Financial development and stock market performance

Harris Dellas
Department of Economics
University of Bern

Martin K. Hess
Studienzentrum Gerzensee
and
Department of Economics
University of Bern

January 3, 2001

Abstract

The level of financial development is an important determinant of the performance of capital markets. We examine stock returns in a cross section of emerging and mature markets (49 countries) over 1980-99. Returns in financially underdeveloped countries have been somewhat lower, but significantly more volatile and less closely linked to -and influenced by- world stock returns. This implies that the stock markets of financially underdeveloped countries may have contributed to higher global risk diversification but not to higher returns. Two features seem responsible for these patterns: Higher transaction costs and greater legal (political) uncertainty.

The distribution of stock returns in less and more developed capital markets differs markedly. In particular, emerging markets seem to exhibit higher average returns and volatility (Bekaert and Harvey, 1995, 1997) and lower correlation with world equity markets (Rouwenhorst, 1999).

Identifying the sources of such cross country differences remains an important challenge. The existing literature has been more concerned about the determinants of cross country differences in stock return performance *within* a type of market (emerging, mature) rather than across different types. For instance, Bekaert and Harvey, 1997, examine several -mostly macroeconomic- potential determinants of equity market volatility across twenty emerging markets. Similarly, Erb, Harvey and Viskanta, 1996, relate expected returns in emerging markets to political, economic and financial risks as well as to stock price fundamentals. And so on.

In the present paper we attempt to explain the cross sectional distribution of stock returns (mean, variance and covariance with the world) in a group of emerging and mature markets. In particular, we investigate whether the observed cross-country differences in the moments of returns can be accounted for by an obvious but so far overlooked candidate, namely the level of financial development[1]. This choice is motivated by the observation that the behavior of assets returns depends on the properties of the financial markets in two distinct ways. First, asset returns depend on how well the financial system carries out its main functions: the facilitation of the trading, hedging and diversification of risk, the provision of liquidity, the monitoring of managers and exertion of corporate control, etc. For instance, shortage of liquidity may exaggerate asset price movements. A segregated national capital market may experience smaller comovements with world markets. Higher transaction costs may require a higher gross rate of return. And so on. And second, financial markets affect asset prices through their effects on macroeconomic fundamentals (growth, volatility). There seems to exist a broad consensus in the recent literature that less financially developed systems contribute to greater output and consumption volatility and to lower economic growth (Aghion, Banerjee and Piketty, 1999, Bernanke and Gertler, 1990, Greenwald and Stiglitz, 1993, Kiyotaki and Moore, 1997, Levine, 1997).

Our sample consists of 49 countries and the data set spans the period 1980-99. We use quarterly returns measured in US dollars but for certain questions (such as the sensitivity to external shocks) we also look at multiple time horizons as some effects may vary over time. We first examine the relationship between financial development and stock returns by making use of the standard measures that have been used extensively in the literature (measures of the size and "quality" of the banking system as well as the size of the stock market). After establishing that financial development is an important determinant of the empirical distribution of returns we go one step further and attempt to identify the elements of underdevelopment that are responsible for the observed patterns (e.g. higher transaction

[1]This issue has been partly and indirectly studied in the context of the implications of financial liberalization (see Bekaert and Harvey, 1995, Stulz, 1999)

costs, ill-functioning legal environment, restrictions to international capital movements and so on).

The main findings are as follows: Stock returns in financially mature countries have been higher, less volatile and more closely linked to - and influenced by - world stock returns than returns in less mature markets. This implies that investments in the stock markets of countries with less developed financial systems may have paid off in terms of risk diversification but not in terms of higher returns. Finally, these relationships can be attributed mostly to two features of the countries with financially underdeveloped systems: higher transaction costs[2] and greater legal (political) uncertainty[3].

The rest of the paper is organized as follows: Section 1 sketches a simple model that links the development of the financial system to the volatility of stock returns. Section 2 presents the empirical analysis. Section 3 introduces the relevant variables that explain cross-country variation in stock market performance. Section 4 presents the results and section 5 concludes.

1 A simple model

A key function of the financial system is to lessen the informational problems associated with the financing of investment activities. This contribution is related not only to the amelioration of standard moral hazard and adverse selection problems but also to the fact that a bank may possess superior information relative to the entrepreneurs concerning the profitability of a particular proposed project. A similar role is played by venture capital. Consequently, if a firm receives some funds from a bank (or venture capitalists) then this could serve as a signal to third, less informed parties about the quality of this particular firm. This signal could generate additional sources of funds for the firm (for instance, through the stock market).

In this section we construct a simple model that emphasizes the role played by the financial system in identifying "promising" firms (not necessarily start- ups). We assume that once a firm has been identified as a good prospect by a "bank" -the identification taking the form of a loan- then this firm can draw the additional necessary funds from the stock market. A firm that does not enjoy the stamp of bank approval is shut out of the stock markets because its expected, net value is negative.

Let there be two types of firms, high (H) and low (L) ones with population shares q and $1-q$ respectively. The low types produce a zero level of output independent of the quantity of inputs used. Hence, they would never be financed if they could be identified as such. The high types produce an amount of homo-

[2]The quality of communications and transportation infrastructure as well as bureaucratic delays are our proxy for transaction costs.

[3]The risk of expropriation and the risk of contract repudiation by the government are our proxy for legal (political) uncertainty.

geneous output that is a positive function of the inputs used. The firm type is unobservable when investment decisions are made. Nevertheless, banks possess informational capital that allows them to form an educated opinion about the type of the firm. Naturally, the bank's assessment is imperfect (that is, it is occasionally proved wrong). Let p_{HH} be the probability that a bank will classify a high type correctly and p_{HL} be the probability that the bank will misclassify a low type as a high. We will use p_{HH} as out measure of financial development. Namely, we will assume that the more advanced the financial system the higher the quality of a bank's decisions and thus the less likely that a misclassification error will occur.

Let there be N identical banks and N firms which match randomly in the beginning of the period. Matching is assumed to be costless, hence all banks will offer the same lending rate. Each bank is endowed with a fixed amount of resources, B. A match results in a loan if the bank assesses the firm type to be high. If the banks are risk neutral and there is a riskless asset in the economy that offers a rate of return R (say, a government bond) then the interest rate charged on the bank loan, R_B is simply

$$R_B = \frac{R}{p_{HH}} \tag{1}$$

If this condition is satisfied then the bank lends an amount equal to B. A total of $pN = (p_{HH} * q + p_{HL} * (1 - q))N$ firms is financed by banks.

How does the quality of the financial system affect the number of firms receiving loans? It is plausible to assume that the probability of misclassification is symmetric for high and low types, that is, $p_{HL} = p_{LH}$ (where p_{ij} is the probability of classifying a firm as i type when the true type is j). Since $p_{HH} + p_{LH} = 1$ we have that $p_{HL} = 1 - p_{HH}$. Hence, $p \leq q$ when $q \geq 0.5$ and $p > q$ when $q < 0.5$. Hence, a more advanced financial system will be associated with a higher number of firms getting financed by banks and the stock market when the average firm is not a "lemon" ($q > 0.5$).

Proposition 1: If the average firm is not a "lemon" then countries with less financially developed systems (lower p_{HH}) will be characterized by a lower ratio of loans to total bank assets and fewer firms being listed on the stock market.

After receiving the loan, a firm issues shares on the stock market in order to draw additional investment funds. In order to keep the analysis simple we will make the assumption that there exists a large number of risk neutral individuals, each of them having sufficient funds to buy all the shares issued by the firm. The firms are randomly matched with the individual investors. Matching is costless, so each firm will receive exactly the same amount of capital. An investor has an amount of funds equal to F. He chooses how much of these funds to supply as capital, K, to the firm by maximizing expected profits, Π

$$\Pi = p_{HH} * [y(K + B) - R_B * B] + p_{HL} * 0 + (F - K) * R \tag{2}$$

where $y(K + B)$ is the production function. The term inside the square brackets

in the equation of expected profits corresponds to the income that a high type firm distributes to the shareholder after it has repaid the bank loan. This amount is paid out with probability p_{HH}. The second term corresponds to the income expected to be distributed to the shareholders by a low type firm that was inadvertently financed. This amount is equal to zero. The third term is the income from investing the remaining funds in the risk free asset. Profit maximization requires

$$p_{HH} * y' = R \tag{3}$$

where $y' = dy/dK$. Hence $y' = R_B$.

We want to know how the level of development of the financial system affects the capitalization of firms. Totally differentiating (3) gives

$$\frac{dK}{dp_{HH}} = -\frac{R}{y" * p_{HH}^2} > 0 \tag{4}$$

Proposition 2: Firm capitalization depends positively on the level of financial development.

We have thus established that a better functioning financial system leads to a larger stock market (more and bigger firms).

We now turn to the question of how financial development affects the properties of stock prices (mean and volatility). Due to our assumptions of risk neutrality, costless matching and a riskless asset, the expected rate of return is simply equal to R independent of the value of p_{HH}. One the one hand, the high type firms in less developed countries have less capital so they have a higher marginal product of capital. On the other hand, this return advantage is offset by the losses suffered from higher misclassification errors.

Production takes place after the completion of investment. The firm type is revealed and individuals find out what kind of return they have earned on their investments. For the firms of high type - a $(p_{HH} * q)/p$ share of the population of the financed firms- the surprise component of the rate of return is $R_B - R$. For the low type firms -with a share of $p_{HL} * (1 - q)/p$- it is $-R$. The variance of stock returns, V, is then given by

$$V = [p_{HH} * q * (R_B - R)^2 + p_{HL} * (1 - q) * (-R)^2]/p \tag{5}$$

Return volatility is due to misclassification errors. When perfect identification is possible, the variance becomes zero. By differentiating the equation for volatility with regard to p_{HH} it can be seen that a higher level of financial development (a higher p_{HH}) leads to lower volatility of stock returns.

2 Empirical analysis

Understanding the sources of differences in the behavior of stock returns across countries is an important theoretical and empirical issue in finance. Aggregate

variables are a natural starting point as they appear to vary significantly across countries (see Dellas and Hess, 2000). Bekaert and Harvey, 1997, examined whether asset concentration, stock market development (market capitalization), economic integration (the degree of trade openness), microstructure (turnover ratios) and the macroeconomy (exchange rate variability, credit ratings) could explain cross sectional differences in stock return volatility in a set of 20 emerging markets. They found that, with the exception of trade openness, nothing else seems to matter. Similarly, Bekaert et al., 2000, addressed this issue in a group of emerging markets using a broader set of variables. They found that some variables such as market capitalization, inflation and the price earning ratio had some -but limited- success in accounting for the observed cross sectional differences in stock market performance.

Our objective is to extend this literature by studying both emerging and mature markets together. And also, to focus mostly on a tighter set of macroeconomic variables, namely those pertaining to the degree of development of the financial system. In particular, we study cross-country differences in the empirical distribution of stock market returns based on the regression equation

$$y_i = \alpha + \beta f_i + \gamma' \mathbf{z}_i + \delta x_i + \varepsilon_i, \tag{6}$$

where y_i is the moment under consideration (mean, standard deviation, correlation with world stock returns and variability of stock return due to domestic factors), f_i is the measure of financial development, $\mathbf{z}_i$ is a set of "deeper" variables related to financial development and x_i is a control variable.

The choice of the currency of denomination of the returns is not straightforward. Under perfect capital mobility, the use of a single currency (say, the US dollar) would seem the most appropriate as it would make cross country comparisons meaningful for the world representative investor. However, in a world where purchasing power does not hold, the real returns associated with a given currency would differ depending on the location of the investor. In addition, there exist two more complications. First, some of the countries included in the sample have had international investment restrictions. And second, for reasons not well understood, there exists a strong home bias in portfolio selection. These two favor the selection of the domestic currency. Using local currency, however, would ignore the importance of international capital flows. We adopt a mixed approach. For the mean and the variance of returns we follow the literature by using the US dollar. For the correlation with the world we measure returns in terms of the currency of a reference G3-country[4]. The criterion for the selection of the reference country is location: Germany is the reference country for the European and African countries, Japan for the pacific economies and the US for all American countries. The motivation for this choice is that cross-country economic links tend to have

[4]Nevertheless, we have also carried out the analysis using local currency. The results suggest that the nominal currency of the returns matters somewhat for the relationship between financial development and stock market performance but it is not critical for the results.

a strong regional component because of strong trade and capital links, common policies and similarities in economic structure.

The definition of the mean (M), the standard deviation (SD) and the correlation of the return with the "world" return (COR) is straightforward. They are simply the corresponding sample moments for each country. In order to study international comovements we have used an additional variable besides COR. Namely, the fraction of the variance of stock returns that can be attributed to domestic factors. The decomposition of the total variance has been carried out using a two-variable VAR(1) that includes the domestic and the "world" return. The percentage of the variance of the forecast error in the domestic return that is due to the innovation to the local return is taken to be the measure of the sensitivity of the domestic stock markets to external developments. A high value for this variable indicates low susceptibility to external influences. The variance decomposition has been computed in two distinct ways. The first assumes the existence of only two shocks: the foreign and the local. The second assumes three shocks: the foreign, the domestic and a common shock. More formally, the computation has been based on the following specification:

$$\mathbf{r}_t = \mathbf{c} + \mathbf{\Phi}\mathbf{r}_{t-1} + \mathbf{B}\boldsymbol{\varepsilon}_t \tag{7}$$

where vector $\mathbf{r}_t$ contains return data for the country of interest and the world. Under the first specification, the standard recursive identification scheme is used. $\mathbf{B}$ is diagonal, $\boldsymbol{\varepsilon}_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ with the contemporaneous effect running from the world to the country. Under the second specification, we choose $\mathbf{B} = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ and $\boldsymbol{\varepsilon}_t = \begin{pmatrix} \varepsilon_{ct} & \varepsilon_{at} & \varepsilon^{\star}_{at} \end{pmatrix}'$ where ε_{ct}, ε_{at} and $\varepsilon^{\star}_{at}$ denote common, domestic and foreign country shocks, respectively. By construction, the contemporaneous correlation between the latter two shocks is zero. In particular, the reduced form disturbances are simply the sum of a common shock and the shock in the respective country $\begin{pmatrix} \varepsilon_{ct} + \varepsilon_{at} & \varepsilon_{ct} + \varepsilon^{\star}_{at} \end{pmatrix}'$.

We call $VD2$ and $VD3$ the fraction of the variance of stock returns that can be attributed to domestic factors according to the two and three shock decomposition respectively.

3 Data

The key explanatory variable, f_i, represents the level of financial development. As discussed in the introduction, financial intermediaries' main function is to mitigate the effects of information and transaction costs. They do so by facilitating the trading, hedging and diversification of risk, by providing liquidity and by helping monitor managers and exert corporate control.

Unfortunately, it is not possible to construct exact representations of these functions, specially in the context of a large section of countries. As a result, we

follow Levine et al. (2000) in using three popular indicators of financial intermediary development (see Levine et al. for a more detailed discussion of the strengths and weaknesses of these indicators): Liquid liabilities (LLY), commercial-central bank (CCB) and private credit (PC).

Liquid liabilities (LLY) is currency plus the demand and interest-bearing liabilities of banks and nonbank financial intermediaries divided by GDP. This is a standard measure of "financial depth", that is, of the overall size of the financial intermediary sector. Its main shortcoming is that it may not accurately represent the effectiveness of the financial sector in mitigating the effects of informational asymmetries and transactions costs.

Commercial-central bank (CCB) equals the ratio of commercial bank assets divided by commercial bank plus central bank assets. CCB measures the degree to which it is the commercial banks rather than the central bank that finance investment. As King and Levine (1993) emphasize, the intuition underlying this measure is that banks are more likely to monitor managers, facilitate risk management, and mobilize savings than central banks. Nevertheless it does not directly measure the effectiveness of banks in carrying out some of their main functions (such as exerting corporate control, lowering transactions costs) and is ability to capture the quality and quantity of financial services is unknown.

The third indicator, private credit (PC), equals the value of credits by financial intermediaries to the private sector divided by GDP. According to Levine et al. (2000), this measure represents an improvement over other commonly used indicators because it only includes credit issued by the private sector to the private sector (it excludes credit issued to governments, government agencies, and public enterprises; and credits issued by the central bank).

Finally, we use a forth variable to measure financial development, namely, the ratio of the total value of shares traded as a percentage of GDP (EQV). While commercial banks dominate the financial system at lower levels of economic development, stock markets become increasingly more important as economies grow. EQV is a measure of stock market liquidity.

Discovering the existence of a significant relationship between financial development and asset prices does not suffice to identify the exact channels through which financial advancement works. This is due to the fact that, in spite of their differences, none of these popular indicators can be uniquely associated with a particular function (or group of related functions) of financial intermediaries. For instance, how should one interpret a negative association of CCB with return volatility? Does it arise from the banks' assumed monitoring activities that restrain excessive risk taking? Or does it arise from the banks' contribution to lower transaction costs?

We have therefore attempted to gain additional insight into the role of financial intermediaries by introducing additional explanatory variables. Transactions (TRANS) is the sum of two index measures: One describes the quality of communications and transportation infrastructure, and the other, bureaucratic delays. In our view, TRANS is a good, direct measure of transaction costs. A low value of

TRANS implies a lower rate of return in the absence of sufficient capital mobility. It also implies higher asset price volatility, for instance, by making assets less liquid.

Underdeveloped financial systems are often found in countries exhibiting greater political risk. Again this element is not directly captured by any of the four financial indicators. In order to take into account the effects that government capriciousness has on economic and financial transactions we use the variable LEGAL. LEGAL is the sum of two indexes that measure the risk of expropriation and the risk of repudiation of contracts by the government respectively. A low value of LEGAL indicates that the risk of doing business in this country is high due to arbitrary government behavior.

Another variable that is related to financial development and also matters for asset prices is the existence of official impediments to international financial transactions. Segregated markets are less likely to respond to external shocks than internationally integrated ones. Segregation may also bring about greater volatility depending on the relative importance of domestic and foreign shocks. We use the variable capital controls (CC) to capture the effects of official financial restrictions.

We supplement the list of financial development variables with two more variables. The degree of trade openness (OP) is the sum of a country's exports and imports divided by GDP. The intra-industry trade variable (IIT) is the share of intra-industry trade in total trade. We base our measure on the index by Grubel and Lloyd (1975) which represents the share of a bidirectional international trade flows *within* an industrial sector s as a percentage of total trade in this sector.

$$\mathrm{IIT}_s = \frac{(X_s + M_s) - |X_s - M_s|}{(X_s + M_s)}$$

Our measure is calculated as the weighed sum of IIT_s over 34 manufacturing industry sectors. Export volume in each sector is used as the relevant weight. The sectors are classified by the Bureau of Economic Analysis (BEA).

The motivation for including these two variables is that the trade/production structure is related to the degree of financial development and it also matters for the behavior of stock returns. A high value for IIT means a lower degree of country specialization and hence greater synchronization with the rest of the world and greater macroeconomic volatility. Less developed countries tend to be more specialized than more developed ones.

The sample consists of 49 countries and covers stock returns over 1980-1999. Almost all of the independent variables are the sample averages of annual observations: 1980-95 for LLY, CCB, PC and EQV; 1982-95 for TRANS and LEGAL, 1980-99 for OP and 1980-92 for IIT. The only exception is the CC variable which is an index of capital controls in effect in 1996. Due to missing observations the sample size varies depending on the variables included. We present a detailed description of the data, data sources and variable construction in the appendix.

The stock return variable is the percentage change in stock prices over the relevant interval (quarterly, except for the regression involving COR where we also

use daily returns) adjusted for the change in the exchange rate against the US dollar[5].

4 Results

Tables 1 and 2 report the characteristics of stock returns and the simple correlation coefficients between the variables used in the regression for the quarterly observations[6]. We observe three general patterns:

Tables 1 and 2 here

The mean return (M) is negatively correlated with the standard deviation of returns (SD) but positively linked to the correlation of domestic and world returns (COR, VD2 and VD3). This implies that countries with high stock returns have experienced lower volatility but at the same time they have comoved more closely with world capital markets and have also been subjected to stronger external influences. At least theoretically, a portfolio consisting of stocks from financially developed and underdeveloped countries could be efficient.

Second, the mean (M) is positively associated with all measures of financial development[7]. SD is negatively associated and COR and VD2 and VD3 are positively associated with those measures. The correlation of returns with the remaining variables accords well to the predictions of theory. Capital controls (CC) lower the rate of return but increase volatility and bring about lower synchronization of domestic and world returns. A more diversified production-trade structure (a high IIT) is associated with a higher mean return, a lower volatility and greater synchronization with world equity markets. Note that financially more developed countries have higher production-trade diversification, lower restrictions on international capital movements and more trade openness.

Third, the correlation between the indicators of financial development and transactions costs (TRANS) and political uncertainty (LEGAL) is very high. The correlation between private credit (PC) and TRANS is particularly high, an indication that PC indeed captures elements of the "quality" of the financial system as claimed by Levine et al. (2000).

[5] Except for the regressions involving comovements with the rest of the world (COR) and also external effects (VD2, VD3) where the rate of return is calculated also in the currency of the reference country.

[6] We have also computed the correlations for daily returns in order to gain some insights into the dynamics of the transmission of external shocks to the domestic stock markets. It turns out that there is very little difference between these two sets of correlations. Hence, transmission of external shocks occurs quickly and at the same pace independent of the level of financial development.

[7] The finding that the average rate of return on stocks has been lower in financially underdeveloped countries seems to contrast previously reported findings. The difference is partly due to the fact that our sample includes a period (the second half of the 90's) that has been very favorable to stock markets in developing countries but unfavorable to LDC markets.

Tables 3 to 10 report the regression results. As the results are very similar across the three financial intermediation indicators and for the sake of space we only report results with PC as financial intermediation variable[8] (and also EQV). Similarly, the results are very robust with respect to the choice of VD2 and VD3 so we only report those with the two-shock decomposition VD2[9].

Tables 3 to 10 here

The estimation strategy is as follows: We first run a univariate regression against the financial development variable (first row). We then include one of the "deeper" variables, TRANS and LEGAL (second and third rows). Finally, we include those of the remaining variables that have additional explanatory power. The exchange rate variables FXM and FXSD are included in order to make sure that the observed differences in the empirical distribution of returns across countries are not simply due to exchange rate changes or exchange rate volatility. The following patterns emerge:

1. The level of financial development is a significant determinant of the empirical distribution of stock returns. A more developed financial system is associated with a somewhat higher mean return, and significantly lower volatility and greater susceptibility to (and also comovements with) foreign markets. The level of development of the banking system seems to play a more important role in this relationship than the size of the stock market.

2. The financial development indicators tend to lose their statistical significance once we have accounted for the size of transaction costs and/or legal uncertainty. It seems that both of these variables capture the effectiveness of and the constraints faced by the financial sector.

3. While exchange rate changes play some role in accounting for the differences in the distribution of returns across countries, their contribution is limited.

4. The same is true for the other explanatory variables. They also tend to lose their significance once the influence of transaction costs and political uncertainty has been taken into account. The only exception concerns the susceptibility to/comovements with foreign markets. The trade-production structure (and to a smaller extent the degree of openness and capital controls) is an important determinant of the link between domestic and foreign stock markets. Greater trade diversification implies a greater international synchronization.

5 Conclusions

Understanding the causes of the observed cross-country differences in stock returns is an important challenge. Part of the recent literature has attempted to

[8] PC is the preferred indicator for Levine et al., 2000, as it isolates credit issued to the private sector and excludes credit issued by the central bank.

[9] All the excluded tables can be found at:
http://www-vwi.unibe.ch/amakro/resear/resea.htm

address this issue by appealing to cross country macroeconomic differences. The present paper falls within this approach. The main differences from the existing literature are two: First, we study mature and emerging markets together. And second, instead of examining as broadly a set of explanatory variables as possible, we restrict ourselves to a particular, very plausible variable, namely the level of financial development. There exist good theoretical reasons for this choice, as the recent literature on financial development and growth and volatility has demonstrated.

We establish that financial development has significant explanatory power for the empirical, cross country distribution of stock returns. We then go a step further and examine which features of financial underdevelopment are responsible for the observed patterns. It turns out that there are two important features, both of which affect the effectiveness of the financial system in carrying out its main functions. Transaction costs and legal uncertainty: High transaction costs imply, among other things, that assets are less liquid and that the financial system is hindered in its information processing activities. Legal uncertainty means that asset prices are susceptible to an additional, potentially volatile source of risk, namely political risk.

If the portfolio diversification properties of LDC stocks are not significant from the point of view of the international investor then our finding that the mean stock return has not been higher in financially underdeveloped countries suggests limited international capital mobility. This could be due to either official restrictions - which have been quite prevalent- or to portfolio home bias.

There are two important tasks ahead. The first is to develop useful theoretical models linking the key functions of the financial system to the properties of asset prices. The existing literature has only indirectly suggested such links, through the effects of financial development on the properties of macroeconomic activity (for instance, see King and Levine, 1993, Aghion et al., 1999). The second is to produce more appropriate financial development indicators, namely indicators that can be uniquely and precisely associated with specific functions of the financial system. And then relate these indicators to the properties of asset prices.

References

[1] Aghion, Philippe, Abhijit Banerjee and Thomas Piketty (1999): "Dualism and Macroeconomic Volatility", *Quarterly Journal of Economics*, vol. 114, no. 4, pp. 1359-1397.

[2] Bekaert, Geert and Campbell R. Harvey (1995): "Time-Varying World Market Integration", *Journal of Finance*, vol. 50, no. 2, pp. 403-444.

[3] Bekaert, Geert and Campbell R. Harvey (1997): "Emerging Equity Market Volatility", *Journal of Financial Economics*, vol. 43, no. 1, pp. 29-77.

[4] Bekaert, Geert, Campbell R. Harvey, Christian Lundblad (2000): "Emerging Equity Markets and Economic Development", NBER Working Paper, no. 7763.

[5] Bernanke Ben and Mark Gertler (1990): "Financial Fragility and Economic Performance", *Quarterly Journal of Economics*; vol. 105, no.1, pp. 87-114.

[6] Dellas, Harris and Martin K. Hess (2000): "Financial Development and the Sensitivity of Stock Markets to External Influences", Studienzentrum Gerzensee, Working Paper, no. 00.06.

[7] Erb, Claude B., Campbell R. Harvey and Tadas E. Viskanta (1996): "Political Risk, Financial Risk and Economic Risk", *Financial Analysts Journal*, vol. 52, no. 6, 28-46.

[8] Feenstra, Robert C., Robert E. Lipsey and Harry P. Bowen (1997): "World Trade Flows, 1970-1992, with Production and Tariff Data", NBER Working Papers, no. 5910.

[9] Greenwald and Stiglitz (1993): "Financial Market Imperfections and Business Cycles", *Quarterly Journal of Economics*, vol. 108, no. 1, pp. 77-114.

[10] Grubel, Herbert G. and Peter J. Lloyd. 1975. *Intra-Industry Trade: The Theory and Measurement of International Trade in Differentiated Products*, Wiley, New York.

[11] Knack, Stephen and Philip Keefer (1995): "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures", *Economics and Politics*, vol. 7, no. 3, pp. 207-227.

[12] King, Robert G. and Ross Levine (1993): "Finance, Entrepreneurship, and Growth", *Journal of Monetary Economics*, vol. 32, no. 3, pp. 513-542.

[13] Kiyotaki, Nobuhiro and John Moore (1997): "Credit Cycles", *Journal of Political Economy*, vol. 105, no. 2, pp. 211-248.

[14] Levine, Ross (1997): "Financial Development and Growth: Views and Agenda", *Journal of Economic Literature*, vol. 35, no. 2, pp. 688-726.

[15] Levine, Ross, Norman Loyaza and Thorsten Beck (2000): "Financial Intermediation and Growth: Causality and Causes", *Journal of Monetary Economics*, vol. 46, no. 1, pp. 31-77.

[16] Rouwenhorst, K. Geert (1999): "Local Return Factors and Turnover in Emerging Stock Markets", *Journal of Finance*, vol. 54, no. 4, pp. 1439-1464.

[17] Stulz, René M. (1999): "International Portfolio Flows and Security Markets", Charles A. Dice Center, Working Paper, no. 99-03.

[18] Tamirisa, Natalia T. (1999): "Exchange and Capital Controls as Barriers to Trade", *International Monetary Fund Staff Papers*, vol. 46, no. 1, pp. 69-88.

6 Appendix

6.1 Data Description and Sources

6.1.1 Stock Market, Exchange Rate and CPI

Country	Stock market index	USD exchange rate	Sample
Argentina	IFCARGL	ARGPESO	80.1-99.4 $85.3-99.4
Australia	TOTMKAU	AUSTDOL	80.1-99.4
Austria	TOTMKOE AS	AUSTSCH	80.1-99.4
Bangladesh	BDTALSH	BS..AE.	90.2-99.4
Belgium	TOTMKBG BF	BELGLUX	80.1-99.4
Brazil	IFCBRAL	BRACRUZ	80.1-99.4 $91.1-99.4
Canada	TOTMKCN	CNDDOLLR	80.1-99.4
Chile	IFCHILL	CHILPES	80.1-99.4
Colombia	IFCOLBL	COLUPES	85.1-99.4
Denmark	TOTMKDK	DANISHK	80.1-99.4
Finland	FNOCSPRC	FINMARK	80.1-99.4
France	TOTMKFR FF	FRENFRA	80.1-99.4
Germany	TOTMKBD DM	DMARKER	80.1-99.4
Greece	IFCGREL	GREDRAC	80.1-99.4
Hong Kong	TOTMKHK	HKDOLLR	80.1-99.4
Hungary	BUXINDX	HNI..AE.	91.2-99.4
Iceland	ICEXALL	ICEKRON	93.1-99.4
India	IFCINDL	INDRUPE	80.1-99.4
Indonesia	TOTMKID	INDORUP	90.3-99.4
Ireland	TOTMKIR	IPUNTER	80.1-99.4
Israel	ISTGNRL	ISRSHEK	84.2-99.4
Italy	TOTMKIT~L	ITALIRE	80.1-99.4
Japan	TOTMKJP	JAPAYEN	80.1-99.4
Jordan	IFCJORL	JOI..AE	80.1-99.4
Luxembourg	TOTMKLX~LF	FINLUXF	92.2-99.4
Malaysia	TOTMKMY	MALADLR	86.2-99.4
Mexico	IFCMEXL	MEXPESO	80.1-99.4
Netherlands	TOTMKNL FL	GUILDER	80.1-99.4
New Zealand	TOTMKNZ	NZDOLLR	88.2-99.4
Nigeria	IFCNIGL	NGI..AE	85.1-99.4
Norway	TOTMKNW	NORKRON	80.1-99.4
Pakistan	IFCPAKL	PAKRUPE	85.1-99.4
Peru	PEGENRL	PERUSOL	91.2-99.4
Philippines	IFCPHIL	PHILPES	85.1-99.4
Portugal	POBVLGN PE	PORTESC	88.2-99.4
Singapore	TOTMKSG	SINGDOL	80.1-99.4
South Africa	TOTMKSA	COMRAND	80.1-99.4
South Korea	IFCKORL	KORSWON	80.1-99.4
Spain	MADRIDI EP	SPANPES	80.1-99.4
Sri Lanka	SRALLSH	SRIRUPE	85.2-99.4
Sweden	TOTMKSD	SWEKRON	82.2-99.4
Switzerland	TOTMKSW	SWISSFR	80.1-99.4
Taiwan	TAIWGHT	TAIWDOL	80.1-99.4
Thailand	IFCTHAL	THABAHT	80.1-99.4
Turkey	IFCTURL	TKI..AE	87.1-99.4
United Kingdom	TOTMKUK	USDOLLR	80.1-99.4
United States	TOTMKUS	USDOLLR	80.1-99.4
Venezuela	IFCVENL	VENEBOL	85.1-99.4
Zimbabwe	IFCZIW$	ZIMBDOL	80.1-99.4

Notes:
[1]Source: Datastream. Table contains Datastream mnemonics.
[2]The source for Taiwanese exchange rates before 1985 is http://www.stat.gov.tw.

6.1.2 Financial Development Variables

PC: Private credit: the value of credits by financial intermediaries to the private sector divided by GDP.

CCB: The ratio of commercial bank assets divided by commercial bank assets plus central bank assets.

LLY: Liquid liabilities: currency plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries divided by GDP. These three variables are taken from Levine, Loyaza and Beck (2000). They cover the period 1980-1995.

EQV: Stock market capitalization: The total value of shares traded as a percentage of GDP. The values are averaged 1980-99. Source: World Development Indicators, The World Bank.

6.1.3 Risk and Openness Variables

LEGAL: Sum of the indexes that measure the risk of expropriation (i.e. outright confiscation or forced nationalization) and of the repudiation of contracts by the government due to budget cutbacks, indigenization pressure, a change in government or in its economic and social priorities. The data are averages of the period 1980-95 (Austria: 1992-95). Lower scores indicate higher risk. Source: *International Country Risk Guide,* Political Risk Services.

TRANS: Sum of the indexes that measure bureaucratic delays and infrastructure quality (i.e. facilities for- and ease of communication between headquarters and the operation and within the country as well as the quality of transportation). High values indicate high efficiency. The data are averages over the period 1982-95 (for 18 countries 1984-95). Source: Business Environmental Risk Intelligence. The components of LEGAL and TRANS are described in more detail in Knack and Keefer (1995).

CC: This index measures the degree of capital controls imposed by a country. We use the data definition described by Tamirisa (1999). The data are 1996 values (for 10 countries 1997). Source: *Annual Report on Exchange Arrangements and Exchange Restrictions*, IMF.

OP: The openness to trade variable expresses trade (exports plus imports) as a percentage of GDP. Values are averages 1980-98. Source: World Development Indicators, The World Bank.

IIT: The intraindustrial trade variable is an export-weighted sum of the intraindustry trade index by Grubel and Lloyd (1975) for 34 manufacturing industries according the Bureau of Economic Analysis (BEA) classification. The data are averages 1980-92 and described in detail by Feenstra, Lipsey and Bowen (1997). Source: NBER Trade Database, Disk 2: World Trade Flows, 1970-92.

Exchange rate: The domestic currency- US dollar rate, or for the correlations with the world measure, the domestic currency-US, or Deutsch Mark or Japanese Yen rate respectively. The exchange rate control variables are mean (FXM) and variance (FXSD) of the growth rates of the local currency relative to the US dollar.

Table 1: Descriptive Statistics

country	M	SD	COR	VD2
Argentina	1.494	30.465	0.175	89.105
Australia	2.034	12.166	0.344	88.127
Austria	2.263	13.715	0.658	58.230
Bangladesh	-0.333	20.772	0.117	98.136
Belgium	2.451	10.389	0.673	55.434
Brazil	2.030	28.678	0.058	99.419
Canada	2.123	9.395	0.817	33.038
Chile	3.442	18.048	0.272	93.999
Colombia	3.500	19.618	0.110	96.841
Denmark	3.372	9.614	0.579	70.604
Finland	4.368	11.572	0.279	63.014
France	2.846	11.681	0.677	52.831
Germany	2.593	10.091	na	na
Greece	0.893	20.514	0.249	90.909
Hong Kong	3.085	18.255	0.264	94.242
Hungary	2.029	19.331	0.637	60.485
Iceland	4.790	8.886	0.128	94.632
India	2.128	15.487	-0.106	95.101
Indonesia	-0.439	29.049	0.347	91.595
Israel	2.649	11.188	0.462	78.162
Italy	3.116	14.097	0.537	68.790
Japan	3.273	13.571	na	na
Jordan	0.898	7.401	0.264	89.361
Korea, Rep. of	2.438	21.921	0.401	79.372
Luxemburg	4.179	9.017	0.808	31.003
Malaysia	2.866	19.695	0.295	86.904
Mexico	2.553	25.453	0.436	81.134
Netherlands	3.370	8.500	0.773	39.000
New Zealand	0.946	11.264	0.356	81.855
Nigeria	0.836	19.701	0.218	94.824
Norway	2.810	14.403	0.539	71.151
Pakistan	0.517	17.409	-0.033	99.913
Peru	5.609	19.982	0.070	94.775
Philippines	5.122	23.115	0.316	88.331
Portugal	1.155	12.612	0.553	63.421
Singapore	2.632	14.867	0.394	82.995
South Africa	1.796	15.826	0.481	76.137
Spain	2.763	13.054	0.572	67.421
Sri Lanka	1.264	14.853	-0.130	97.853
Sweden	4.071	12.784	0.723	49.105
Switzerland	3.064	10.674	0.771	43.936
Taiwan	4.393	28.687	0.272	90.401
Thailand	1.216	22.364	0.234	94.643
Turkey	3.822	29.658	0.386	83.313
United Kingdom	3.089	9.170	0.529	69.537
USA	3.427	7.599	na	na
Venezuela	2.322	23.151	-0.028	95.641
Ireland	2.941	12.003	0.595	62.482
Zimbabwe	-0.816	24.606	0.279	92.355

Notes: Table displays values of the mean (M), standard deviation (SD), correlation with the world return (COR) and the domestic influence on stock returns (VD2) as measured by a variance decomposition from VAR (see equation (7)) with 2 orthogonal shocks. Data source in the appendix.

Table 2: Correlation at Quarterly Frequency

	M	SD	COR	VD2	PC	EQV	CCB	LLY
M	1							
SD	-0.285	1						
COR	0.314	-0.607	1					
VD2	-0.298	0.672	-0.932	1				
PC	0.209	-0.632	0.667	-0.705	1			
EQV	0.159	-0.329	0.381	-0.396	0.759	1		
CCB	0.074	-0.613	0.680	-0.645	0.706	0.464	1	
LLY	0.074	-0.637	0.562	-0.603	0.842	0.777	0.644	1
TRANS	0.305	-0.735	0.845	-0.837	0.792	0.457	0.682	0.646
LEGAL	0.262	-0.779	0.798	-0.793	0.719	0.410	0.726	0.655
CC	-0.113	0.356	-0.644	0.617	-0.318	-0.049	-0.431	-0.272
OP	0.195	-0.448	0.478	-0.435	0.426	0.440	0.574	0.532
IIT	0.244	-0.520	0.691	-0.678	0.399	0.262	0.564	0.537
FXM	-0.154	0.636	-0.419	0.397	-0.445	-0.255	-0.525	-0516
FXSD	-0.227	0.626	-0.364	0.332	-0.376	-0.217	-0.368	-0.452

	TRANS	LEGAL	CC	OP	IIT	FXM	FXSD
M							
SD							
COR							
VD2							
PC							
EQV							
CCB							
LLY							
TRANS	1						
LEGAL	0.832	1					
CC	-0.563	-0.581	1				
OP	0.457	0.448	-0.044	1			
IIT	0.534	0.656	-0.582	0.490	1		
FXM	-0.368	-0.441	0.192	-0.426	-0.330	1	
FXSD	-0.337	-0.415	0.085	-0.365	-0.295	0.922	1

Notes: The displayed figures are correlation coefficients between the variables used in the regressions. The variables are described in the appendix.

Table 3: Dependent Variable: Mean

PC	TRANS	LEGAL	FXM	R^2
0.012**			0.037	0.060
(0.006)			(0.022)	
-0.003	0.901		-0.003	0.073
(0.008)	(0.552)		(0.024)	
0.001		0.395***	0.014	0.196
(0.006)		(0.146)	(0.025)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 4: Dependent Variable: Mean

EQV	TRANS	LEGAL	FXM	R^2
0.014*			0.028	0.040
(0.008)			(0.020)	
0.003	0.714*		0.002	0.100
(0.009)	(0.370)		(0.023)	
0.006		0.375***	0.016	0.224
(0.007)		(0.118)	(0.024)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 5: Dependent Variable: Standard Deviation

PC	TRANS	LEGAL	OP	FXSD	R^2
-0.068***				0.050	0.214
(0.024)				(0.034)	
0.015	-6.981***			0.198***	0.528
(0.035)	(2.378)			(0.060)	
-0.008		-1.894***		0.201***	0.497
(0.025)		(0.589)		(0.059)	
-0.022		-1.660***	-0.034*	0.189***	0.634
(0.022)		(0.517)	(0.019)	(0.050)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 6: Dependent Variable: Standard Deviation

EQV	TRANS	LEGAL	FXSD	R^2
-0.043			0.074**	0.120
(0.034)			(0.033)	
0.023	-6.277***		0.180***	0.597
(0.034)	(1.440)		(0.051)	
0.020		-2.093***	0.185***	0.549
(0.028)		(0.447)	(0.051)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 7: Dependent Variable: Correlation

PC	TRANS	LEGAL	CC	OP	IIT	R^2
0.004***						0.330
(0.001)						
0.000	0.347***					0.580
(0.001)	(0.083)					
0.001		0.100***				0.555
(0.001)		(0.021)				
0.001	0.252***		-0.271**			0.691
(0.001)	(0.089)		(0.126)			
0.000	0.240***				0.526***	0.700
(0.001)	(0.076)				(0.146)	
0.001		0.088**		0.001*		0.613
(0.001)		(0.021)		(0.001)		
0.001		0.083***			0.334**	0.593
(0.001)		(0.022)			(0.159)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 8: Dependent Variable: Correlation

EQV	TRANS	LEGAL	IIT	R^2
0.003**				0.067
(0.001)				
-0.000	0.322***			0.523
(0.001)	(0.059)			
-0.000		0.113***		0.527
(0.001)		(0.018)		
-0.001	0.227***		0.495***	0.627
(0.001)	(0.060)		(0.157)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 9: Dependent Variable: Domestic Stock Market Surprises

PC	TRANS	LEGAL	CC	OP	IIT	R^2
-0.321***						0.304
(0.074)						
-0.040	-24.768***					0.590
(0.099)	(6.253)					
-0.057		-8.160***				0.572
(0.078)		(1.583)				
-0.106	-18.113***		19.144**			0.721
(0.087)	(6.376)		(8.993)			
-0.060	-17.041***				-37.920***	0.694
(0.085)	(5.859)				(11.150)	
-0.080		-7.131***		-0.126**		0.655
(0.071)		(1.515)		(0.056)		
-0.051		-6.728***			-28.692**	0.623
(0.073)		(1.596)			(11.700)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.

Table 10: Dependent Variable: Domestic Stock Market Surprises

EQV	TRANS	LEGAL	OP	IIT	R^2
-0.171					0.031
(0.111)					
0.051	-25.112***				0.536
(0.104)	(4.402)				
0.102		-9.314***			0.565
(0.084)		(1.302)			
0.001	-27.111***		0.072*		0.568
(0.104)	(4.384)		(0.039)		
0.054	-18.579***			-34.026***	0.619
(0.095)	(4.617)			(12.089)	
0.119		-8.139***		-21.164*	0.588
(0.082)		(1.426)		(11.801)	

Notes: The entries are the estimated coefficients in a cross-sectional regression of the mean of stock returns in US dollars on a constant and a set of explanatory variables described in the appendix. Standard errors in parenthesis. ***,** and * denote significance at the 99%, 95% and 90% level, respectively.