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Financial development and stock returns: A cross country analysis*

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Abstract

We examine stock returns in a cross section of emerging and mature markets (49 countries) over 1980-99. Stock returns are found to be significantly related to the degree of financial development. In general, a deeper and higher quality banking system is associated with lower volatility of stock returns and a greater synchronization in the movements of domestic and world returns. International synchronization is also greater the more liquid the stock market.

JEL Classification: G15, O10 Keywords: Financial development, stock returns

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There exists a large literature dealing with the cross country analysis of stock returns (Bekaert and Harvey, 1995, 1997, Erb et al. 1996a, 1996b, Rouwenhorst, 1999). Interestingly, this literature has been exclusively preoccupied with the determinants of cross-country differences in stock return performance *within* a type of market (emerging or mature) rather than across different types. In this paper we pool emerging and mature equity markets together and investigate to what degree the observed cross-country differences in the moments of stock returns can be accounted for by an obvious but so far overlooked candidate, namely the level of financial development[1].

Our motivation for investigating this relationship is based on the observation that the behavior of assets returns is related to the properties of the financial markets in two distinct ways. First, asset returns directly 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. Surprisingly, these issues have not received any formal attention before. And second, financial markets affect asset prices indirectly through their effects on macroeconomic fundamentals (for instance, on the rate and volatility of economic growth). The relationship between macroeconomic performance and financial development has been the subject of a substantial body of recent research[2]. A presumption seems to have emerged that financial development leads to higher economic growth. But the link between financial development and volatility seems to be ambiguous, both theoretically (Bacchetta and Caminal, 2000) and empirically (Beck et al. 2001).

In this paper, we examine stock returns in a group of 49 countries over the period

[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)

[2]See King and Levine (1993), Levine and Zervos (1998), Levine et al. (2000), Beck et al. (2000) for the relationship between financial development and growth. And Bernanke and Gertler (1990), Greenwald and Stiglitz (1993), Kiyotaki and Moore (1997), Aghion et al. (1999), Bacchetta and Caminal (2000), Denizer et al. (2000), Beck et al. (2001) for the relationship between financial development and output volatility

1980-99. The returns are computed on a quarterly basis and are measured in US dollars. We employ standard measures of financial development, pertaining to the size and "quality" of the banking system as well as the "liquidity" of the stock market, that have been extensively used in the literature (see e.g. Levine et al., 2000). The value of using several, alternative measures of financial development lies in the fact that as they represent different aspects of the financial system they may help shed light on which elements of under-development are responsible for the observed patterns (e.g. market size, efficiency, restrictions to international capital movements and so on).

The results tend to differ somewhat depending on the indicator of financial development used and the currency of denomination of returns. Nevertheless, irrespective of the currency denomination of the returns, we find that financial development is significantly related to the behavior of the second moments of the distribution of stock returns. In general, "deeper" and more efficient banking systems have been associated with significantly lower stock return volatility as well as a closer comovement with world returns[3]. Stock market liquidity, on the other hand, is only related to the international synchronization of stock returns.

The rest of the paper is organized as follows: Section I outlines some theoretical considerations. Section II describes the empirical methodology and Section III the data. Section IV presents the results.

I Theoretical considerations

The main functions of the financial system are (see Levine, 1997): the facilitation of the trading, hedging and diversification of risk, the provision of liquidity, the monitoring of managers and exertion of corporate control and the matching of savers and investors. We investigate how the distribution of asset returns may depend –directly or indirectly– on how well the financial system carries out these functions. There is a relatively recent

[3]The closer comovements could reflect either common international shocks or greater susceptibility to foreign shocks. This is investigated by Dellas and Hess (2002), who find that the latter is the key factor, that is, financial development makes a country's financial market more vulnerable to foreign influences even after controlling for the influence of capital controls and international trade.

literature –reviewed below– that studies how the financial system affects an important determinant of stock market performance, namely, macroeconomic performance (growth and volatility of output). We call such effects indirect effects. There may also be a direct relationship between the financial system and stock returns, but there exists no formal work addressing this issue. Below we speculate on the nature of this relationship.

a) Direct relationship

I. The monitoring of managers and exertion of corporate control

More efficient monitoring of managers and exertion of corporate control typically imposes tighter constraints on the riskiness of the projects pursued by the firms. Lower risk undertaken then implies a lower and more stable rate of returns of the firm's stock, because of the smoother path of capital gains and dividends .

What is in the heart of this argument is the lessening of the informational problems associated with the financing of investment activities. Note that the banks' contribution is related not only to the amelioration of standard moral hazard and adverse selection problems (the managers having an incentive to take on excessive risk) but also to the fact that there may exist cases where a bank possess superior information relative to the entrepreneurs concerning the prospects of a particular proposed project .

In addition to forcing the borrowing firm to undertake more prudent projects, the bank's exertion of corporate control may also make the firm diversify its activities in order to guarantee a minimum cash flow for debt repayments. More diversified activities mean a smoother stock price path.

II. The provision of liquidity

A more sophisticated financial system means a higher level of liquidity. Shortage of liquidity tends to exaggerate asset price movements and this is the main reason that central banks typically inject liquidity into the financial system in periods of turbulence[4]. Note that both bank and stock market liquidity are important here. A thin stock market is more likely to exhibit larger gyrations in prices. A sufficiently liquid banking system

[4]While it is commonly accepted that liquidity in general reduces stock price volatility, there also seems to exist an informal view that too much of it can prove destabilizing.

allows stock traders to smooth their trades, minimizing price volatility.

It is worth also mentioning that, stock market liquidity may carry a positive externality on itself. Rousseau and Wachtel (2000) argue that the option to exit through a liquid market mechanism increases venture capital and entrepreneurial activity in general. The increase in the latter leads to an expansion of the stock market, making the market more liquid. Hence, through this channel, a liquid stock market has an multiplier negative effect on price volatility.

b) Indirect relationship

There are two main, indirect routes through which financial development may matter for stock returns: Through its effects on macroeconomic growth and volatility. And through its effects on the structure of production and pattern of international trade. Because the effects on macroeconomic growth have been discussed extensively elsewhere (see, for instance, Levine 1997), we will focus here on macroeconomic volatility only.

I. Macroeconomic volatility

Financial development affects macroeconomic volatility through various channels. First, by allowing an economy to absorb shocks more efficiently. For instance, Aghion et al. (1999) show that when capital markets are backward, in the sense that individuals have unequal access to investment opportunities, then the demand and supply of credit (and hence the supply of output) is more cyclical. The shocks can also be absorbed more efficiently when there is greater diversification, which is an important function of the banks.

And second, financial development brings about an amelioration of informational asymmetries. When information in the credit markets is asymmetric, Bernanke and Gertler (1990) show that shocks to the net worth of borrowers amplify economic fluctuations (see also Greenwald and Stiglitz, 1993). Similarly, Kiyotaki and Moore (1997) show that capital market imperfections amplify the effects of temporary productivity shocks and make them more persistent, through their effect on the net wealth of credit-constrained borrowers. However, Bacchetta and Caminal (2000) show that this is not

always the case and that whether financial imperfections (asymmetric information) exacerbate business cycles or not depends on the impact of the shock on the composition of external and internal funds for credit-constrained firms. Recent empirical work by Beck et al. (2001) confirms the existence of such an ambiguity. Namely, they document the absence of a robust relation between financial intermediary development and growth volatility[5].

II. Production structure and trade patterns

International trade is another important route linking the stage of financial development to stock market performance, and in particular to stock return volatility and international stock price comovements. It involves two mechanisms. First, financially advanced countries (the rich) tend to trade more. A larger degree of openness increases the sensitivity to foreign shocks inducing a positive association between financial development and international financial interdependence.

The second mechanism operates through the effects of trade on the structure of production. Helpman and Razin (1978) note that if a country without a well functioning financial market cannot diversify domestic production risks through international asset trade, it may have to do so by selecting a more diversified production structure. Thus, financial backwardness implies a domestic production structure that is *more similar* to that in the rest of the world. In the presence of important industry specific shocks, financial backwardness then leads to a positive covariation between domestic and world economic activity but to a lower aggregate volatility (because of the higher production diversification). Financial development, on the other hand, allows for better international risk sharing and allows for greater production specialization. This implies a smaller correlation in movements in economic activity and stock markets across countries but greater domestic macroeconomic volatility.

This argument is based on the traditional theory of trade and ignores economic convergence and the resulting intra-industry trade. In this case one should expect a

[5]Denizer et al. (2000), though, claim a negative relation between finance and volatility. An important difference between this paper and Beck et al. (2001) is that the former does not condition the effects on individual shocks while the latter does.

positive relationship between the stage of economic (financial) development and the degree of susceptibility to foreign shocks (because of similarities in production and trade structure across countries). Intra-industry trade would also imply lower volatility because it is associated with a lower degree of specialization.

A final link between finance and volatility can be claimed based on the findings of Beck (2002). Beck argues that economies with a better-developed financial sector have a comparative advantage in sectors with high scale economies, typically, manufacturing. Given the well established fact that volatility differs systematically across sectors, one may be able to link finance to volatility through the effects of the former on the production structure.

In summary. Financial development (both banking and stock market) seems to have a negative, direct effect on stock market volatility. Banking development also seems to have indirect effects on both volatility and international correlations by influencing output volatility as well as the structure of production and trade. But, these indirect effects seem ambiguous, as different theories generate different patterns. It is then important to turn to the empirical evidence as a mean of determining which effects dominate.

II 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 exhibit significant variation across countries. Bekaert and Harvey (1997) examine 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 find that, with the exception of trade openness, nothing else seems to matter. Similarly, Bekaert et al. (2001), address this issue in a group of emerging markets using a broader set of variables. They find 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 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

$$y_i = \alpha + \beta f_i + \gamma x_i + \varepsilon_i, \tag{1}$$

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, and x_i is a control variable.

The choice of the currency of denomination of the returns is not obvious. 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 dual approach. Namely, we compute returns both in terms of the US dollar and the domestic currency. Depending on one's priors on the degree of international segmentation, one may select the set of results to focus on. For the correlation with the world we measure returns in terms of the currency of a reference G3-country rather than the USD only. 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 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 co-movements we use 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 is based on the following specification:

$$r_t = c + \Phi r_{t-1} + B\varepsilon_t \tag{2}$$

where vector r_t contains return data for the country of interest and the world. Under the first specification, the standard recursive identification scheme is used. B is diagonal, $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ with the contemporaneous effect running from the world to the country. Under the second specification, we choose $B = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ and $\varepsilon_t = \begin{pmatrix} \varepsilon_{ct} & \varepsilon_{at} & \varepsilon^{\star}_{at} \end{pmatrix}'$ 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 attributed to domestic factors according to the two and three shock decomposition respectively.

III The 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[6]: 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. King and Levine (1993) argue that this measure may be useful because private banks are more likely to monitor managers, facilitate risk management, and mobilize savings than central banks. Hence, a higher value of CCB may indicate higher financial quality (efficiency). Nevertheless CCB 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 its 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. This indicator combines quality and depth and according to Levine et al. (2000) it represents an improvement over other

[6]See Levine et al. (2000) for a more detailed discussion of the strengths and weaknesses of these indicators

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 fourth variable to measure financial development, namely, the ratio of the total value of shares traded as a percentage of GDP (EQV). EQV is a measure of stock market liquidity.

In addition to the financial development variables, we employ a number of control variables that may capture the indirect effects discussed in section I. As discussed in section I, financial development is related to economic volatility. We have thus included in the regressions a measure of output volatility in order to capture the independent effects that output volatility may have on stock returns. Our measure of output volatility ($YVOL$) is the standard deviation of the annual percentage growth rate of GDP computed in constant –local currency– prices. Moreover, in the regressions involving USD based returns, we have included a measure of exchange rate volatility (FXV) to check to what extent the volatility of stock returns is driven by exchange rate volatility. Similarly, we use the change of a country's currency with respect to the US dollar (FXM) in the regression including mean returns measured in US dollars.

We also include two more variables that relate to international trade. The degree of trade openness (OP) is the sum of a country's exports and imports divided by GDP. Greater trade openness makes domestic firms -and hence domestic stock returns- more susceptible to world economic conditions. 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.

$$IIT_s = \frac{(X_s + M_s) - |X_s - M_s|}{(X_s + M_s)} \tag{3}$$

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 the latter variable is that the trade/production structure influences the distribution of stock returns. A high value for IIT means a low degree of country specialization and hence greater synchronization with the rest of the world. Less developed countries tend to be more specialized than more developed ones.

Finally, there is another variable that is of obvious importance for stock returns. It relates to 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 or lower 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.

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; 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 is the quarterly, percentage change in stock prices either in domestic currency or adjusted for the change in the exchange rate against the US dollar[7].

IV The results

Tables 1–2 report the characteristics of stock returns and the simple correlation coefficients between the variables used in the regression for the quarterly observations[8]. 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.

[7]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.

[8]For completeness sake we also report the correlations with some additional underdevelopment variables which were included in the regression reported in table 11)

Hence, transmission of external shocks occurs quickly and at the same pace independent of the level of financial development. The results are very similar for $VD2$ and $VD3$ so we only report those with the two-shock decomposition.

Tables 1 and 2 here

We observe three general patterns. 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 and $VD2$). 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 -weakly- positively associated with all measures of financial development[9] but this association is statistically insignificant. SD is negatively associated and COR and $VD2$ are positively associated with those measures. The correlation of returns with the remaining variables is plausible. 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 a 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 high. The correlation between private credit PC and $TRANS$ is particularly high, an indication that PC may capture elements of the "quality" of the financial system as claimed by Levine et al. (2000).

[9]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 1990's) that has been very favorable to stock markets in developed countries but unfavorable to LDC markets.

The presentation of the regression results is organized as follows. In each table we combine a single moment of the distribution of stock returns with a single measure of financial development. In the first two data rows we use USD returns while in the third and fourth row we use domestic currency computed returns. The regressors in the equation of the volatility of returns include the volatility of output and, when returns are measured in USD, also the volatility of the exchange rate. When returns are measured in USD, the regressions of the mean also include the average change of the exchange rate during that period. The inclusion of the foreign exchange variable is done in order to account for the cross country differences in returns that are associated with exchange rate changes. For the sake of space, we only report here results with the volatility and correlation with world returns for PC and EQV. The regressions involving the other measures of banking development as well as those involving the mean return are reported in the appendix. The findings for $VD2$ and $VD3$ are identical to those obtained when we use COR so we have left them out (they are available from the authors).

Tables 3 to 6 here

The results indicate that the relationship between financial development and stock market performance depends somewhat on the moment considered, the financial indicator and the currency denomination of returns. Nevertheless, irrespective of the currency denomination of the returns, we find that financial development is significantly related to the second moments of the distribution of stock returns. In general, "deeper" and more efficient banking systems have been associated with significantly lower stock return volatility as well as a closer comovement with world returns. By comparing table 3 to tables 7-8 it can be seen that it is banking "quality" (PC) that seems to matter. The estimated coefficients of CCB and LLY are not statistically significant at the 5% level. That is, mere banking size is less important than "quality".

Table 4 shows that stock market liquidity cannot account for cross country differences in these two moments of the stock returns. On the other hand, stock market liquidity appears to be negatively related to mean returns (table 10) and positively to international

correlations (table 6) but only when returns are denominated in domestic currency. But even in this case, EQV does not seem to have any implications for volatility.

The other variables all seem to have the expected sign (see I). The results indicate that general macroeconomic instability is a significant contributor to the volatility of stock returns. And the same is true for exchange rate volatility. The fact that the estimated coefficient on PC indicator decreases somewhat but remains large and highly significant after including the GDP volatility variable as well as the trade variables suggests –to us– that both the direct and indirect effects discussed in section I are empirically relevant.

Official impediments to international capital flows (higher capital controls) mean greater domestic volatility and weaker comovements with world markets. Hence, while capital controls seem to insulate domestic markets from external developments, they prevent the smoothing out of domestic shocks, which contributes to greater domestic volatility. The net effect of capital controls is higher volatility.

Trade openness functions similarly to international capital market integration. It reduces volatility and enhances international stock market comovements. The intra-trade variable (IIT) also has the expected sign. Namely, it is associated with stronger international comovements. Nevertheless, it does not seem to matter for volatility[10].

The overall fit is very high. For instance, in the volatility regression, R^2 is 0.73.

Before concluding, it is important to offer a caveat. Financial development is simply one facet of economic development. In addition to having an underdeveloped financial system, less developed countries also lag behind in several other aspects which may or may not be caused by the factors that are responsible for the lack of financial development. While it is important to identify all these aspects, it is very difficult to do so. In an earlier version of this paper, we tried to deal with this problem by including additional variables capturing economic underdevelopment (per capita income), transactions costs, political risk and so on. Unfortunately, the correlation between these variables and the FD variables is very high, so due to multicollinearity, their inclusion makes it impossible

[10]The IIT variable was also included in the volatility regressions. While it was always statistically insignificant, its presence did not have any noticeable effect on any of the other regressors.

to estimate precisely the separate effects of FD and of those other variables (see table 11 in the appendix for an example of this). Hence, we cannot rule out the possibility that there is some other aspect of underdevelopment, that is strongly correlated with the aspects considered here and which is the fundamental driving force of stock returns.

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 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 broad a set of explanatory variables as possible, we restrict ourselves to a particular, very plausible but so far overlooked variable, namely the level of financial development. There exist good theoretical reasons for this choice, as the recent work on financial development and output growth and volatility has hinted.

We establish that the variance and covariance of country stock returns are closely related to banking development and that this is true irrespective of the currency in which rates of stock returns are measured. Interestingly, stock market development (liquidity) only seems to be related to the covariance of domestic with world returns.

There are two important tasks ahead. The first is to develop 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. 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.

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V Appendix

V-A Data Description and Sources

Stock Market and Exchange Rates

Country	Stock market index	USD exchange rate	Sample
Argentina	IFCARGL	ARGPESO	80.1-99.4
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
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	ITALIRE	80.1-99.4
Japan	TOTMKJP	JAPAYEN	80.1-99.4
Jordan	IFCJORL	JOI..AE	80.1-99.4
Luxembourg	TOTMKLXLF	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

Source: Datastream. The table contains Datastream mnemonics. The source for the Taiwanese exchange rates before 1985 is http://www.stat.gov.tw.

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 et al. (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.

Control Variables

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 et al. (1997). Source: NBER Trade Database: World Trade Flows, 1970-92.

FXV, FXM: The standard deviation and the average value of quarterly exchange rate changes (the domestic currency-US dollar rate) respectively. For the correlations with the world, the domestic currency-USD, or DM or JY rate respectively. Source: Datastream (see the Appendix).

$YVOL$: Standard deviation of the annual percentage growth rate of GDP over the entire sample period, based on constant, local currency, prices. WDI, World Bank,

1980-1999

Y: Initial per capita income as of 1980. Source: World Development Indicators, The World Bank.

$TRANS$: 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).

$LEGAL$: 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.

Table 1: Descriptive Statistics

country	$M^{\$}$	M^{dom}	$SD^{\$}$	SD^{dom}	$COR^{\$}$	COR^{dom}	$VD2$
Argentina	1.494	23.868	30.465	48.504	0.175	0.490	89.105
Australia	2.034	2.513	12.166	10.415	0.344	0.510	88.127
Austria	2.263	2.393	13.715	13.494	0.658	0.874	58.230
Bangladesh	-0.333	0.675	20.772	20.822	0.117	0.079	98.136
Belgium	2.451	2.849	10.389	9.550	0.673	0.687	55.434
Brazil	2.030	7.965	28.678	169.603	0.058	0.540	99.419
Canada	2.123	2.305	9.395	8.299	0.817	0.884	33.038
Chile	3.442	7.124	18.048	17.759	0.272	0.308	93.999
Colombia	3.500	8.162	19.618	18.608	0.110	0.514	96.841
Denmark	3.372	3.833	9.614	10.019	0.579	0.782	70.604
Finland	4.368	4.770	11.572	11.646	0.279	0.818	63.014
France	2.846	3.422	11.681	11.159	0.677	0.937	52.831
Germany	2.593	2.761	10.091	9.746	na	na	na
Greece	0.893	3.522	20.514	20.196	0.249	0.374	90.909
Hong Kong	3.085	3.510	18.255	17.592	0.264	0.593	94.242
Hungary	2.029	5.729	19.331	20.442	0.637	0.698	60.485
Iceland	4.790	4.790	8.886	8.253	0.128	-0.031	94.632
India	2.128	4.407	15.487	16.796	-0.106	0.718	95.101
Indonesia	-0.439	1.210	29.049	20.107	0.347	0.597	91.595
Israel	2.649	8.616	11.188	15.706	0.462	0.640	78.162
Italy	3.116	4.244	14.097	14.045	0.537	0.702	68.790
Japan	3.273	1.907	13.571	10.925	na	na	na
Jordan	0.898	2.025	7.401	7.676	0.264	0.070	89.361
Korea, Rep. of	2.438	2.616	21.921	18.022	0.401	0.559	79.372
Luxemburg	4.179	4.852	9.017	10.138	0.808	0.348	31.003
Malaysia	2.866	3.283	19.695	18.574	0.295	0.417	86.904
Mexico	2.553	9.344	25.453	25.638	0.436	0.626	81.134
Netherlands	3.370	3.578	8.500	8.483	0.773	0.927	39.000
New Zealand	0.946	1.300	11.264	9.928	0.356	0.492	81.855
Nigeria	0.836	6.959	19.701	11.588	0.218	0.348	94.824
Norway	2.810	3.340	14.403	13.830	0.539	0.763	71.151
Pakistan	0.517	2.565	17.409	17.253	-0.033	0.047	99.913
Peru	5.609	12.150	19.982	25.494	0.070	0.075	94.775
Philippines	5.122	5.906	23.115	21.240	0.316	0.442	88.331
Portugal	1.155	2.010	12.612	12.714	0.553	0.711	63.421
Singapore	2.632	2.253	14.867	14.352	0.394	0.492	82.995
South Africa	1.796	4.038	15.826	13.489	0.481	0.779	76.137
Spain	2.763	3.977	13.054	13.003	0.572	0.776	67.421
Sri Lanka	1.264	2.874	14.853	14.336	-0.130	0.388	97.853
Sweden	4.071	4.825	12.784	14.260	0.723	0.949	49.105
Switzerland	3.064	3.066	10.674	10.093	0.771	0.833	43.936
Taiwan	4.393	3.432	28.687	24.684	0.272	0.443	90.401
Thailand	1.216	1.472	22.364	20.406	0.234	0.429	94.643
Turkey	3.822	17.347	29.658	31.972	0.386	0.638	83.313
United Kingdom	3.089	3.448	9.170	8.256	0.529	0.797	69.537
USA	3.427	3.427	7.599	7.599	na	na	na
Venezuela	2.322	8.914	23.151	22.914	-0.028	0.280	95.641
Ireland	2.941	3.656	12.003	12.158	0.595	0.577	62.482
Zimbabwe	-0.816	3.779	24.606	21.804	0.279	0.401	92.355

This 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 VARs (see equation (2)) with two shocks. Subscripts \$ and *dom* denote the moments are calculated from return series in US dollars and domestic currency, respectively. The data sources are described in the Appendix.

Table 2: Variable Correlations

Panel A: Stock Return Moments with FD

	$M^{\$}$	M^{dom}	$SD^{\$}$	SD^{dom}	$COR^{\$}$	COR^{dom}	$VD2$	LLY	PC	CCB	EQV
$M^{\$}$	1										
M^{dom}	0.219	1									
$SD^{\$}$	-0.212	0.508***	1								
SD^{dom}	-0.066	0.346**	0.523***	1							
$COR^{\$}\$$	0.213	-0.257*	-0.479***	-0.293*	1						
COR^{dom}	0.153	-0.088	-0.257*	-0.079	0.680***	1					
$VD2$	0.278*	-0.228	-0.583***	-0.286*	0.911***	0.676***	1				
LLY	0.099	-0.475***	-0.445***	-0.315**	0.549***	0.270*	0.564***	1			
PC	0.211	-0.404***	-0.459***	-0.284*	0.588***	0.549***	0.566***	0.755***	1		
CCB	0.240	-0.432***	-0.476***	-0.411***	0.557***	0.323**	0.527***	0.499***	0.614***	1	
EQV	0.210	-0.261*	-0.246*	-0.139	0.298**	0.299**	0.231	0.571***	0.772***	0.428***	1

Panel B: Stock Return Moments with Control Variables

	$M^{\$}$	M^{dom}	$SD^{\$}$	SD^{dom}	$COR^{\$}$	COR^{dom}	$VD2$
Y	0.157	-0.131	-0.269*	-0.065	0.336**	0.512***	0.340**
$YVOL$	0.013	0.353**	0.481***	0.229	-0.058	-0.046	-0.121
IIT	0.140	-0.221	-0.361***	-0.207	0.568***	0.603***	0.565***
CC	-0.404***	0.045	0.474***	0.207	-0.580***	-0.510***	-0.535***
$LEGAL$	0.521***	-0.370**	-0.611***	-0.246*	0.729***	0.692***	0.737***
OP	0.115	-0.256	-0.234	-0.177	0.233	-0.013	0.182
$TRANS$	0.424***	-0.373**	-0.638***	-0.291*	0.723***	0.597***	0.722***

Panel C: FD with Control Variables

	LLY	PC	CCB	EQV	Y	$YVOL$	IIT	CC	$LEGAL$	OP	$TRANS$
Y	0.364**	0.550***	0.226	0.298*	1						
$YVOL$	-0.359**	-0.305**	-0.236	-0.102	-0.285*	1					
IIT	0.251	0.278*	0.306**	0.345**	0.130	-0.202	1				
CC	-0.322	-0.399***	-0.477***	-0.263**	-0.275*	0.275*	-0.404***	1			
$LEGAL$	0.538***	0.650***	0.631***	0.452***	0.323**	-0.290*	0.486***	-0.683***	1		
OP	0.377**	0.066	0.339**	0.410***	-0.224	0.030	0.346**	-0.175	0.253	1	
$TRANS$	0.582***	0.812***	0.613***	0.568***	0.408***	-0.441***	0.494***	-0.612***	0.829***	0.303*	1

This 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 VARs (see equation (2)) with two shocks. The superscripts $^{\$}$ and ^{dom} denote that the moments are calculated in US dollars and domestic currency, respectively. The data sources are described in the Appendix. ***, ** and * denote significance at a 99%, 95% and 90% level, respectively.

Table 3: Standard deviation of returns and PC

	PC	**FXV**	**YVOL**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$SD^{\$}$	-6.81	0.049				0.25	44
	(0.003)	(0.27)					
$SD^{\$}$	-4.02	0.12	1.60	7.25	-0.057	0.73	39
	(0.034)	(0.001)	(0.000)	(0.045)	(0.011)		
SD^{dom}	-17.5					0.08	44
	(0.046)						
SD^{dom}	-12.8		2.94	7.65	-0.19	0.18	39
	(0.06)		(0.012)	(0.61)	(0.15)		

Cross-country regression of the standard deviation of stock returns -in USD and domestic currency- on the variables in row 1. The numbers in parenthesis are P-values based on robust standard errors.

Table 4: Standard deviation of returns and EQV

	EQV	**FXV**	**YVOL**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$SD^{\$}$	-4.30	0.07				0.16	47
	(0.15)	(0.13)					
$SD^{\$}$	-1.13	0.16	1.70	9.17	-0.006	0.60	43
	(0.65)	(0.000)	(0.000)	(0.003)	(0.65)		
SD^{dom}	-12.55					0.02	47
	(0.07)						
SD^{dom}	-3.69		3.58	14.1	-0.05	0.10	43
	(0.32)		(0.014)	(0.40)	(0.002)		

Cross-country regression of the standard deviation of stock returns -in USD and domestic currency- on the variables in row 1. The numbers in parenthesis are P-values based on robust standard errors..

Table 5: Correlation with world returns and PC

	PC	**CC**	**OP**	**IIT**	$\mathbf{R}^2$	**N**
$COR^{\$}$	0.44				0.35	41
	(0.000)					
$COR^{\$}$	0.22	-0.58	0.002	0.27	0.71	36
	(0.001)	(0.020)	(0.002)	(0.03)		
COR^{dom}	0.42				0.30	41
	(0.000)					
COR^{dom}	0.26	-0.36	-0.001	0.46	0.18	36
	(0.004)	(0.017)	(0.034)	(0.003)		

Cross-country regression of the correlation of stock returns -measured in USD and domestic currency- with "world" returns. The numbers below in parenthesis are P-values based on robust standard errors.

Table 6: Correlation with world returns and EQV

	EQV	**CC**	**OP**	**IIT**	$\mathbf{R}^2$	**N**
$COR^{\$}$	0.28				0.09	44
	(0.053)					
$COR^{\$}$	0.045	-0.64	0.00	0.45	0.49	40
	(0.751)	(0.012)	(0.85)	(0.003)		
COR^{dom}	0.29				0.09	44
	(0.025)					
COR^{dom}	0.15	-0.47	-0.001	0.53	0.52	40
	(0.024)	(0.003)	(0.000)	(0.000)		

Cross-country regression of the correlation of stock returns -measured in USD and domestic currency- with "world" returns. The numbers below in parenthesis are P-values based on robust standard errors.

Table 7: Standard deviation of returns and CCB

	CCB	**FXV**	**YVOL**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$SD^{\$}$	-13.78	0.13	1.58	7.16	-0.04	0.72	41
	(0.034)	(0.001)	(0.000)	(0.045)	(0.011)		
SD^{dom}	-74.13		2.73	-0.86	-0.10	0.23	41
	(0.15)		(0.016)	(0.94)	(0.18)		

Cross-country regression of the standard deviation of stock returns -in USD and domestic currency- on the variables in row 1. The numbers in parenthesis are P-values based on robust standard errors.

Table 8: Standard deviation of returns and LLY

	LLY	**FXV**	**YVOL**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$SD^{\$}$	-3.05	0.14	1.60	9.33	-0.048	0.70	39
	(0.13)	(0.000)	(0.000)	(0.006)	(0.015)		
SD^{dom}	-14.34		2.83	18.73	-0.15	0.17	39
	(0.15)		(0.016)	(0.94)	(0.18)		

Cross-country regression of the standard deviation of stock returns -in USD and domestic currency- on the variables in row 1. The numbers in parenthesis are P-values based on robust standard errors.

Table 9: Mean return and PC

	PC	**FXM**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$M^{\$}$	1.17	0.036			0.10	44
	(0.035)	(0.21)				
$M^{\$}$	0.62	0.016	-2.89	0.009	0.31	39
	(0.20)	(0.33)	(0.006)	(0.012)		
M^{dom}	-4.39				0.16	44
	(0.016)					
M^{dom}	-4.61		-3.87	-0.03	0.22	39
	(0.040)		(0.33)	(0.09)		

Cross-country regression of the correlation of stock returns -measured in USD and domestic currency- with "world" returns. The numbers below in parenthesis are P-values based on robust standard errors.

Table 10: Mean return and EQV

	EQV	**FXM**	**CC**	**OP**	$\mathbf{R}^2$	**N**
$M^{\$}$	1.39	0.027			0.08	47
	(0.021)	(0.31)				
$M^{\$}$	0.65	0.00	-3.19	0.00	0.28	43
	(0.23)	(0.98)	(0.002)	(0.68)		
M^{dom}	-4.16				0.07	47
	(0.014)					
M^{dom}	-3.29		-0.73	-0.01	0.08	43
	(0.069)		(0.81)	(0.19)		

Cross-country regression of the correlation of stock returns -measured in USD and domestic currency- with "world" returns. The numbers below in parenthesis are P-values based on robust standard errors.

Table 11: Standard deviation of returns and measures of underdevelopment

	PC	**TRANS**	**LEGAL**	**Y**	**FXV**	**YVOL**	$\mathbf{R}^2$	**N**
$SD^{\$}$	.75	-1.85	-.139	-.000	.182	.925	0.72	34
	(0.79)	(0.34)	(0.79)	(0.54)	(0.000)	(0.095)		
SD^{dom}	-8.74	-5.71	-1.50	.001		2.41	0.12	34
	(0.44)	(0.098)	(0.15)	(0.025)		(0.094)		

Cross-country regression of the standard deviation of stock returns -in USD and domestic currency- on the variables in row 1. The numbers in parenthesis are P-values based on robust standard errors.