traded/GDP, and turnover. First, for each country, i, we compute the means-removed market capitalization, total value traded/GDP, and turnover ratios. We define the means-removed value of variable X for country i as $X(i)^m = [X(i) - \text{mean}(X)] / \{ABS[\text{mean}(X)]\}$, where the term in the denominator is the absolute value of the average value of X across all countries from 1986 to 1993. For the pricing-error measures (APT and ICAPM) and the market concentration measure, where larger numbers refer to less stock market development, we multiply the indicator numbers by negative 1 before computing the means-removed values. Second, we take a simple average of the means-removed market capitalization, total value traded, and turnover ratios to obtain an overall index of stock market development, INDEX1.[4] INDEX1 is calculated for forty-one countries (see table 2). INDEX2 is constructed in the same way. It aggregates information on the three

4. We computed principal components indexes of the indicators, which allow the data to choose the weights rather than taking a simple average. However, we do not report these indexes because the rankings they produce are very highly correlated with the indexes we report.

Table 2. *Aggregate Indexes of Stock Market Development, 1986–93*

	INDEX1[a]		INDEX2[b]		INDEX3[c]		INDEX4[d]	
Economy	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*
Argentina	32	–0.59	15	–0.47	23	–0.87	15	–0.50
Australia	13	0.19	7	0.12	7	0.15		
Austria	19	–0.15						
Belgium	28	–0.47						
Brazil	24	–0.29	11	–0.38	12	–0.37	10	–0.23
Canada	14	0.09						
Chile	27	–0.46	12	–0.40	11	–0.34	13	–0.37
Colombia	40	–0.88	23	–0.71	22	–0.68	21	–0.73
Denmark	26	–0.37						
Finland	30	–0.53						
France	21	–0.21						
Germany	3	1.38						
Greece	36	–0.73	18	–0.61	17	–0.60	16	–0.52
Hong Kong	2	2.01						
India	23	–0.26	9	–0.13	9	–0.11	7	–0.01
Indonesia	35	–0.71	17	–0.52	14	–0.48		
Israel	15	0.08						
Italy	29	–0.51						
Japan	1	2.02	1	1.63	1	1.63	1	1.41
Jordan	16	–0.08	8	0.04	8	0.07	8	–0.06
Korea, Rep. of	6	1.05	4	0.84	4	0.85	4	0.73
Malaysia	8	0.90	5	0.72	5	0.79	5	0.60
Mexico	18	–0.14	10	–0.16	10	–0.17	9	–0.11
Netherlands	12	0.32						
New Zealand	25	–0.33						
Nigeria	41	–0.96	20	–0.67	21	–0.67	19	–0.59
Norway	20	–0.18						
Pakistan	39	–0.82	16	–0.51	16	–0.49	11	–0.33
Philippines	31	–0.54	14	–0.43	13	–0.42	14	–0.40
Portugal	33	–0.61	13	–0.42	15	–0.49	12	–0.34
Singapore	7	1.04						
South Africa	10	0.48						
Spain	22	–0.25						
Sweden	17	–0.10						
Switzerland	9	0.75						
Thailand	11	0.38	6	0.36	6	0.36	6	0.31
Turkey	34	–0.61	19	–0.61	19	–0.62	17	–0.54
United Kingdom	4	1.23	3	1.01	3	1.02	3	0.89
United States	5	1.21	2	1.01	2	1.03	2	0.94
Venezuela	37	–0.74	22	–0.68	18	–0.61	20	–0.66
Zimbabwe	38	–0.81	21	–0.67	20	–0.66	18	–0.56
Average		0.02		–0.07		–0.07		–0.05
Number of economies	41		23		23		21	

Note: Details of the calculation of the indexes are discussed in the text. Definitions of the indicators are given in table 1. The ranking order, by index, is from high to low. The indexes represent averages during the period from 1986 to 1993.

a. INDEX1 is the average of market capitalization, total value traded/GDP, and turnover.

b. INDEX2 adds APT pricing error to INDEX1.

c. INDEX3 adds ICAPM pricing error to INDEX1.

d. INDEX4 adds market concentration to INDEX2.

Source: Authors' calculations.

indicators used in INDEX1 and APT pricing error to obtain an overall indicator of stock market development that incorporates international integration. INDEX2 includes only the twenty-three countries with APT estimates. INDEX3 combines INDEX1 with the ICAPM pricing error. INDEX3 includes only the twenty-three countries with ICAPM pricing-error estimates. INDEX4 averages the means-removed values of market capitalization, total value traded/GDP, turnover, APT pricing error, and market concentration. We compute this index only for the twenty-one countries with data on all five underlying indicators.

Rankings of Stock Market Development

Table 2 gives the country-by-country values and rankings for the four aggregate indexes. Although there are variations in country rankings, the indexes are very highly correlated, with correlation coefficients of 0.96. Thus, the various conglomerate indexes give very similar country rankings. Here we briefly summarize the results from table 2.

Consider first INDEX4, which aggregates the largest number of individual stock market development indicators but has the fewest countries. The INDEX4 variable says that Japan, the United States, the United Kingdom, and Korea have the most developed stock markets when aggregating information on market size, liquidity, international integration, and market concentration. Colombia, Venezuela, Nigeria, and Zimbabwe have the four lowest rankings in this twenty-one-country sample.

Next, consider INDEX1, which aggregates the least information but includes the most economies (forty-one) with data on all the underlying indicators. INDEX1 ranks Japan, Hong Kong, Germany, the United Kingdom, the United States, Korea, Singapore, and Malaysia as having very highly developed stock markets when aggregating information on market size and liquidity. INDEX1 implies that Nigeria, Colombia, Pakistan, and Zimbabwe have the least developed stock markets. As noted above, Germany's high ranking is strongly influenced by the tumultuous years surrounding reunification when there was an explosion of equity transactions. If Germany's two years of exceptionally high trading are removed in computing its averages during the period from 1986 to 1993, Germany falls from the top ten.

Although it is difficult to answer unambiguously the question of which stock markets are most developed, our evaluation of the indexes presented in table 2 suggests that the three most developed markets are in Japan, the United States, and the United Kingdom. The most underdeveloped markets are in Colombia, Venezuela, Nigeria, and Zimbabwe. Furthermore, the data suggest that Hong Kong, Singapore, Korea, Switzerland, and Malaysia have highly developed stock markets, and Turkey, Greece, Argentina, and Pakistan have underdeveloped markets.

Note that there is a close correspondence between income per capita and stock market development. Poorer countries have lower stock market development than richer countries on average. Also note that there are important exceptions. Fre-

quently, many markets termed emerging—such as Korea, Malaysia, and Thailand—are uniformly ranked higher than markets termed developed—such as France, the Netherlands, Australia, Canada, Sweden, and many other European countries.

III. Which Stock Markets Are Developing Most Rapidly?

Which stock markets are developing most rapidly? To answer this question, we rank countries according to the growth rates of the individual indicators of stock market development.

Growth Rates of Individual Indicators of Stock Market Development

Table 3 presents the average annual growth rates of the individual indicators of stock market development from 1986 to 1993. Here we highlight three points. First, in terms of market size, Indonesia and Turkey boomed over this period, growing at average annual rates of more than 100 percent a year. As a benchmark, market capitalization in the United States grew at 4 percent annually. At the other extreme, Finland, Japan, Germany, Sweden, New Zealand, and Italy saw their market capitalization ratios shrink from 1986 to 1993. Using another measure of market size, Indonesia, Turkey, Portugal, and Thailand saw the number of listed companies grow at an annual rate of over 18 percent.

Second, as measured by total value traded/GDP, Indonesia, Portugal, Turkey, Venezuela, and Greece experienced rapid liquidity growth (more than 200 percent), while Japan and Italy weathered rapid declines (–12 and –14 percent, respectively). As with total value traded/GDP, the turnover measure of liquidity identifies Indonesia as the fastest-growing market in terms of liquidity.

Third, some cross-country quandaries emerge from studying stock market growth. Consider, for example, the cases of Mexico and Portugal. Both countries liberalized their capital markets and privatized public enterprises, and both countries experienced very rapid improvements in international integration (as measured by the APT pricing error). In terms of market volatility, Mexico saw rapid declines in return volatility as it liberalized its economy and privatized state enterprises. In contrast, stock return volatility in Portugal exploded as it liberalized its capital markets and privatized its public enterprises. Another noteworthy difference between the two countries is that while market concentration grew dramatically in Mexico, it shrunk steadily in Portugal.

Growth Rates of Aggregate Indexes of Stock Market Development

Using individual stock market development indicators, we found it difficult to assess which markets experienced the most rapid overall development. Thus, we now evaluate the growth rate of overall indexes of stock market development. In section II, the goal was to compare the level of stock market development across countries. Here, however, we seek to measure the growth rate of each country's level of overall stock market development. Consequently, we now use the growth rate of each country's stock market

indicator. We average these growth rates to compute an overall index of stock market development.

We construct INDEXG1, which aggregates information on market capitalization, total value traded/GDP, and turnover, by computing the average annual growth rate for each indicator for each country. We then take a simple average of the growth rates to obtain an overall index of stock market development for each country. This index allows us to examine the growth rate of each country's overall level of stock market development.

INDEXG2 combines the growth rates of market capitalization, total value traded/GDP, turnover, and the APT pricing-error measure. INDEXG2 includes only countries with APT pricing-error estimates. INDEXG3 is similar to INDEXG2, except that INDEXG3 uses the ICAPM pricing-error estimates instead of the APT pricing-error estimates. Finally, INDEXG4 averages the annual growth rates of market capitalization, total value traded/GDP, turnover, APT pricing error, and market concentration. We compute this index only for the twenty-five countries with data on all five underlying indicators for the period from 1986 to 1993.

Table 4 reports the aggregate indexes of overall stock market growth. The main findings are straightforward. Regardless of the index, Indonesia, Turkey, Portugal, and Venezuela experienced the most rapid overall stock market development over the eight years. Although these countries began the period with underdeveloped markets, other countries with similarly underdeveloped stock markets—such as Colombia, Pakistan, and Zimbabwe—did not enjoy the explosive development experienced by Indonesia, Turkey, Portugal, and Venezuela.

We investigated whether stock markets that were initially underdeveloped grew faster. There is some evidence in support of convergence. Markets that were initially small and illiquid grew faster and became more liquid. Markets that initially were volatile and priced risk poorly tended to grow larger but not necessarily more liquid.

IV. Is Stock Market Development Linked to the Rest of the Financial System?

Do countries with well-developed stock markets have well-developed banks and nonbank financial intermediaries? To address this question, we discuss four types of measures of financial intermediary development: financial system, banks, nonbank financial corporations, and insurance and pension companies. We look at correlations among the indicators. We then construct aggregate indexes of financial intermediary development, which we use to examine the correlation between stock market development and financial intermediary development.

Indicators of Financial Intermediary Development

Here we discuss the size of the financial system, the size and efficiency of the banking system, the size of nonbank financial corporations, and the size of private insurance and private pension funds.

Table 3. *Growth Rates of Indicators of Stock Market Development, 1986–93*

Economy	Market capitalization		Total value traded/GDP		Number of listed companies		Turnover		Volatility		Market concentration		Institutional development		APT pricing error		ICAPM pricing error	
	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
Argentina	3	0.87	8	1.18	41	–0.03	21	0.17	31	0.09	22	0.08	6	0.09	18	0.14	24	0.43
Australia	31	0.02	34	0.08	32	0.00	29	0.06	5	–0.02					8	–0.01	10	0.01
Austria	12	0.37	6	1.48	13	0.06	5	0.91	26	0.04								
Belgium	33	0.00	37	0.01	38	–0.02	3	1.54	8	–0.02								
Brazil	16	0.30	21	0.34	37	–0.01	42	–0.11	24	0.04	21	0.07	14	0.04	5	–0.03	13	0.05
Canada	35	0.00	38	0.01	30	0.01	32	0.05	22	0.03	25	0.09						
Chile	19	0.27	23	0.27	25	0.03	43	–0.11	16	0.01	15	0.02	16	0.03	11	0.00	14	0.06
Colombia	11	0.42	15	0.54	35	–0.01	37	–0.03	35	0.15	18	0.05	10	0.05	17	0.09	23	0.27
Denmark	24	0.06	14	0.55	34	–0.01	13	0.38										
Finland	36	–0.02	28	0.19	23	0.03	18	0.24	27	0.05								
France	23	0.07	32	0.09	16	0.05	30	0.06	33	0.10	19	0.06						
Germany	38	–0.03	24	0.26	26	0.02	15	0.30	2	–0.05	8	–0.02						
Greece	9	0.51	5	2.50	17	0.05	11	0.43	29	0.08	10	0.00	2	0.22	23	0.19	18	0.13
Hong Kong	26	0.06	22	0.31	9	0.09	17	0.25										
India	15	0.32	29	0.16	29	0.02	40	–0.08	32	0.09	12	0.00	17	0.02	4	–0.06	8	0.00
Indonesia	1	1.89	1	17.74	1	0.37	1	1.82					20	–0.06	19	0.14	1	–0.26
Ireland									21	0.03								
Israel	7	0.53	16	0.50	5	0.15	7	0.54	25	0.04								
Italy	41	–0.10	41	–0.14	19	0.05	22	0.16	6	–0.02								
Japan	37	–0.03	40	–0.12	27	0.02	39	–0.07	28	0.06	2	–0.09			3	–0.10	3	–0.07
Jordan	20	0.12	12	0.58	33	0.00	19	0.24	7	–0.02	5	–0.05	12	0.04	24	0.26	20	0.16
Korea, Rep. of	17	0.28	18	0.43	8	0.09	36	–0.01	18	0.01	24	0.09	15	0.03	12	0.03	9	0.01
Luxembourg					6	0.12	2	1.66										
Malaysia	14	0.34	7	1.31	10	0.09	12	0.40	3	–0.05	3	–0.08	19	0.01	14	0.04	5	–0.02
Mexico	10	0.49	11	0.62	22	0.04	34	0.01	1	–0.06	26	0.23	13	0.04	1	–0.15	4	–0.07
Netherlands	32	0.01	31	0.13	21	0.04	4	1.39	12	–0.01								

Japan	37	−0.03	40	−0.12	27	0.02	39	−0.07	28	0.06	2	−0.09			3	−0.10	3	−0.07
Jordan	20	0.12	12	0.58	33	0.00	19	0.24	7	−0.02	5	−0.05	12	0.04	24	0.26	20	0.16
Korea, Rep. of	17	0.28	18	0.43	8	0.09	36	−0.01	18	0.01	24	0.09	15	0.03	12	0.03	9	0.01
Luxembourg					6	0.12	2	1.66										
Malaysia	14	0.34	7	1.31	10	0.09	12	0.40	3	−0.05	3	−0.08	19	0.01	14	0.04	5	−0.02
Mexico	10	0.49	11	0.62	22	0.04	34	0.01	1	−0.06	26	0.23	13	0.04	1	−0.15	4	−0.07
Netherlands	32	0.01	31	0.13	21	0.04	4	1.39	12	−0.01								
New Zealand	40	−0.05	26	0.20	43	−0.11	24	0.10	4	−0.03								
Nigeria	21	0.10	25	0.23	12	0.08	35	−0.01			9	0.00	4	0.11	9	−0.01	15	0.06
Norway	25	0.06	10	0.67	39	−0.03	9	0.45	23	0.03								
Pakistan	18	0.27	19	0.40	11	0.08	41	−0.09	11	−0.01	23	0.08	7	0.09	21	0.16	22	0.25
Philippines	5	0.61	13	0.57	18	0.05	38	−0.06	17	0.01	20	0.07	9	0.06	13	0.04	6	0.00
Portugal	8	0.51	2	3.25	3	0.20	14	0.35	37	0.85	7	−0.03	18	0.02	2	−0.14	2	−0.26
Singapore	29	0.04	20	0.34	15	0.06	10	0.43										
South Africa	28	0.04	30	0.13	20	0.04	27	0.08										
Spain	34	0.00	33	0.09	24	0.03	25	0.10	20	0.03								
Sweden	39	−0.05	39	−0.02	42	−0.05	26	0.09	30	0.08								
Switzerland	22	0.07	35	0.05	14	0.06	16	0.29	19	0.02	17	0.02						
Taiwan (China)					7	0.12	20	0.17	10	−0.02	6	−0.03	8	0.09	16	0.05	17	0.12
Thailand	6	0.57	9	0.76	4	0.18	31	0.05	15	0.01	1	−0.12	11	0.04	22	0.17	16	0.09
Turkey	2	1.02	3	2.87	2	0.23	6	0.65	34	0.13	13	0.01	1	0.29	20	0.14	19	0.14
United Kingdom	30	0.03	27	0.20	40	−0.03	23	0.10	14	0.00	14	0.02			7	−0.02	7	0.00
United States	27	0.04	36	0.04	36	−0.01	33	0.02	9	−0.02	16	0.02			6	−0.02	11	0.01
Venezuela	4	0.66	4	2.77	31	0.01	8	0.48	36	0.27	11	0.00	3	0.17	15	0.04	21	0.24
Zimbabwe	13	0.35	17	0.45	28	0.02	28	0.06	13	0.00	4	−0.07	5	0.11	10	−0.01	12	0.04
Average		0.27		1.02		0.05		0.31		0.05		0.02		0.07		0.04		0.06
Number of economies	41		41		43		43		37		26		20		24		24	

Note: Growth rates are the average annual growth rates. Definitions of the indicators are given in table 1. For each indicator, economies are ranked by the rate of growth of stock market development, from high to low. Thus, for market capitalization, total value traded/GDP, number of listed companies, turnover, and institutional development, the ranking by value of the indicator is from high to low. For volatility, market concentration, APT pricing error, and ICAPM pricing error, the ranking by value of the indicator is from low to high.

Source: Authors' calculations.

Table 4. *Growth Rates of Aggregate Indexes of Stock Market Development, 1986–93*

	INDEXG1		INDEXG2		INDEXG3		INDEXG4	
Economy	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*
Argentina	7	0.74	6	0.52	7	0.45	5	0.54
Australia	36	0.05	21	0.04	21	0.04		
Austria	6	0.92						
Belgium	10	0.52						
Brazil	24	0.18	15	0.14	15	0.12	16	0.12
Canada	38	0.02					24	–0.01
Chile	26	0.14	18	0.11	17	0.09	17	0.10
Colombia	18	0.31	12	0.21	14	0.17	12	0.22
Denmark	16	0.33						
Finland	28	0.14						
France	34	0.07					22	0.04
Germany	25	0.17					14	0.14
Greece	5	1.15	5	0.81	5	0.83	4	0.86
Hong Kong	22	0.20						
India	29	0.14	16	0.12	16	0.10	18	0.10
Indonesia	1	7.15	1	5.33	1	5.43		
Israel	9	0.52						
Italy	40	–0.03						
Japan	41	–0.07	23	–0.03	23	–0.04	25	–0.03
Jordan	17	0.31	13	0.17	12	0.19	9	0.25
Korea, Rep. of	21	0.23	14	0.17	13	0.17	13	0.15
Malaysia	8	0.68	7	0.50	6	0.52	6	0.53
Mexico	14	0.37	8	0.32	9	0.30	11	0.22
Netherlands	11	0.51						
New Zealand	33	0.09						
Nigeria	31	0.11	20	0.08	20	0.06	20	0.08
Norway	13	0.39						
Pakistan	23	0.20	17	0.11	18	0.08	15	0.13
Philippines	15	0.37	10	0.27	10	0.28	8	0.26
Portugal	3	1.37	3	1.06	3	1.09	2	1.04
Singapore	20	0.27						
South Africa	32	0.09						
Spain	35	0.06						
Sweden	39	0.01						
Switzerland	27	0.14					19	0.10
Thailand	12	0.46	9	0.30	8	0.32	7	0.37
Turkey	2	1.51	2	1.10	2	1.10	1	1.13
United Kingdom	30	0.11	19	0.09	19	0.08	21	0.08
United States	37	0.03	22	0.03	22	0.02	23	0.02
Venezuela	4	1.30	4	0.97	4	0.92	3	0.98
Zimbabwe	19	0.29	11	0.22	11	0.21	10	0.23
Average		0.53		0.55		0.54		0.31
Number of economies	41		23		23		25	

Note: Growth rates of indexes are obtained by averaging the growth rates of different stock market indicators, depending on the index. Indexes are defined in table 2. The ranking, by growth rate of each index, is from high to low.

Source: Authors' calculations.

FINANCIAL SYSTEM. On the basis of work by King and Levine (1993), we use three measures of financial system development. The ratio of liquid liabilities of the financial intermediaries to GDP is M3 money supply divided by GDP. The ratio is a measure of the overall size of the formal financial system. If the size of the financial system is positively related to the provision of financial services, then this ratio should be a good indicator of the provision of financial intermediary services.

The ratio of quasi-liquid liabilities to GDP is M3 money supply minus M1, divided by GDP. It subtracts narrow money from the liquid liabilities measure of financial intermediary size. Analysts sometimes use the quasi-liquid measure instead of liquid liabilities because M1/GDP represents highly liquid bank deposits and therefore may not be as closely associated with efficient financial intermediation as longer-term investments in financial intermediaries. The quasi-liquid measure focuses on longer-term liabilities.

Liquid and quasi-liquid liabilities that finance government deficits may not reflect the provision of efficient financial intermediary services (such as acquiring information about firms, monitoring managers, and facilitating transactions and risk diversification). Therefore, we compute a third variable, domestic credit to private firms divided by GDP. Unfortunately, although IMF (various issues) classifies credit as "claims on the private sector," some of these claims in some countries include credit to public enterprises.

Table 5 indicates that Hong Kong, Japan, and Switzerland had well-developed financial systems as measured by liquid and quasi-liquid liabilities to GDP and domestic credit to private firms. In contrast, Argentina, Brazil, Mexico, Colombia, and Nigeria had underdeveloped financial systems as revealed by these three indicators.

BANKS. To measure the level of development of the banking system, we use the ratio of the total claims of deposit money banks to GDP. The three countries with the largest values for this indicator were Switzerland, Luxembourg, and Japan. At the other extreme, Nigeria, Argentina, and Venezuela had the lowest ratio of bank credit to GDP during the period from 1986 to 1993.

We compute a measure of banking efficiency, which we call spread, that equals the difference between bank lending and borrowing rates. This measure may not accurately capture banking efficiency because the interest rate data may not accurately reflect borrowing and lending costs. The spread indicator will not provide accurate information on how well banks monitor firm managers, nor will it capture government intervention in the banking system in a very informative way. But the spread indicator is widely used and available across countries. We include it for completeness. For better measures of financial repression for a few select countries see Giovannini and De Melo (1993). According to the spread indicator, the banking systems of Switzerland, Canada, and the United Kingdom were among the most efficient, whereas Argentina, Israel, and Turkey had the least efficient banks.

lopment,

INDEXG4	
Rank	*Value*
5	0.54
16	0.12
24	−0.01
17	0.10
12	0.22
22	0.04
14	0.14
4	0.86
18	0.10
25	−0.03
9	0.25
13	0.15
6	0.53
11	0.22
20	0.08
15	0.13
8	0.26
2	1.04
19	0.10
7	0.37
1	1.13
21	0.08
23	0.02
3	0.98
10	0.23
	0.31
25	

stock market
h rate of each

Table 5. *Indicators of Financial Intermediary Development, 1986–93*
(annual average)

	Liquid liabilities to GDP[a]		*Quasi-liquid liabilities to GDP*[b]		*Domestic credit to private sector to GDP*		*Total claims of deposit banks to GDP*		*Spread*[c]		*Assets of private nonbank financial corporations to GDP*		*Assets of private insurance and pension funds to GDP*	
Economy	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*
Argentina	44	0.23	41	0.15	39	0.26	41	0.37	38	45.28				
Australia	24	1.13	19	0.89	16	1.07	22	1.19	28	6.28	5	0.45	8	0.35
Austria	9	1.72	7	1.44	11	1.36	4	2.39						
Belgium	31	0.94	33	0.55	29	0.61	20	1.20	26	5.70				
Brazil	43	0.26	42	0.14	38	0.29	36	0.51						
Canada	21	1.27	14	0.97	24	0.86	28	0.93	2	1.38	6	0.42	6	0.48
Chile	36	0.72	28	0.61	22	0.93	29	0.90	30	6.96				
Colombia	41	0.47	38	0.28	40	0.25			33	9.70	21	0.06	18	0.03
Denmark	23	1.19	27	0.62	21	0.98	21	1.20	23	5.35	15	0.12	5	0.54
Finland	25	1.10	21	0.82	8	1.60	14	1.60	12	3.55	12	0.21	9	0.33
France	16	1.36	20	0.87	6	1.77	8	2.00	34	10.57	10	0.28	11	0.20
Germany	17	1.34	15	0.94	5	1.80	5	2.16	22	5.15			10	0.33
Greece	12	1.54	9	1.21	33	0.45	27	0.95	31	7.19				
Hong Kong	1	3.91	1	3.53										
India	33	0.87	31	0.57	32	0.51	33	0.68	8	3.00				
Indonesia	37	0.65	35	0.44	28	0.66	34	0.65	16	4.23	22	0.02		
Ireland	32	0.88	26	0.64	31	0.52	30	0.87	21	5.10				
Israel	20	1.30	10	1.19	17	1.01	7	2.07	37	20.95				
Italy	13	1.47	23	0.75	27	0.71	24	1.01	32	7.34	9	0.33	17	0.06
Japan	2	3.57	2	3.00	2	2.27	3	2.58	11	3.31			7	0.43
Jordan	4	2.40	8	1.41	15	1.24	16	1.52	24	5.56	17	0.08	16	0.07
Korea, Rep. of	29	0.96	22	0.78	19	0.99	25	1.00	6	2.90	3	0.55	12	0.14
Luxembourg	6	2.36					2	2.59	4	2.31				
Malaysia	8	1.89	5	1.51	12	1.33	13	1.61	5	2.68	8	0.39	14	0.10
Mexico	42	0.42	37	0.29	37	0.29	38	0.48	35	13.76	18	0.08	19	0.02
Netherlands	10	1.61	11	1.16	9	1.53	9	1.97	29	6.92	25	0.00	1	1.08
New Zealand	27	1.03	29	0.61	23	0.92	23	1.10	17	4.49				
Nigeria	40	0.48	40	0.23	42	0.24	42	0.33	19	4.60	19	0.08		

Italy	13	1.47	23	0.75	27	0.71	24	1.01	32	7.34	9	0.33	17	0.06
Japan	2	3.57	2	3.00	2	2.27	3	2.58	11	3.31			7	0.43
Jordan	4	2.40	8	1.41	15	1.24	16	1.52	24	5.56	17	0.08	16	0.07
Korea, Rep. of	29	0.96	22	0.78	19	0.99	25	1.00	6	2.90	3	0.55	12	0.14
Luxembourg	6	2.36					2	2.59	4	2.31				
Malaysia	8	1.89	5	1.51	12	1.33	13	1.61	5	2.68	8	0.39	14	0.10
Mexico	42	0.42	37	0.29	37	0.29	38	0.48	35	13.76	18	0.08	19	0.02
Netherlands	10	1.61	11	1.16	9	1.53	9	1.97	29	6.92	25	0.00	1	1.08
New Zealand	27	1.03	29	0.61	23	0.92	23	1.10	17	4.49				
Nigeria	40	0.48	40	0.23	42	0.24	42	0.33	19	4.60	19	0.08		
Norway	22	1.26	30	0.61	14	1.27	15	1.57	15	4.21				
Pakistan	35	0.79	39	0.25	30	0.55	32	0.70			23	0.01	22	0.00
Philippines	38	0.63	34	0.48	36	0.34	37	0.48	20	5.04	20	0.07	20	0.01
Portugal	14	1.47	16	0.93	25	0.84	17	1.49	27	5.96				
Singapore	7	2.26	4	1.80	7	1.64	12	1.87	9	3.02	2	0.84	13	0.11
South Africa	26	1.06	24	0.72	26	0.74	31	0.78	10	3.20				
Spain	15	1.44	18	0.90	13	1.31	11	1.89	18	4.59	11	0.24	15	0.08
Sweden	30	0.96			20	0.98	18	1.41	25	5.68	1	0.89	4	0.56
Switzerland	3	2.83	3	2.26	1	3.14	1	3.26	1	0.87				
Taiwan (China)	5	2.38	6	1.49	4	1.80	6	2.10						
Thailand	19	1.31	12	1.12	18	0.99	19	1.23	13	3.60	13	0.15	21	0.01
Turkey	39	0.61	36	0.41	35	0.36	35	0.54	36	19.50	24	0.01		
United Kingdom	11	1.59	17	0.92	3	1.97	10	1.97	3	1.82	16	0.08	2	0.92
United States	18	1.33	13	0.99	10	1.42	26	0.99	7	3.00	4	0.53	3	0.67
Venezuela	34	0.80	32	0.55	34	0.40	40	0.45			7	0.40		
Zimbabwe	28	0.96	25	0.70	41	0.24	39	0.45	14	3.90	14	0.13		
Average		1.33		0.95		1.01		1.31		6.81		0.26		0.30
Number of economies	44		42		42		42		38		25		22	

Note: The financial intermediary development of each economy is ranked from high to low. This ranking is shown by ranking the value of the indicator from high to low for liquid liabilities to GDP, quasi-liquid liabilities to GDP, domestic credit to private sector to GDP, total claims of deposit banks to GDP, assets of private nonbanks to GDP, and assets of private insurance and pension funds to GDP; for spread, the ranking by value of the indicator is from low to high.

a. Liquid liabilities of the financial system are the M3 definition of money.

b. Quasi-liquid liabilities are M3 minus M1 money.

c. The spread is the difference between bank lending and borrowing rates.

Source: Authors' calculations.

NONBANK FINANCIAL CORPORATIONS. We use the ratio of assets of private nonbank financial intermediaries to GDP to measure the size of nonbank financial corporations, such as finance companies, mutual funds, and brokerage houses. The four economies with the largest values for this indicator were Sweden, Singapore, Korea, and the United States. Indonesia, Pakistan, Turkey, and the Netherlands had very low values.[5]

INSURANCE AND PENSION COMPANIES. Finally, we use the ratio of assets of private insurance companies and pension funds to GDP to measure the size of private insurance and pension companies. The three countries with the largest values for this indicator were the Netherlands, the United Kingdom, and the United States. The Philippines, Thailand, and Pakistan had very low values.

Correlations between Various Indicators of Financial Intermediary Development

The measures of financial system size—the liquid, quasi-liquid, and domestic credit to private firms indicators—are very highly correlated. The correlation coefficients are 0.79 or higher and significant at the 0.01 level. The correlations between the indicators of the size of the financial system and indicators of the size of banks, private nonbank financial corporations, and private insurance and pension companies are not as strong. Although all of the correlations are positive, many are not significant. Furthermore, the correlation coefficient of those that are significant is frequently below 0.50.

The different financial intermediary indicators give different country rankings of financial intermediary development. These differences reflect financial structures across countries, that is, different combinations of financial intermediaries and financial markets that compose a country's financial system. Differences in financial structure may reflect legal differences. For example, countries with universal banking, as distinct from the more segregated legal and regulatory impediments of the United States, may develop different combinations of financial intermediaries. The overall size of the financial system across countries with different financial structures, however, may be similar, as may be the provision of financial services to investors. For example, countries with big financial systems have big banks and nonbank financial corporations, but the correlation between financial system size and private insurance and pension companies is not strong.

Aggregate Indexes of Financial Intermediary Development

Because we want to compare an overall measure of financial intermediary development with our aggregate indicators of stock market development, we construct conglomerate indexes of financial intermediary development. Using

5. We collected data on private nonbank financial corporations, insurance companies, and pension funds from individual country reports, including documents published by ministries of finance, central banks, and regulatory agencies.

the same procedure for constructing conglomerate indexes discussed above, this section constructs three financial intermediary indexes. FINDEX1 averages the means-removed values of the ratio of liquid liabilities to GDP and the ratio of domestic credit to the private sector to GDP. FINDEX2 averages the means-removed values of the ratio of liquid liabilities to GDP, the ratio of domestic credit to the private sector to GDP, the ratio of assets of private nonbank financial corporations to GDP, and the ratio of assets of private insurance and pension funds to GDP. FINDEX3 combines the means-removed values of the ratio of total claims of deposit banks to GDP, the ratio of assets of private nonbank financial corporations to GDP, and the ratio of assets of private insurance and pension funds to GDP. Table 6 provides the country rankings and the values of these indexes from 1986 to 1993. The aggregate indexes of financial intermediary development are highly correlated, with correlation coefficients above 0.73 and *P*-values less than 0.01.

The results in table 6 on FINDEX3—which aggregates information on banks, private nonbank financial corporations, and private insurance companies and pension funds—suggest that the top five economies with the most developed financial intermediaries were Switzerland, Sweden, Luxembourg, Australia, and Singapore. The five countries with the least developed financial intermediaries were Colombia, Pakistan, the Philippines, Turkey, and Mexico. We prefer FINDEX3 to the other financial intermediary indexes because it combines information on particular financial intermediaries: banks, nonbank financial corporations, and insurance companies and pension funds. The other aggregate indexes mix information on particular intermediaries with information on liabilities that span across different types of intermediaries.

Stock Market Development and Financial Intermediary Development

Do countries with well-developed stock markets have well-developed banks and nonbank financial intermediaries? Table 7 presents the correlations between individual indicators of stock market development and individual indicators of financial intermediary development. Here we highlight three points.

First, stock market size (market capitalization) and liquidity (as measured by total value traded/GDP) are positively correlated with all of the indicators of financial intermediary development. They are significantly correlated with all of the indicators of financial intermediary development except the ratio of the assets of private insurance and pension companies to GDP. Second, volatility is significantly negatively correlated with all the indicators of financial intermediary development except the ratio of assets of private nonbank financial corporations to GDP. Thus, countries with well-developed financial intermediaries, large banks, and large private insurance companies and pension funds tend to have less volatile stock markets. Third, APT and ICAPM pricing errors are negatively correlated with indicators of financial intermediary development. Countries with stock markets that are internationally integrated tend to have larger financial systems and banks than countries with less internationally integrated markets.

Table 6. *Aggregate Indexes of Financial Intermediaries, 1986–93*

	FINDEX1[a]		FINDEX2[b]		FINDEX3[c]	
Economy	*Rank*	*Value*	*Rank*	*Value*	*Rank*	*Value*
Argentina	42	–0.79			37	–0.72
Australia	11	0.23			4	0.75
Austria	20	–0.12	7	0.23	12	0.34
Belgium	29	–0.35			23	–0.06
Brazil	41	–0.75			34	–0.58
Canada	17	–0.06	6	0.27	13	0.32
Chile	28	–0.29			28	–0.32
Colombia	40	–0.72	20	–0.78	43	–0.82
Denmark	21	–0.12	12	–0.02	19	0.01
Finland	13	0.12	10	0.03	20	0.01
France	8	0.31	9	0.09	18	0.06
Germany	9	0.30			14	0.31
Greece	26	–0.23			27	–0.30
India	30	–0.44			33	–0.48
Indonesia	32	–0.46			36	–0.72
Ireland	31	–0.45			29	–0.36
Israel	19	–0.07			10	0.54
Italy	22	–0.13	15	–0.17	26	–0.23
Japan	2	1.31			7	0.62
Jordan	6	0.42	14	–0.16	31	–0.45
Korea, Rep. of	24	–0.21	11	0.02	17	0.08
Luxembourg					3	0.94
Malaysia	10	0.29	8	0.10	21	0.00
Mexico	39	–0.71	19	–0.77	39	–0.77
Netherlands	7	0.34	4	0.53	6	0.65
New Zealand	23	–0.20			25	–0.19
Nigeria	38	–0.71			38	–0.72
Norway	15	0.03			15	0.16
Pakistan	33	–0.46	17	–0.72	42	–0.81
Philippines	37	–0.61	18	–0.73	41	–0.78
Portugal	18	–0.06			16	0.11
Singapore	4	0.56	1	0.70	5	0.68
South Africa	27	–0.23			30	–0.39
Spain	14	0.11	13	–0.15	24	–0.14
Sweden	25	–0.21	2	0.67	2	1.04
Switzerland	1	1.45			1	1.39
Taiwan (China)	3	0.64			11	0.51
Thailand	16	–0.02	16	–0.36	32	–0.48
Turkey	36	–0.59			40	–0.78
United Kingdom	5	0.45	5	0.53	9	0.55
United States	12	0.14	3	0.59	8	0.60
Venezuela	35	–0.52			22	–0.06
Zimbabwe	34	–0.52			35	–0.59
Average		–0.08		–0.00		–0.02
Number of economies	42		20		43	

Note: Details of the calculation of the indexes are discussed in the text. The ranking order, by growth rate of each index, is from high to low.

a. FINDEX1 is the average of the ratio of liquid liabilities (M3 money) to GDP and the ratio of domestic credit to the private sector to GDP.

b. FINDEX2 is the average of the ratio of liquid liabilities (M3 money) to GDP, the ratio of domestic credit to the private sector to GDP, the ratio of the assets of private nonbank institutions to GDP, and the ratio of assets of private insurance and pension funds to GDP.

c. FINDEX3 is the average of the ratio of total claims of deposit banks to GDP, the ratio of the assets of private nonbank institutions to GDP, and the ratio of the assets of private insurance and pension funds to GDP. FINDEX3 does not include the last two terms if data are not available.

Source: Authors' calculations.

Table 7. *Correlations between Indicators of Financial Intermediary and Stock Market Development, 1986–93*

	Financial intermediary indicator					
Stock market indicator	*Liquid liabilities to GDP*[a]	*Total claims of deposit banks to GDP*	*Domestic credit to private sector to GDP*	*Quasi-liquid liabilities to GDP*[b]	*Assets of private nonbanks to GDP*	*Assets of private insurance and pension funds to GDP*
Market capitalization						
Correlation	0.66	0.40	0.52	0.67	0.47	0.29
	[0.00]	[0.01]	[0.00]	[0.00]	[0.02]	[0.20]
Number of observations	41	40	40	40	25	22
Total value traded/GDP						
Correlation	0.75	0.58	0.70	0.78	0.46	0.33
	[0.00]	[0.00]	[0.00]	[0.00]	[0.02]	[0.14]
Number of observations	41	40	40	40	25	22
Turnover						
Correlation	0.18	0.42	0.38	0.22	0.27	0.11
	[0.25]	[0.01]	[0.01]	[0.16]	[0.20]	[0.61]
Number of observations	41	40	40	40	25	22
APT pricing error						
Correlation	−0.49	−0.48	−0.54	−0.45	−0.06	−0.40
	[0.01]	[0.02]	[0.01]	[0.03]	[0.84]	[0.20]
Number of observations	24	24	24	24	16	12
ICAPM pricing error						
Correlation	−0.51	−0.47	−0.55	−0.46	−0.23	−0.38
	[0.01]	[0.02]	[0.01]	[0.02]	[0.39]	[0.22]
Number of observations	24	24	24	24	16	12
Volatility						
Correlation	−0.41	−0.42	−0.40	−0.37	−0.12	−0.52
	[0.01]	[0.01]	[0.01]	[0.03]	[0.60]	[0.02]
Number of observations	37	37	37	36	21	20
Market concentration						
Correlation	−0.24	−0.28	−0.32	−0.24	−0.42	−0.56
	[0.24]	[0.16]	[0.11]	[0.23]	[0.11]	[0.04]
Number of observations	26	26	26	26	16	14
Institutional development						
Correlation	−0.05	0.21	0.26	0.04	0.42	0.51
	[0.84]	[0.37]	[0.27]	[0.86]	[0.15]	[0.20]
Number of observations	20	20	20	20	13	8

Note: *P*-values are in brackets. Indicators of stock market development are defined in table 1.
a. Liquid liabilities are the M3 definition of money.
b. Quasi-liquid liabilities are M3 minus M1 money.
Source: Authors' calculations.

Table 8. *Correlations between Aggregate Indexes of Financial Intermediary and Stock Market Development, 1986–93*

	Stock market index			
Financial intermediary index	*INDEX1*	*INDEX2*	*INDEX3*	*INDEX4*
FINDEX1				
Correlation	0.72	0.83	0.84	0.81
	[0.00]	[0.00]	[0.00]	[0.00]
Number of observations	40	23	23	21
FINDEX2				
Correlation	0.67	0.89	0.89	0.92
	[0.00]	[0.00]	[0.00]	[0.00]
Number of observations	20	11	11	10
FINDEX3				
Correlation	0.62	0.79	0.79	0.80
	[0.00]	[0.00]	[0.00]	[0.00]
Number of observations	40	23	23	21

Note: *P*-values are in brackets. The stock market indexes are defined in table 2, and the financial intermediary indexes are defined in table 6. Details of the calculation of the indexes are discussed in the text.

Source: Authors' calculations.

Using the conglomerate indexes of stock market development and the conglomerate indexes of financial intermediary development, the strong positive correlation between stock market development and financial intermediary development emerges even more strongly. As shown in table 8, the aggregate indexes of stock market development are all significantly correlated with the aggregate indexes of financial intermediary development at the 0.01 level.

Furthermore, measures of stock market pricing errors, as represented by APT and ICAPM, are positively correlated with banking inefficiency as measured by the interest rate spread (table 9). Stock market development (including measures of pricing errors) and financial intermediary development (including measures of banking efficiency) go hand in hand. These results are consistent with Boyd and Smith's (1996) model, where there is a role for both banking and equity markets as economies develop. Thus, with increases in per capita income and wealth, stock markets emerge and complement (but not replace) bank lending. As economies develop, their financial systems display a wide array of institutions and markets.

V. Summary

This article collected and summarized information on a wide assortment of indicators of stock market and financial intermediary development. To describe different characteristics of equity market development, we used measures of stock market size, liquidity, integration with world capital markets, volatility,

Table 9. *Correlations between Stock Market Pricing Errors and Financial Intermediary Inefficiency, 1986–93*

Indicator	*Spread*[a]	*APT pricing error*	*ICAPM pricing error*
Spread			
Correlation	1.00	0.20	0.81
	[0.00]	[0.39]	[0.00]
Number of observations	39	21	21
APT pricing error			
Correlation		1.00	0.68
		[0.00]	[0.00]
Number of observations		24	24
ICAPM pricing error			
Correlation			1.00
			[0.00]
Number of observations			24

Note: *P*-values are in brackets.
a. The spread is the difference between bank lending and borrowing rates.
Source: Authors' calculations.

concentration, and features of the regulatory system. To describe the development and structure of financial intermediaries, we used measures of the overall size of the financial intermediary sector, the allocation of credit, the spread between borrowing and lending interest rates, and the size of particular types of financial intermediaries, such as banks, insurance companies, and pension funds. No single measure is the correct measure of stock market or financial intermediary development. Indeed, each indicator may be the appropriate measure for a particular question. Consequently, this article's major contribution is the collection and comparison of a wide variety of indicators. The article constructs aggregate indexes of stock market and financial intermediary development that combine the information reflected in several individual indicators.

There are enormous cross-country differences for each indicator of stock market development. For example, the ratio of market capitalization to GDP is greater than 1 in five countries and less than 0.10 in five countries. Even so, there are intuitively appealing correlations among the individual stock market indicators and between the stock market indicators and measures of financial intermediary development. Big markets, for example, tend to be less volatile, more liquid, and less concentrated in a few stocks; internationally integrated markets tend to be less volatile; and institutionally developed markets tend to be large and liquid. Moreover, we find that across countries the level of stock market development is highly correlated with the development of banks, nonbank financial corporations, and insurance companies and private pension funds.

When we compute conglomerate indexes of overall stock market development, plausible and educational patterns emerge. We find that the three most

developed markets are Japan, the United States, and the United Kingdom. The most underdeveloped markets are Colombia, Venezuela, Nigeria, and Zimbabwe. The data suggest that Korea, Switzerland, and Malaysia have highly developed stock markets, while Turkey, Greece, Argentina, and Pakistan have underdeveloped markets. Furthermore, although richer countries generally have more developed stock markets than poorer countries, many markets labeled emerging—such as Korea, Malaysia, and Thailand—are systematically more developed than markets labeled developed—such as France, the Netherlands, Australia, Canada, Sweden, and Norway.

During the period from 1986 to 1993, some markets exhibit very rapid development in terms of size, liquidity, and international integration. Indonesia, Turkey, Portugal, and Venezuela have experienced explosive development. Future case studies into the underlying causes of and the economic consequences of this rapid development could yield valuable insights.

In this article, the goal has not been to test specific hypotheses rigorously. Rather, our objectives have been to compile and compare different indicators of stock market development, highlight some important correlations, and, most important, stimulate future research into the links between stock market development and economic development.

Appendix. The Cross-Country Comparability of Stock Market Data

The IFC began calculating emerging market indexes in 1981. IFC selects stocks for inclusion in the indexes on the basis of three criteria: size, liquidity, and industry. The indexes include the largest and most actively traded stocks in each market, targeting 60 percent of total market capitalization at the end of each year. The index targets 60 percent of trading volume during the year. Size is measured by market capitalization, and liquidity is measured by the total value of shares traded during the year. Selection criteria used by Morgan Stanley Capital International (MSCI) in creating industrial country stock indexes are comparable to those of the IFC. In constructing the MSCI indexes, 60 percent coverage of the total market capitalization of each market is the primary objective. In contrast to the IFC indexes, MSCI indexes have no secondary objective regarding volume of trading. Instead, they try to replicate the industrial composition of the local market and take a representative sample of large, medium, and small capitalization stocks. MSCI uses liquidity as a consideration in choosing among the medium and small capitalization stocks.

The IFC indexes represent value-weighted portfolios of the stocks in each market. Each stock is weighted by its market capitalization in the same way in which the MSCI country indexes are formed, using the chained Paasche method.

Most of the stock market indicators compiled in this study are constructed using complete market information, and are fully comparable. For example, the market capitalization ratio is the value of all listed shares in the stock exchange divided by GDP in all countries. This is true for all our indicators except the

volatility and asset pricing indicators, which use index information or individual stock prices for those indicators included in the indexes. For volatility and asset pricing, differences in constructing MSCI and IFC indexes may introduce a bias. However, as discussed above, the magnitude of this bias is likely to be small, and MSCI and IFC indexes have been used in cross-country empirical studies in the literature (see for example Bekaert and Harvey 1995 and De Santis 1993).[6]

6. This appendix is mostly based on IFC (1993) and Schmidt (1990).

References

The word "processed" describes informally reproduced works that may not be commonly available through library systems.

Bekaert, Geert, and Campbell Harvey. 1995. "Time-Varying World Market Integration." *Journal of Finance* 50(2):403–44.

Bencivenga, Valerie R., Bruce D. Smith, and Ross M. Starr. 1996. "Equity Markets, Transactions Costs, and Capital Accumulation: An Illustration." *The World Bank Economic Review* 10(2):241–65.

Bonser-Neal, Catherine, Greggory Brauer, Robert Neal, and Simon Wheatley. 1990. "International Investment Restrictions and Closed-End Country Fund Prices." *Journal of Finance* 45(2):523–47.

Boyd, John, and Bruce Smith. 1996. "The Coevolution of the Real and Financial Sectors in the Growth Process." *The World Bank Economic Review* 10(2):371–96.

Cho, D. C., C. S. Eun, and L. W. Senbet. 1986. "International Arbitrage Pricing Theory: An Empirical Investigation." *Journal of Finance* 41(2, June):313–29.

Claessens, Stijn, Susmita Dasgupta, and Jack Glen. 1995. "Return Behavior in Emerging Stock Markets." *The World Bank Economic Review* 9(1):131–52.

DeLong, J. B., Andrei Shleifer, Lawrence Summers, and R. J. Waldmann. 1989. "The Size and Incidence of the Losses from Noise Trading." *Journal of Finance* 44(3):681–96.

Demirgüç-Kunt, Aslı, and Ross Levine. 1995. "Stock Market Development and Financial Intermediaries: Stylized Facts." Working Paper No. 1462. World Bank, Policy Research Department, Washington, D.C. Processed.

Demirgüç-Kunt, Aslı, and Vojislav Maksimovic. 1996. "Stock Market Development and Financing Choices of Firms." *The World Bank Economic Review* 10(2):341–69.

De Santis, Giorgio. 1993. "Asset Pricing and Portfolio Diversification: Evidence from Emerging Financial Markets." In Stijn Claessens and Sudarshan Gooptu, eds., *Portfolio Investment in Developing Countries*. World Bank Discussion Paper 228. Washington, D.C.

Devereux, Michael B., and Gregor W. Smith. 1994. "International Risk Sharing and Economic Growth." *International Economic Review* 35(4):535–50.

Errunza, Vihang, and Etienne Losq. 1985a. "The Behavior of Stock Prices on LDC Markets." *Journal of Banking and Finance* 9:561–75.

———. 1985b. "International Asset Pricing under Mild Segmentation: Theory and Test." *Journal of Finance* 40(1, March):105–24.

———. 1989. "Capital Flow Controls, International Asset Pricing and Investors' Welfare: A Multi-Country Framework." *Journal of Finance* 44(1):1025–38.

Errunza, Vihang, and Lemma Senbet. 1981. "The Effects of International Operations on the Market Value of the Firm: Theory and Evidence," *Journal of Finance* 36(May):401–17.

Errunza, Vihang, Etienne Losq, and Prasad Padmanabhan. 1992. "Tests of Integration, Mild Segmentation and Segmentation Hypotheses." *Journal of Banking and Finance* 16(5):949–72.

Giovannini, Alberto, and Martha De Melo. 1993. "Government Revenue from Financial Repression." *American Economic Review* 4(September):953–63.

Gultekin, Mustafa N., N. Bulent Gultekin, and Alessandro Penati. 1989. "Capital Controls and International Capital Market Segmentation: The Evidence from the Japanese and American Stock Markets." *Journal of Finance* 44(**September**):849–69.

Harvey, Campbell R. 1995. "The Risk Exposure of Emerging Equity Markets." *The World Bank Economic Review* 9(1):19–50.

IFC (International Finance Corporation). 1993. *IFC Index Methodology*. Washington, D.C.

IMF (International Monetary Fund). Various issues. *International Financial Statistics*. Washington, D.C.

Jorion, Philippe, and Eduardo Schwartz. 1986. "Integration vs. Segmentation in the Canadian Stock Market." *Journal of Finance* 41(3):603–12.

King, Robert G., and Ross Levine. 1993. "Finance and Growth: Schumpeter Might Be Right." *Quarterly Journal of Economics* 108(3):717–38.

Korajczyk, Robert A. 1994. "Measuring Integration of Developed and Emerging Stock Markets." Northwestern University, Department of Finance, Evanston, Ill. Processed.

———. 1996. "A Measure of Stock Market Integration for Developed and Emerging Markets." *The World Bank Economic Review* 10(2):267–89.

Korajczyk, Robert A., and Claude J. Viallet. 1989. "An Empirical Investigation of International Asset Pricing." *Review of Financial Studies* 2(4):553–85.

Levine, Ross. 1991. "Stock Markets, Growth, and Tax Policy." *Journal of Finance* 46(4):1445–65.

Levine, Ross, and Sara Zervos. 1996. "Stock Market Development and Long-Run Growth." *The World Bank Economic Review* 10(2):323–39.

Obstfeld, Maurice. 1994. "Risk-Taking, Global Diversification, and Growth." *American Economic Review* 85(5, December):1310–29.

Pagano, Marco. 1993. "The Flotation of Companies on the Stock Market: A Coordination Failure Model." *European Economic Review* 37:1101–25.

Schmidt, Dana. 1990. *Morgan Stanley Capital International (MSCI) Indices*. New York: Morgan Stanley.

Schwert, G. William. 1989. "Why Does Stock Market Volatility Change over Time?" *Journal of Finance* 44(5):1115–53.

Shiller, Robert J. 1981. "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *American Economic Review* 71:421–36.

Solnik, B. H. 1974. "The International Pricing of Risk: An Empirical Investigation of the World Capital Market Structure." *Journal of Finance* 29:365–78.

Stehle, Richard. 1977. "An Empirical Test of the Alternative Hypothesis of National and International Pricing of Risky Assets." *Journal of Finance* 32(2):493–502.

Wheatley, Simon. 1988. "Some Tests of International Equity Market Integration." *Journal of Financial Economics* 21:177–213.