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The Information Content of Stock Markets: Why Do Emerging Markets Have So Little Firm-Specific Risk?

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Preliminary, Comments Welcome.

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by

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Abstract

Stock prices in emerging economies move in step much more than in advanced economies. Emerging markets' prices capitalize less firm specific information, and appear subject to more economy-wide fluctuations. Measures of this consonance of stock returns are positively correlated with indicators of poor property rights protection, inefficient legal systems and corrupt government. Lax accounting standards strengthen these correlations, but do not have an independent effect. We argue that property rights, judicial efficiency, clean government and meaningful accounting information let stock markets process information and allocate capital better, and thus contribute to economic growth. The absence of these factors may discourage informed trading and foster noise trading.

1. Introduction

Hayek (1945) sets forth a fundamental principle of modern economics; the vital role of markets is to process information. The effectiveness of capital markets in this role may be particularly important. First, capital prices direct an economy's capital flows, and hence determine the directions of its long-term growth. Second, capital prices provide managers with feedback about how investors evaluate their performance.

These roles require stock prices to reflect information about both individual firms and the economy as a whole. Our empirical analysis, based on cross-sectional international stock market data, has two components:

First, we propose *information indices* for national stock markets based on the ratio of firm-specific risk to market risk in a typical stock. This proposal is motivated by our observation that stock prices in emerging markets tend to move up or down in harmony, whereas stock prices in developed economies tend to move relatively independently of each other. Our information indices are low in countries known to have poorly behaved stock markets (e.g. China, Taiwan, Mexico, India, Turkey, and Japan). Information indices are positively correlated with *per capita* GDP. Also, the information index for the US shows a time trend: US stock prices movements have come, over time, to depend steadily more on firm specific factors and less on market-wide factors.[1]

Second, following La Porta *et al.* (1997), we relate such stock market information indices for different countries to variables reflecting their legal and economic institutional structures. La Porta *et al*. carefully develop such variables and highlight their relationships to the functioning of stock markets. Using multiple regression analysis, we find our information indices to be closely related to measures of sophistication and probity of institutions. In particular, information indices are higher in markets where shareholders rights against directors are stronger, rule of law is more respected, the legal system more efficient, and government corruption is rarer. Sophisticated accounting standards *per se* are uncorrelated with information indices, but appear to augment the correlations of rule of law, legal efficiency and good government measures with information indices. These results survive numerous robustness checks.

Both more firm specific variation and less market wide variation in stock prices accompany high information indices. The former may be due to investors anticipating a higher return to gathering and using firm specific information. The latter may be due either to low information index countries being more macro-economically unstable, or to these economies' stock markets being more prone to noise trading.

In the next section, we review the stylized facts that motivated this research. In section three, we develop our information indices. In section four, we present regression results consistent with better legal and institutional environment increasing the proportion of stock price movements due to firm specific factors, and then attempt to clarify the economics underlying these findings. Section five concludes.

2. Some Stylized Facts

Why Do Emerging Markets Have So Little Firm-Specific Risk?

Table 1 compares the harmony of stock returns in some representative stock markets during the first 26 weeks of 1995. Note that in emerging markets like China, Malaysia, Poland, and Taiwan, most stock prices routinely move in the same direction during a given week. In these markets, it is not atypical for well above 80% of all the stocks move in the same direction in a given week. In Poland, 100% of traded stocks move in the same direction during three of the twenty six weeks. In contrast, in the United States, there are no instances of more than 57% of the stocks moving in the same direction during any one week in this period despite an ongoing "bull market".

Figure 1 graphs weekly data for the whole of 1995. Again, in the US, a typical week has roughly 50% of stocks moving up and 50% moving down. In contrast, the emerging markets are all characterized by most or all stocks moving either up or down in any given week.

Of course, the United States has many more stocks in its markets than do the emerging economies, and the Law of Large Numbers dictates that the aggregate behavior in the US market should be less subject to random fluctuations. However, the contrast between the US market and emerging markets is too stark to be a statistical artifact. Using the data in Figure 1, 57% of US stocks move together in an average week vs. 79% for China, 77% for Taiwan, 81% for Poland and 77% for Malaysia. These differences are all over 20%! In 1995, the fraction of stocks moving together in the US is less than that in China in 49 out of 52 weeks. The same is true for Malaysia in 49 out of 52 weeks, for Taiwan in 44, and for Poland in 50 out of 52 weeks. The null hypothesis that the fraction of stocks moving together in the US is the same as in the merging markets can be rejected in 43 out of 52 weeks for China, 42 for Taiwan, 37 for Poland and 45 for Malaysia.[2]

These observations lead us to wonder whether stocks in emerging markets tend to move in harmony because firm specific information in those economies is scarce and/or unreliable relative to macro-economic information.

The United States as an Emerging Economy?

Figure 2 plots the fraction of stock in the United States market that move together against time. The implication of our hypotheses is that, as the US stock market became more developed, co-movement should decrease over time. This is clearly observed.

The number of stocks traded in the US has increased over time, so the fraction moving together should fall towards the theoretical mean of 50% if returns are independent. This could create a bias. Figure 2 addresses this problem by graphing the fraction of 400 randomly selected stocks that move together each year. The same decline remains apparent. The decline in co-movement in US stock prices does not seem to be an empirical artifact caused by the increase in the number of traded stocks.

As a robustness check, we develop an alternative measuring of the extent of stock price consonance using a linear regression of the form

$$r_{i,t} = \alpha_i + \beta_t \, r_{m,t} + \epsilon_{i,t} \qquad (1)$$

where $r_{i,t}$ is stock i's return in week t and $r_{m,t}$ is a market index. A high R^2 in such a regression indicates a high degree of stock price co-movement. Figure 3 graphs the average R^2 across stocks based on monthly returns for each non-overlapping 5-year period from 1926 to 1995 using all available stocks. Again, because the number of stocks trading in the U.S. has risen over time, the relative importance of a typical stock in a broad market index has declined. To avoid this potential downward bias in R^2 through time, we also plot average R^2s for the largest 300 stocks, ranked at the beginning of each 5-year period, using an equally-weighted market index based on those stocks only. A decline in both R^2s from the 1930s to the present is apparent.

We hypothesize that the declining degree of stock price co-movement might be due to a rising relative return from gathering and applying firm specific information to stock pricing. This could result from investors capitalizing either steadily more firm specific information or steadily less market information.

Figure 4 addresses this issue by displaying the average unexplained variation (denoted σ^2_ϵ) and the variation explained by market (denoted σ^2_m) in stock returns from 1926 to 1995. Each bar represents a 3 year average. It is apparent from Figure 4 that declines in R^2s in the post-war period are mainly due to markets incorporating more firm-specific information, although the size of the variation due to market-wide factors clearly also fell sharply prior to the war.

3. Stock Market Information Content

Background Thoughts

According to finance theory (Grossman, 1976), public investors who accumulate information can gain by trading against less informed investors. This trading moves prices, and consequently informed traders' information is capitalized into stock prices.

In theory, investors should value stocks using both macroeconomic and firm-specific information. Macroeconomic information (e.g. inflation forecasts, new international trade rules, new tax rules, etc.) affects many firms' prices simultaneously.[3] In contrast, firm-specific information (e.g.

signs of better management, an impending lawsuit, a competitor's innovation, etc.) affect the stock price of only one, or at most a few, firms.

When investors obtain new information, they project its impact on a firm's expected future cash flows and their present values. This rapid capitalization of information, especially firm-specific information, is the basis of the widely used *event study methodology* in the empirical financial economics literature (MacKinley, 1997).

The idea behind event studies is that a stock's return can be decomposed into two orthogonal components: one, $P[r_{it} \mid r_{mt}]$, a projection of r_{it} on the market return and the other, ε_{it}, independent of it.

$$r_{it} = P[r_{it} \mid r_{mt}] + \varepsilon_{it} \tag{2}$$

Thus, investors' projections of a firm's returns due to firm-specific factors is ε_{it}.

The extent to which firm-specific information determines stock price movements can be measured by comparing the variances of the two components of r_{it}. If the variance of $P[r_{it} \mid r_{mt}]$, denoted σ_m^2, is large relative to the variance of ε_{it}, denoted σ_ϵ^2, this means the stock price is primarily moving due to market-wide information.

This variance decomposition is itself important information for investors. Consider a public investor inferring the firm specific component, $\varepsilon_{it.}$, from r_{it}. A simple signal extraction calculation shows that the projection $P[\varepsilon_{it} \mid r_{it}]$ is

$$P[\varepsilon_{it} \mid r_{it}] = \left(\frac{\sigma_\epsilon^2}{\sigma_m^2 + \sigma_\epsilon^2} \right) r_{it} \tag{3}$$

The greater $\frac{\sigma_\epsilon^2}{\sigma_m^2 + \sigma_\epsilon^2}$ is, the more r_{it} reflects firm-specific information rather than market-wide information.

The incorporation of information into stock prices depends on the ability of outside investors first to acquire it and second to benefit from it. The former depends on the degree of trust investors have in financial disclosures, press reports, and the like. The latter depends on the extent to which investors' property rights are protected. LaPorta *et al.* (1997a) show that widespread corruption compromises public investors' property rights. These considerations suggest that a country's accounting, legal and institutional environment might affect its stock prices' information content.

Investors accumulate information until the marginal cost of an additional unit exceeds its marginal return (Grossman, 1976). Poor accounting standards, an inefficient legal system that tolerates fraud and other adverse institutional flaws potentially raise the marginal cost of gathering valid information. In an economy where investors' property rights are poorly protected, the marginal return from information is depressed. Knowing that a firm has profitable economic opportunities may be of scant benefit to public shareholders if insiders, bureaucrats, and politicians routinely skim off any positive net present value, either from the firm itself or from the investor directly. Thus, the findings of LaPorta *et al.* (1997a, b) suggest that a country's institutional, legal, and regulatory environment might also affect the type and quantity of information that finds its way into stock prices.

The stylized facts in the previous section suggest that it may be relatively unprofitable in some economies to expend significant resources gathering and analyzing firm-specific information. Consequently, firm-specific stock price movements might be relatively rare in these markets compared to stock markets in advanced economies.

Following this reasoning, we develop measures of the relative importance of firm-specific vs. market-wide stock price movements for different economies. We then correlate these with measures of the sophistication of an economy's institutions from LaPorta *et al.* (1997) that reflect information disclosure standards, the protection of investors' rights and the integrity of the legal system and government.

Distinguishing Firm-Specific from Market Risk

The most direct measure of harmony in stock price movements in a given country is a formalization of the discussion surrounding Table 1. We therefore construct an information index for country j, denoted f_j, based on the fraction of stocks in each market that have returns of the same sign as the local market in a given week. Define

$$f_{jt} = \frac{\max[n_{jt}^{up},\ n_{jt}^{down}]}{n_{jt}^{up} + n_{jt}^{down}} \tag{4}$$

where n_{jt}^{up} is the number of stocks in country j whose prices rise in week t and n_{jt}^{down} is the number of stocks whose prices fall. We then call f_j the average value of f_{jt} across all relevant weeks. The values of f_j must lie between .5 and 1, and the middle panel of Table 2 ranks countries by this variable.[4] The left panel of Table 2 shows that high per capita GDP countries tend to have low f_js while emerging economies have high f_js. Figure 5a illustrates these rankings with their respective countries labeled. Figure 6a graphs each country's f_j versus the logarithm of its *per capita* GDP, illustrating a clear negative correlation. The correlation is -0.571 with a prob-value of 0.001.

A more statistically sophisticated way to distinguish firm-specific stock price movements from market-wide price movements is to run the following regression:

$$r_{it}^{T} = \alpha_i^T + \beta_{1,i}^T r_{m,jt}^{T} + \beta_{2,i}^T [r_{US,t}^{T} + e_{jt}^{T}] \qquad (5)$$

where i is a firm index, j a country index, and t a week index. T is a year superscript, $r_{m,jt}$ is a domestic market index, and $r_{US,t}$ is the US market return. The rate of change in the exchange rate per US dollar is e_{jt}.

We add the US stock market return because economies are at least partially open to foreign capital. The expression $r_{US,t}^{T} + e_{jt}^{T}$ translates US stock market returns into local currency units. For stock markets in the Eastern hemisphere, we lag US market returns by one day to account for time zone differences. Thus, if the weekly stock return in Japan used data from May 7 1994 to May 14 1994, the contemporaneous US market return uses data from May 6 1994 to May 13 1994. When we look at the US, we set $\beta_{2,i}^T$ to zero. We use weekly data to overcome thin markets problems.[5]

We use daily *cum dividend* stock returns for all companies listed in Datastream as of January 1997. This gives us a cross section of 15,920 firms in 40 countries. Datastream returns are unavailable until the 1990s for most countries, so we focus on 1993 through 1995, and use only 1995 data in our international cross-sectional analysis.

Datastream claims that its stock returns are adjusted for splits and other unusual events, but our data do contain some very large stock returns. If these reflect coding errors, they may induce a bias in our data: extreme outlying stock returns may decrease the R^2 estimates more in thin markets. On the assumption that coding errors are over-represented in extreme observations, we trim our data by dropping weekly observations where a stock's return exceeds 25% in absolute value.

The R^2 of regression (1), R_{ij}^{2T}, measures the percent of the variation in the weekly returns of stock i in country j in year T explained by variations in country j's market returns and the US stock market's returns.

Given this, we define

$$R_j^{2\,T} = \frac{\sum_i R_{i,j}^{2\,T} \times SST_{i,j}^T}{\sum_i SST_{i,j}^T} \tag{6}$$

where $SST_{i,j}$ is the sum of squared total variations. R_j^{2T} is the fraction of the variation in the stock returns in country j in year T explained by the local and US market returns, and 1- R_j^{2T} is an estimate of $\sigma_\epsilon^2/(\sigma_m^2 + \sigma_\epsilon^2)$ in equation (3). We then average these estimates over the period from 1993 to 1995, and use $R_j^2 = \frac{1}{T}\sum_T R_j^{2\,T}$ as an alternative stock market information index.

The right panel of Table 2 ranks countries by their R_j^2s, and Figure 5b graphs this ranking. Figure 6a graphs, each country's R^2 versus the logarithm of its *per capita* GDP, again making a clear negative correlation evident.

Idiosyncratic Price Movements and Economic Development

Our data point to a relationship between economic development and a heightened importance of firm specific price movements relative to market-wide movements.

First, Table 2 and Figure 5b show that R^2 estimates tend to be lowest for advanced market economies. The five lowest R^2s are for the US, Canada, Australia, France, and the United Kingdom. OECD countries' R^2s tend to be below the median. The only advance countries with notably high R^2s are Italy, which Zingales (1994) shows to have an extraordinarily poorly functioning stock market, and Japan, whose stock market is regarded by many practitioners as notoriously bubble-prone.

Second, stock markets in emerging economies, and less advanced economies generally, have much higher R^2s. The five highest are for Poland, China, Malaysia, Taiwan and Mexico. The empirical pictures emerged in Figures 5a and 5b are very similar.

Third, figure 6b, like figure 6a, shows a clear negative correlation between R^2s and log(*per capita* GDP). The correlation is -0.359, and its p-value is 0.001.

4. Information Content and Institutional Structure

In this section, we relate our proposed information content measures to indexes of the sophistication and effectiveness of countries' legal and economic institutions. Our premises lead to a falsifiable implication:

PREMISE A: The relative importance of firm-specific price movements to market-wide price movements measures the information content of a stock market.

PREMISE B: Legal and economic institutions that (i) protect shareholders from corporate insiders, (ii) promote an efficient and honest legal system, (iii) discourage government corruption, and (iv) force truthful disclosure to investors together encourage the capitalization of firm-specific information into stock prices.

IMPLICATION C: ($A \wedge B \Longrightarrow C$) A clear relationship should exist between our information content measures and indexes that capture the legal and economic institutional structure of an economy. Specifically, shareholder rights, an honest legal system, clean government, and good accounting standards should correlate positively with high information content in stock markets.

Methodology

Since the fraction of stocks in a given country's stock market that move together is always between .5 and 1, f_j is not suitable as a dependent variable in regression analysis. We therefore define an *information index* of country j's stock markets, denoted Ψ_j, by

$$\Psi_j = \log\left(\frac{2 - 2f_j}{2f_j - 1}\right) \tag{7}$$

which ranges from plus infinity when there is no market-wide price movement at all (i.e. $f_j = .5$), to minus infinity when all stock prices move in tandem (i.e. $f_j = 1$).

Since R^2s are similarly bounded by zero and one, we also need to transform them to obtain a measure that is suitable for linear regression analysis. We therefore propose a second *information index* across countries, Υ_j (upsilon j)**,** equal to

$$\Upsilon_j = \log\left(\frac{1 - R_j^2}{R_j^2}\right) \tag{8}$$

The monotonic transformation Υ_j maps a zero R_j^2 to positive infinity and an R_j^2 of one to negative infinity.

According to our hypotheses, Ψ_j and Υ_j should both be positively correlated with measures of the sophistication of a country's institutional structure. To test this, we regress these information indices on a set of such measures constructed in La Porta *et al.* (1997a) and listed below.

First, investors must be protected from rapacious insiders. If outside investors' property rights to corporate cash flows are poorly protected, its fortunes may have little to do with their dividend stream and their return from gathering information about the firm may be small. Our *Anti-director Rights Index* is the score card of shareholders' rights against directors in various countries compiled by La Porta *et al.* (1997a). It takes values from zero to five according to whether or not shareholders (i) can vote by mail, (ii) are barred from selling stock for a few days around meetings, (iii) can use cumulative voting for directors, (iv) have legal standing to sue directors or to force the company to buy back their shares, (v) call extraordinary shareholder meetings relatively easily.

Second, to protect themselves from fraud and to be sure their property rights in their investments are protected, shareholders must have access to a functional legal system. We use two alternate variables, again taken from La Porta *et al.* (1997a) to capture this. *Rule of Law*, a mark ranging from zero to six, is based on International Credit Rating's assessment of country risk averaged from 1982 to 1995, with higher marks indicating a more firmly embedded tradition of law and order. *Judicial Efficiency* is a score from zero to ten, with high scores indicating an efficient judicial system. It is based on Business International Corporation's assessment of country risk from 1980 to 1993.

Good Government is the sum of three indexes from La Porta *et al.* (1997a), each ranging from zero to ten, and measuring (i) government corruption, (ii) the risk of expropriation by the government, and (iii) the risk of the government repudiating contracts. Higher values of this composite index indicate "good government". All three indices are based on International Credit Rating's assessments between 1982 and 1995. Again, this is a measure of the strength of private property rights.

Accounting Standards ranges from 36 to 83, with lower scores for indicating less useful or trustworthy disclosure and reporting standards. This index was created by La Porta *et al.* (1997a) based on 1990 data from International Accounting and Auditing Trends, Center for International

Financial Analysis and Research Inc. A high index presumably signifies a lower cost of obtaining firm specific information.

Our independent variables are based on information prior to 1995. To avoid having common contemporaneous noise in both the left and right hand side variables, we use only 1995 data to construct our dependent variables, Ψ_j and Υ_j.

The legal and institutional environment data are available for all our countries except Poland, Czech, China, and Taiwan. Accounting standards data are unavailable for Indonesia, Ireland, and Pakistan, giving us a final sample of 35 countries. When we re-do our analyses without the Accounting Standards variable (so as to include Indonesia, Ireland, and Pakistan in the sample), our basic results are not changed.

Univariate and Bivariate Statistics

Table 3 reports simple correlation between our proposed information content indices, Ψ_j and Υ_j and these institutional structure variables. The correlations are mostly positive and significant, consistent with our hypotheses. Better protection of shareholder rights, respect for law and order, an efficient judiciary, and good government may all foster well informed stock markets. Note, however, that the *accounting standards* variable is not significantly correlated with either information index.

Multivariate Regression Analysis

La Porta *et al.* (1997a) find their institutional structure variables to be significantly correlated with *per capita* GDP. Since log (*per capita* GDP) is, in turn, correlated with our information indices, we need a multiple regression framework to test for the marginal importance of the institutional structure variables in explaining them.

We run regressions of the form

$$\left[{}^{information}_{index}\right] = b_0 + b_1\left[{}^{antidirector}_{rights}\right] + b_2\left[{}^{rule}_{of\ law}\right] + b_3\left[{}^{good}_{government}\right] + b_4\left[{}^{accounting}_{standards}\right] + b_5 \ln\left[{}^{per\ capita}_{GDP}\right] \qquad (9)$$

with the variables as defined above and with the information index either Ψ_j or Υ_j. In alternate regressions, we also substitute *judicial efficiency* for *rule of law* since these two measures are highly correlated ($\rho = 0.737$, p-level = 0.000) and would create multicollinearity problems in the same regression. Although this eliminates our worst collinearity bias, the other institutional variables also generate some multicollinearity. Only the *anti-director rights* index is statistically uncorrelated with the other right-hand side variables. Spanos (1986) suggests overcoming multicollinearity problems by using raw collinear independent variables to build orthogonal regressors. Thus, Table 4 contains regressions with each independent variable, x_k, except *anti-director rights*, replaced by x_k - P[$x_k \mid x_n$, $n \neq k$], where P indicates projection.

The left panel of Table 4 shows regressions with Ψ_j as the dependent variable. The right panel uses Υ_j. The first two columns of each panel show that all the institutional structure measures except accounting standards are highly statistically significant in explaining the information indices over and above any effect *via* GDP. The key institutional variables, *anti-director* rights, *rule of law*, *judicial efficiency*, and *good government* are consistently significantly positive at better than the 5% level.

The surprise is that *accounting standards* appears unrelated to our information indices. While the coefficient of *accounting standards* is positive, it is very insignificant. Mandated accounting standards do not appear to affect stock markets' information content once corporate laws to protect shareholders' rights, other aspects of the legal environment, government characteristics, and income level are controlled for. Perhaps, "good" accounting standards have no real teeth unless there is integrity in the government and the legal system. In other words, while *accounting standards* itself may not increase information content, cross terms of *accounting standards* with *rule of law* or *judicial efficiency* and *good government* might.

To investigate this possibility, we consider regressions of the form of (9), but with varying coefficients. Thus, we model one or the other of the following specifications:

$$\tilde{b}_4 = \gamma_0 + \gamma_2[{}^{rule}_{of\ law}] + \gamma_3[{}^{good}_{government}] \qquad (10)$$

$$\hat{b}_4 = {}'_0 + {}'_2[{}^{judicial}_{efficiency}] + {}'_3[{}^{good}_{government}] \qquad (11)$$

The results of regressions of the form of (9) with parameter substitutions (10) or (11) are shown in the second two columns of each panel in Table 4. Good accounting standards alone again appear unimportant, however, they do appear to matter in strengthening the importance of good government and a sound legal system. In the last two columns of the left panel, using information index Ψ_j, the cross term with rule of law shows that γ_2 has a t-ratio of 3.53. The cross term with ${}'_2$ is less significant, but still has a high t-ratio of 2.42. The estimates of γ_3 and ${}'_3$ are both significant at conventional levels, with t-ratios of 2.95 and 2.90 respectively. In the other panel, which uses the alternate information measure, all the cross terms are highly statistically significant.

Robustness Tests

1. Algebraic Artifacts?

By construction, the dependent variables in Table 4 may be correlated with the number of securities in a country's stock market. If the sign of stock return is random, the law of large numbers would make the f_j in Ψ_j closer to 0.5 as the number of stocks increases and thus make Ψ_j larger. Also, because the market index on the right hand side of (5) is a weighted average of the individual stock returns used as dependent variables, a country with more stocks should have a lower R^2_j and thus a greater Υ_j. Intuitively, in a market with few securities, each individual security is a more important part of the market index.

These considerations point to a possible spurious correlation between our information measures and the number of stocks trading in country. The simple correlation coefficient of the logarithm of the number of listed stocks in a country's market with its Ψ information index is .436 (p = .01) and that with its Υ information index is .490 (p = .002). Nonetheless, Table 2 shows that some countries with many stocks, e.g., Japan, have a high R^2 and f, while others with few stocks, e.g., New Zealand, have a low R^2 and f. Clearly, there is considerable variation around any mechanical artifact. Moreover, the correlations may also reflect the intuition that better functioning stock markets should have more listings, rather than a mere artifact.

To insure that an artifact is not driving our results, Table 5 repeats the regressions in Table 4, but includes the *logarithm of the number of listed stocks* in each country's stock market as an additional control variable. This increases the explanatory power of the country level regressions, but the general pattern of point estimates and significance levels for other variables (except the constant) changes little. It is thus unlikely that our results are an artifact of market size.

Another way to overcome the influence of number of stocks is to constrain the number of stocks we use to construct our information indices. The median number of stocks in the stock markets in our sample is 300. For countries with less than 300 stocks, we use all stocks to construct the information content measures. For countries with more than 300, we randomly select 300 stocks.

We then run the regressions as in Table 4. We repeat the procedure twenty times. Table 6 reports the average of the twenty set of results. They are very similar to those reported in Table 4. Indeed, in every trial, we obtain results qualitatively similar to those reported in Table 4.

We conclude that our results are unlikely to be due to algebraic artifacts.

2. Missing Institutional Structure Variables

We have omitted some potentially interesting independent variables. For example, intercorporate equity cross-holdings may cause equity prices to move together. But cross-holdings also magnify problems due to poor accounting standards by rendering financial statements difficult to interpret. Cross-holdings plausibly also magnify the effects of poor shareholder rights protection by facilitating insiders' self-dealing. These effects are captured by existing variables.

It would be interesting to add more institutional variables, however we believe our existing variables suffice for our purposes. Shareholders' rights, judicial efficiency and honest government all imply well protected property rights and therefore a higher marginal return to information collection. Judicial efficiency and meaningful accounting standards together imply a lower cost to gathering firm specific information.

3. Spurious Wealth Effects?

La Porta *et al*. (1996) find that wealthy economies tend to have more mature stock markets and more mature legal systems. Including the logarithm of *per capita* GDP in all our regression should control for this. The importance of this effect is attested by the significance of this variable in Table 4. The significance of our institutional sophistication variables despite the inclusion of *per capita* GDP implies a deeper effect than a spurious negative correlation of stock price co-movement with investor wealth.

4. Small Economy Effects?

Economy size may matter in several ways. First, economic activity in small countries may be concentrated in a small geographical area, allowing local meteorological effects or other local "acts of God" to have market-wide asset pricing effects. Second, large economies are more likely to be diversified across several industries, while small economies are likely to be more specialized. Third, a few large firms may also comprise a large portion of the economic activity in small economies.

To control for these possibility, we construct three new variables. The first is the logarithm of each country's physical size. The second is a Herfindahl index of industry concentration, based on the market values of firms using Datastream's industry codes (roughly equivalent to 3 digit SIC codes). This variable is high when an economy is concentrated in a few industries and low when it is diversified evenly across many industries. The third is a Herfindahl index of firm market capitalization for each country. This variable is high when a few firms are responsible for most of the value in a country's stock markets, and low when the economy is made up of many small firms.

Geographic size is significantly correlated with neither of our information indices. It is, however, correlated with per capita GDP (ρ = -.37, p = .02), the good government index (ρ = -.30, p = .07), and the judicial efficiency index (ρ = -.28, p = .09). When it is included as an additional orthogonalized independent variable, geographical size is insignificant and materially changes neither the point estimates nor the significance of the other variables.

The two Herfindahl indexes are uncorrelated with both information indices and also uncorrelated with the other independent variables. They are insignificant when added to the regressions, either individually or together. Including them materially alters neither the significance nor the point estimates of the variables of interest.

Also, Table 2 illustrates that stock pricing consonance differs between emerging and rich economies, not between large and small ones. The R^2s of small countries like Denmark, Ireland and New Zealand are low, while those of large countries like Brazil, India and China are high.

We conclude that our results are unlikely to derive from a bias due to country size.

5. Less Firm Specific Risk or More Market Risk?

The R^2 of our regression can be defined as $\sigma^2_\epsilon/(\sigma^2_m + \sigma^2_\epsilon)$ where σ^2_ϵ is the variance due to firm specific price movements and σ^2_m the variance explained by the market. When a country's R^2 is high, is this because σ^2_ϵ is low or because σ^2_m is high? In other words, do emerging markets capitalize less firm specific information into stock prices, or more market-wide information?

Since our hypothesis is about the return to firm specific information relative to that from market wide information, either possibility is consistent with our hypothesis. However, resolving this question allows us to probe more deeply into the reasons why institutional structure matters.

Figure 7 graphs σ^2_ϵ and σ^2_m vs. R^2s for countries in our sample. Both a negative relation between firm specific price movements and R^2s and a positive correlation between variation explained by market indices and R^2s are discernable. Regressions explaining the information indices Ψ_j and Υ_j with σ^2_ϵ and σ^2_m confirm this:

$$\Psi_j = .768 + 4.69\sigma^2_\epsilon - 18.6\sigma^2_m \qquad R^2 = 0.66$$

$$\Upsilon_j = 1.58 + 8.57\sigma^2_\epsilon - 29.4\sigma^2_m \qquad R^2 = 0.71$$

with all regression coefficients significant at probability levels well below one percent.

A greater relative importance of firm specific information appears to involve both more firm specific variation in stock prices and less market wide variation. This has two direct implications.

First, investors in economies with higher information indices are incorporating more firm specific information into stock prices than are investors in low information index countries. This suggests that better institutional features lead investors to gather and use more firm specific information.

Second, stock prices in low information index countries exhibit more market wide variation than do stock prices in high information index countries. This is consistent with low information index countries having greater macroeconomic instability. This could plausibly be due either to weak institutions or to less informative stock prices directly. Political and economic upheavals may be more frequent in countries with underdeveloped institutions, and this could create more market wide fluctuations. Alternatively, a lack of reliable firm specific information might induce more investors to become noise traders, as in Delong *et al*. (1989, 1990a, 1990b, 1991)

6. Noise Traders?

Noise trading is usually modeled as an additional market-wide risk factor, as in Delong *et al*. (1989, 1990a, 1990b, 1991). Markets in which noise traders are important should be characterized by more "in tandem" stock price movements, consistent with our higher R^2 and σ_m^2 estimates in countries with weak institutions. In this context, our findings can be interpreted as suggesting that shareholder rights, judicial soundness and good government curb noise trading; and that stringent accounting standards limit noise trading only in the presence of a sound judicial system.

5. Conclusions

The fundamental function of stock markets is to process information about market-wide and firm-specific events, and thereby guide capital towards its best use. The efficient use of capital has been a core assumption in each generation of economic development theory, e.g. Schumpeter (1934, 1950), Solow (1956), Romer (1986). Gauging stock markets' proficiencies in this function is therefore a central issue in finance and economic development. We propose measures of stock markets' information content, and use them to assess the nimbleness of Adam Smith's invisible hand.

Our underlying idea is that when stock pricing is more based on firm-specific information, stock price movements should be less correlated with the market, and we construct stock market information indices to measure this. These indices are higher, indicating less synchronous price movements, in countries that have better functioning government and legal system as well as more sophisticated accounting standards. These results support the conclusion of La Porta *et al.* (1997a, 1997b) that countries' legal and economic institutions are important.

High information indices are due to both more firm specific variation and less market wide variation in stock prices. We suggest that the former effect may be due to investors perceiving a higher return to gathering and using firm specific information. The latter effect may be due either to low information index countries experiencing more macroeconomic instability, or to these economies' stock markets exhibiting more noise trading.

Our findings address a fundamental intellectual and policy question: What does it take to make a stock market process information as it should? Our evidence suggests the following partial answers: laws protecting investors' property rights, a well-functioning legal system, and government relatively free of corruption and political rent-seeking (Murphy *et al.* 1991, 1993). Better accounting standards are important in countries with efficient legal systems, but appear unimportant in countries with dysfunctional courts. If development theories are correct in stressing the importance of optimal capital accumulation, spastic invisible hands in stock markets may seriously impede the development of institutionally deficient emerging economies.

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Table 1. Typical Stock Return Movements in Selected Emerging Markets Compared to the United States.

	CHINA(N=308)			MALAYSIA(N=349)			POLAND(N=38)			TAIWAN(N=339)			U.S.(N=6889)		
Week	%Up	%Down	%Same	%Up	%Down	%Same	%Up	%Down	%Same	%Up	%Down	%Same	%Up	%Down	%Same
1	0.32	0.61	0.07	0.18	0.73	0.09	0.97	0.03	0.00	0.72	0.20	0.08	0.47	0.29	0.24
2	0.04	0.89	0.06	0.08	0.86	0.06	0.05	0.95	0.00	0.09	0.83	0.08	0.47	0.38	0.15
3	0.06	0.88	0.07	0.22	0.69	0.09	0.59	0.31	0.10	0.15	0.79	0.06	0.49	0.37	0.13
4	0.07	0.88	0.05	0.01	0.95	0.03	0.03	0.92	0.05	0.12	0.82	0.06	0.54	0.32	0.14
5	0.84	0.08	0.07	0.80	0.11	0.09	0.03	0.97	0.00	0.70	0.14	0.16	0.33	0.53	0.15
6	0.07	0.50	0.42	0.92	0.02	0.06	1.00	0.00	0.00	0.87	0.07	0.06	0.44	0.43	0.14
7	0.59	0.31	0.10	0.77	0.14	0.10	0.15	0.77	0.08	0.41	0.47	0.12	0.57	0.30	0.13
8	0.18	0.73	0.09	0.47	0.39	0.13	0.10	0.90	0.00	0.70	0.19	0.11	0.48	0.38	0.14
9	0.71	0.22	0.07	0.28	0.60	0.12	0.82	0.13	0.05	0.19	0.71	0.09	0.42	0.43	0.15
10	0.93	0.04	0.04	0.13	0.77	0.11	0.95	0.05	0.00	0.31	0.58	0.11	0.44	0.42	0.14
11	0.09	0.88	0.03	0.12	0.78	0.09	0.03	0.95	0.03	0.47	0.43	0.11	0.33	0.52	0.15
12	0.41	0.51	0.07	0.66	0.23	0.11	0.00	0.92	0.08	0.40	0.45	0.15	0.50	0.37	0.13
13	0.89	0.07	0.04	0.53	0.34	0.13	0.15	0.67	0.18	0.35	0.56	0.10	0.41	0.44	0.15
14	0.84	0.09	0.06	0.41	0.50	0.08	1.00	0.00	0.00	0.49	0.36	0.15	0.50	0.35	0.15
15	0.21	0.73	0.05	0.15	0.73	0.12	1.00	0.00	0.00	0.37	0.48	0.15	0.47	0.37	0.15
16	0.18	0.75	0.07	0.23	0.66	0.11	0.56	0.38	0.05	0.05	0.90	0.05	0.45	0.40	0.15
17	0.29	0.63	0.08	0.56	0.25	0.19	0.90	0.10	0.00	0.16	0.78	0.06	0.41	0.44	0.15
18	0.05	0.92	0.03	0.06	0.87	0.06	0.08	0.92	0.00	0.31	0.60	0.09	0.50	0.35	0.15
19	0.35	0.56	0.09	0.33	0.57	0.10	0.41	0.49	0.10	0.41	0.48	0.11	0.46	0.40	0.14
20	0.29	0.60	0.11	0.94	0.03	0.03	0.87	0.10	0.03	0.43	0.45	0.12	0.49	0.37	0.14
21	0.89	0.08	0.03	0.21	0.72	0.07	0.00	1.00	0.00	0.24	0.65	0.11	0.42	0.44	0.14
22	0.21	0.76	0.04	0.51	0.42	0.07	0.92	0.05	0.03	0.20	0.69	0.11	0.46	0.39	0.15
23	0.16	0.79	0.05	0.78	0.17	0.05	0.74	0.23	0.03	0.39	0.52	0.10	0.47	0.39	0.14
24	0.55	0.37	0.08	0.16	0.77	0.07	0.36	0.51	0.13	0.09	0.85	0.06	0.44	0.41	0.15
25	0.04	0.84	0.12	0.72	0.18	0.09	0.41	0.49	0.10	0.12	0.82	0.06	0.52	0.34	0.14
26	0.73	0.20	0.07	0.30	0.60	0.09	0.82	0.05	0.13	0.75	0.18	0.07	0.47	0.39	0.14

Based on Datastream daily cum *dividend stock returns.*

Table 2: Countries sorted in the left panel by per capita GDP, averaged over 1992 through 1994, in the middle panel by the fraction of stocks moving together in a typical week, and in the third by market model R^2. The middle panel uses all available weekly returns, the right panel trims returns at ±25%.

country	*number of stocks in markets*	*1995 per capita US$ GDP*	*country*	*fraction of stocks moving in step (f_j)*	country	R^2_j	$R^2 = \frac{\sigma^2_m}{\sigma^2_m + \sigma_\varepsilon} = 1 - \frac{\sigma^2_\varepsilon}{\sigma^2_m + \sigma^2_\varepsilon}$	
							σ^2_ε	σ^2_m
Japan	2276	$ 33,190	United States	57.9%	United States	2.2%	0.1740	0.0037
Denmark	264	$ 27,174	Canada	58.3%	Canada	6.5%	0.1898	0.0125
Norway	138	$ 25,336	France	59.2%	France	7.5%	0.0870	0.0071
Germany	1232	$ 24,343	Germany	61.1%	Australia	7.6%	0.1486	0.0102
United States	7241	$ 24,343	Portugal	61.2%	U.K.	8.1%	0.0676	0.0045
Austria	139	$ 23,861	Australia	61.4%	Denmark	8.7%	0.0590	0.0048
Sweden	264	$ 23,861	U.K.	63.1%	Ireland	9.2%	0.0729	0.0045
France	982	$ 23,156	Denmark	63.1%	New Zealand	9.3%	0.1108	0.0076
Belgium	283	$ 21,590	New Zealand	64.6%	Germany	10.2%	0.0670	0.0086
Holland	100	$ 20,952	Brazil	64.7%	Holland	10.4%	0.0514	0.0059
Singapore	381	$ 20,131	Holland	64.7%	Portugal	11.8%	0.0836	0.0061
Hong Kong	502	$ 19,930	Belgium	65.0%	Belgium	13.1%	0.0472	0.0081
Canada	815	$ 19,149	Ireland	65.7%	Korea	13.7%	0.1740	0.0362
Finland	104	$ 18,770	Pakistan	66.1%	Austria	13.9%	0.0606	0.0062
Italy	312	$ 18,770	Sweden	66.1%	Indonesia	14.5%	0.1272	0.0207
Australia	654	$ 17,327	Austria	66.2%	Norway	14.5%	0.0859	0.0116
U.K.	1628	$ 17,154	Italy	66.6%	Philippines	15.4%	0.1454	0.0285
Ireland	70	$ 14,186	Norway	66.6%	Pakistan	15.6%	0.1402	0.0297
New Zealand	137	$ 12,965	Japan	66.6%	Sweden	16.1%	0.0841	0.0139
Spain	144	$ 12,965	Chile	66.9%	Chile	17.9%	0.0859	0.0227
Taiwan	353	$ 10,698	Spain	67.0%	Hong Kong	18.2%	0.1183	0.0208
Portugal	90	$ 9,045	Indonesia	67.1%	Brazil	18.5%	0.1427	0.0274
Korea	461	$ 7,555	South Africa	67.2%	Spain	19.9%	0.0666	0.0158
Greece	248	$ 7,332	Thailand	67.4%	South Africa	20.1%	0.0744	0.0183
Mexico	187	$ 3,944	Hong Kong	67.8%	Finland	20.3%	0.1134	0.0188
Chile	190	$ 3,361	Philippines	68.8%	India	20.4%	0.1316	0.0307
Malaysia	362	$ 3,328	Finland	68.9%	Singapore	21.2%	0.1016	0.0240
Brazil	398	$ 3,134	Czech	69.1%	Columbia	21.5%	0.0945	0.0249
Czech	87	$ 3,072	India	69.5%	Peru	22.0%	0.1283	0.0520
South Africa	93	$ 2,864	Singapore	69.7%	Italy	22.1%	0.0731	0.0164
Turkey	188	$ 2,618	Greece	69.7%	Japan	22.3%	0.1106	0.0337
Poland	45	$ 2,322	Korea	70.3%	Thailand	23.2%	0.1090	0.0406
Thailand	368	$ 2,186	Peru	70.5%	Czech	24.2%	0.1251	0.0284
Peru	81	$ 1,920	Mexico	71.2%	Greece	25.8%	0.1028	0.0244
Columbia	48	$ 1,510	Columbia	72.3%	Mexico	28.3%	0.1285	0.0524
Philippines	171	$ 880	Turkey	74.4%	Turkey	30.5%	0.2184	0.1414
Indonesia	218	$ 735	Malaysia	75.4%	Taiwan	35.5%	0.0835	0.0584
China	323	$ 455	Taiwan	76.3%	Malaysia	35.9%	0.0788	0.0593
Pakistan	120	$ 424	China	80.0%	China	46.5%	0.0791	0.0656
India	467	$ 302	Poland	80.9%	Poland	56.9%	0.1181	0.1556

Stock market data is missing in 1993 and 1994 for Poland and Brazil, and in 1993 for the Czech Republic. All Wilcoxon and Kuiper statistics are significant at 1%, indicating other countries' R^2s significantly differ from that of the US.

Table 3: Univariate Statistics and Simple Correlation Coefficients Between Information Content Indices, Ψ_j and Υ_j, and Legal and Institutional Environment Variables.

variables	*mean*	*standard deviation*	*minimum*	*maximum*	*correlation with Ψ*	*correlation with Υ_j*	*correlation with ln(I)*
Information Content Measures							
Average Fraction of Stocks Moving the Same Direction as the Market (f_j)	*.659*	*.052*	*.569*	*.772*	*-.993* *(.00)*	*-.900* *(.00)*	*-.509* *(.00)*
Information Content Index based on the f_j for country j (Ψ_j)	*.808*	*.501*	*-.180*	*1.837*	*1.00* *(.00)*	*.909* *(.00)*	*.512* *(.00)*
R square of market model based on weekly data for country j	*.169*	*.099*	*.0211*	*.429*	*-.888* *(.00)*	*-.949* *(.00)*	*-.415* *(.01)*
Information Content Index based on the R_j^2 for country j (Υ_j)	*1.764*	*.758*	*.285*	*3.838*	*.909* *(.00)*	*1.00* *(.00)*	*.457* *(.00)*
Institutional Structure Indices							
Logarithm of Per Capital GDP	*8.940*	*1.295*	*5.705*	*10.410*	*.512* *(.00)*	*.457* *(.00)*	*1.000* *(.00)*
Anti-director Rights Index	*2.541*	*1.238*	*0*	*5*	*.280* *(.09)*	*.351* *(.03)*	*-.008* *(.96)*
Rule of Law Index	*7.433*	*2.540*	*2.08*	*10*	*.589* *(.00)*	*.525* *(.00)*	*.899* *(.00)*
Judicial Efficiency	*7.777*	*2.213*	*2.5*	*10*	*.413* *(.01)*	*.460* *(.00)*	*.722* *(.00)*
Good Government Index	*23.920*	*4.982*	*12.94*	*29.59*	*.552* *(.00)*	*.527* *(.00)*	*.919* *(.00)*
Accounting Standards Index	*63.735*	*10.869*	*36.0*	*83*	*.237* *(.18)*	*.230* *(.19)*	*.442* *(.01)*

Sample = 37 countries. The Accounting Standards Index is available for 34 countries (The Index is not available for Ireland, Pakistan, and Indonesia). Numbers in parenthesis are probability levels at which the null hypothesis of zero correlation can be rejected.

Table 4: Regressions of stock market information content indices, constructed using all available firms for each country, on variables capturing legal protection to shareholders rights, as well as legal, governmental, and institutional environment, controlling for per capita GDP. The dependent variables are our proposed measures of information content, Ψ_j in the left panel and Υ_j in right panel, all estimated using 1995 data. The independent variables are averaged over 1992 to 1995.

Dependent Variable	***Ψ is an inverse logistic transformation of the fraction of stocks moving together***				**ϒ is an inverse logistic transformation of the R_j^2s of regressions of stock returns on market indices**			
	(4a.1)	***(4a.2)***	***(4a.3)***	***(4a.4)***	***(4b.1)***	***(4b.2)***	***(4b.3)***	***(4b.4)***
Intercept	0.504	0.504	0.504	0.504	1.182	1.182	1.182	1.182
	(3.22)	(3.05)	(3.00)	(3.06)	(5.07)	(5.12)	(4.98)	(4.94)
Anti-director Rights Index	0.118	0.118	0.118	0.118	0.223	0.223	0.223	0.223
	(2.11)	(2.08)	(2.04)	(2.01)	(2.66)	(2.69)	(2.62)	(2.60)
Rule of Law Index	1.001	-	33.589	-	1.300	-	43.613	-
	(4.35)		(4.20)		(3.79)		(3.72)	
Judicial Efficiency Index	-	0.253	-	7.383	-	0.415	-	12.099
		(2.90)		(2.80)		(3.27)		(3.16)
Good Government Index	0.619	0.467	21.573	3.589	0.851	0.642	29.660	4.934
	(4.19)	(4.13)	(4.04)	(3.98)	(3.87)	(3.90)	(3.80)	(3.77)
Accounting Standards Index	0.010	0.010	0.431	0.233	0.010	0.010	0.425	0.229
	(0.95)	(0.94)	(0.92)	(0.90)	(0.63)	(0.64)	(0.62)	(0.61)
Accounting Std. × Rule of Law Indices	-	-	0.599	-	-	-	0.770	-
			(3.53)				(3.10)	
Accounting Std. × Judic. Ef. Indices	-	-	-	0.149	-	-	-	0.228
				(2.42)				(2.54)
Accounting Std. × Good Govt. Indices	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]			[illegible]	[illegible]
log(per capita GDP)	1.472	1.294	1.504	1.308	1.920	1.387	1.961	1.706
	(4.09)	(4.03)	(3.95)	(3.89)	(3.58)	(3.62)	(3.52)	(3.49)
R^2	0.480	0.465	0.481	0.466	0.476	0.486	0.496	0.489

Sample size is 34 counties, due to missing data for China, Czech Republic, Indonesia, Ireland, Pakistan, and Poland. Numbers in parenthesis are t-ratios.

a. To avoid multicollinearity, we enter the independent variables as components uncorrelated with all other independent variables; that is x_i - P[x_i| x_k k i]. Anti-director rights, which is uncorrelated to the other independent variables, is not orthogonalized in this way.

Table 5: Regressions of stock market information content indices, constructed using all available firms for each country, on variables capturing legal protection to shareholders rights, as well as legal, governmental, and institutional environment, controlling for per capita GDP and the number of stocks listed in each country's stock markets. The dependent variables are our proposed measures of information content, Ψ_j in the left panel and Υ_j in right panel, all estimated using 1995 data. The independent variables are averaged over 1992 to 1994[a].

Dependent Variable	*Ψ is an inverse logistic transformation of the fraction of stocks moving together*				*ϒ is an inverse logistic transformation of the R_j^2s of regressions of stock returns on market indices*			
	(5a.1)	*(5a.2)*	*(5a.3)*	*(5a.4)*	*(5b.1)*	*(5b.2)*	*(5b.3)*	*(5b.4)*
Intercept	-0.051	-0.084	-0.072	-0.113	0.536	0.550	0.556	0.543
	(0.12)	(0.20)	(0.17)	(0.26)	(0.86)	(0.89)	(0.86)	(0.84)
Anti-director Rights Index	0.086	0.084	0.085	0.083	0.185	0.186	0.186	0.186
	(1.45)	(1.41)	(1.38)	(1.33)	(2.06)	(2.09)	(2.03)	(2.01)
Rule of Law Index	0.873	-	29.148	-	1.151	-	38.784	-
	(3.60)		(3.46)		(3.14)		(3.09)	
Judicial Efficiency Index	-	0.210	-	6.065	-	0.369	-	10.733
		(2.34)		(2.23)		(2.77)		(2.66)
Good Government Index	0.543	0.407	18.845	3.103	0.763	0.578	26.695	4.430
	(3.53)	(3.46)	(3.39)	(3.31)	(3.28)	(3.32)	(3.22)	(3.19)
Accounting Standards Index	0.004	0.004	.182	0.089	0.003	0.004	0.155	0.081
	(0.40)	(0.37)	(0.37)	(0.33)	(0.20)	(0.21)	(0.21)	(0.20)
Accounting Std. × Rule of Law Indices	-	-	0.496	-	-	-	0.658	-
			(2.73)				(2.43)	
Accounting Std. × Judic. Ef. Indices	-	-	-	0.114	-	-	-	0.191
				(1.76)				(1.99)
Accounting Std. × Good Govt. Indices	-	-	0.322	0.059	-	-	0.440	0.081
			(2.25)	(2.18)			(2.06)	(2.04)
log(per capita GDP)	1.255	1.091	1.274	1.093	1.667	1.469	1.710	1.483
	(3.27)	(3.20)	(3.13)	(3.06)	(2.87)	(2.91)	(2.82)	(2.79)
log(number of listed stocks)	0.112	0.118	0.116	0.124	0.130	0.127	0.126	0.129
	(1.44)	(1.52)	(1.43)	(1.51)	(1.11)	(1.10)	(1.05)	(1.06)
R^2	0.518	0.507	0.521	0.510	0.499	0.508	0.517	0.511

Sample size is 34 counties, due to missing data for China, Czech Republic, Indonesia, Ireland, Pakistan, and Poland.. Numbers in parenthesis are t-ratios.

[a] *To avoid multicollinearity, we enter the independent variables as components uncorrelated with all other independent variables; that is x_i - P[x_i| x_k k   i]. Anti-director rights, which is uncorrelated to the other independent variables, is not orthogonalized in this way.*

Table 6: Bootstrap analysis of regressions of stock market information content indices, constructed using 300 randomly selected firms from each country, on variables capturing legal protection to shareholders' rights, as well as legal, governmental, and institutional environment. [a] **The dependent variables are our proposed measures of information content, Ψ_j in the left panel and Υ_j in the right panel, all estimated using 1995 data. The independent variables are averaged over 1992 to 1994.** [b]

Dependent Variable	*Ψ is an inverse logistic transformation of the fraction of stocks moving together*				*Υ is an inverse logistic transformation of the R_j^2s of regressions of stock returns on market indices*			
	(6a.1)	(6a.2)	(6a.3)	(6a.4)	(6b.1)	(6b.2)	(6b.3)	(6b.4)
Intercept	0.485	0.485	0.485	0.485	1.200	1.200	1.200	1.200
	(2.99)	(2.95)	(2.89)	(2.84)	(5.29)	(5.29)	(5.17)	(5.11)
Anti-director Rights	0.125	0.125	0.125	0.125	0.210	0.210	0.210	0.210
Index	(2.16)	(2.13)	(2.09)	(2.05)	(2.58)	(2.58)	(2.52)	(2.49)
Rule of Law Index	1.029	-	34.526	-	1.196	-	40.139	-
	(4.31)		(4.17)		(3.58)		(3.50)	
Judicial Efficiency	-	0.260	-	7.575	-	0.353	-	10.282
Index		(2.87)		(2.77)		(2.83)		(2.73)
Good Government	0.639	0.482	22.273	3.705	0.771	0.582	26.876	4.471
Index	(4.17)	(4.11)	(4.03)	(3.97)	(3.60)	(3.60)	(3.52)	(3.48)
Accounting	0.012	0.012	0.501	0.271	0.005	0.005	0.207	0.112
Standards Index	(1.06)	(1.05)	(1.03)	(1.01)	(0.31)	(0.31)	(0.31)	(0.30)
Accounting Std. ×	-	-	0.626	-	-	-	0.676	-
Rule of Law Indices			(3.56)				(2.78)	
Accounting Std. ×	-	-	-	0.156	-	-	-	0.185
Judic. Ef. Indices				(2.44)				(2.10)
Accounting Std. ×	-	-	0.422	0.079	-	-	0.445	0.083
Good Govt. Indices			(3.01)	(2.96)			(2.29)	(2.27)
log(per capita GDP)	1.502	1.320	1.534	1.334	1.710	1.503	1.747	1.520
	(4.02)	(3.97)	(3.89)	(3.83)	(3.28)	(3.28)	(3.20)	(3.17)
R^2	0.476	0.460	0.478	0.461	0.460	0.461	0.476	0.464

Sample size is 34 counties, due to missing data for China, Czech Republic, Indonesia, Ireland, Pakistan, and Poland.

[a.] *Numbers in parenthesis are average t-ratios for regressions over twenty randomly selected subsamples. The t-ratios for individual subsample regressions are quite similar to the averages and to each other in all twenty trials.*

[b.] *To avoid multicollinearity, we enter the independent variables as components uncorrelated with all other independent variables; that is x_i - $P[x_i | x_k \; k \quad i]$. Anti-director rights, which is uncorrelated to the other independent variables, is not orthogonalized in this way.*

Figure 1: The Fraction of Stocks Moving Up in Price in Each Week of 1995

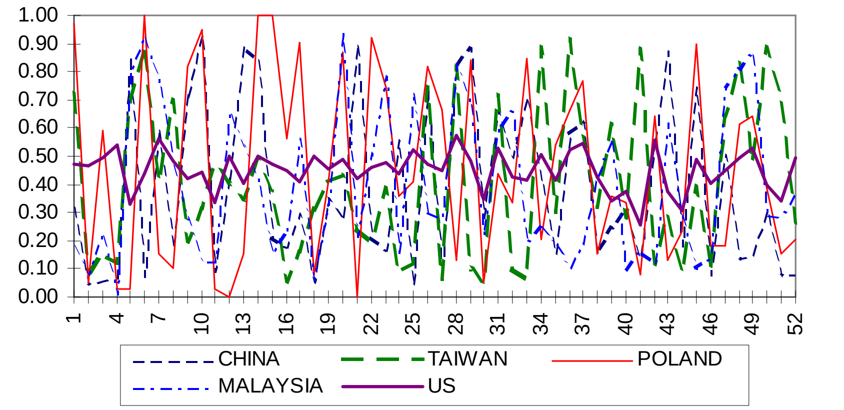


Figure 2: The fraction of US Stock Prices Moving Together from 1926 to 1995

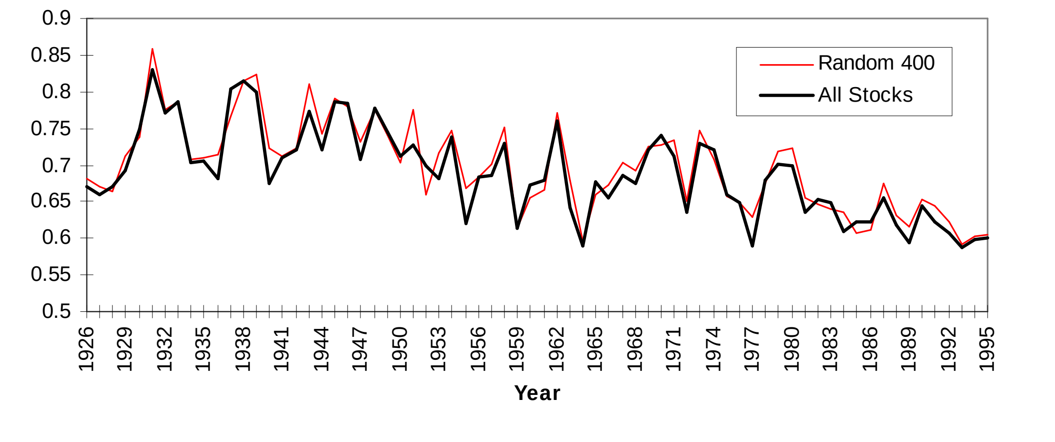


Figure 3: Average R2 Across Stocks Based on Monthly Returns from 1926 to 1995

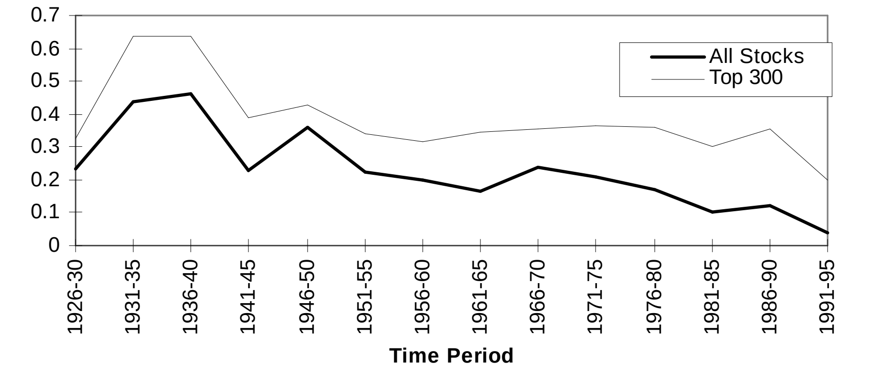


Figure 4: Variations Unexplained (SSE) and Explained (SSR) by Market Returns

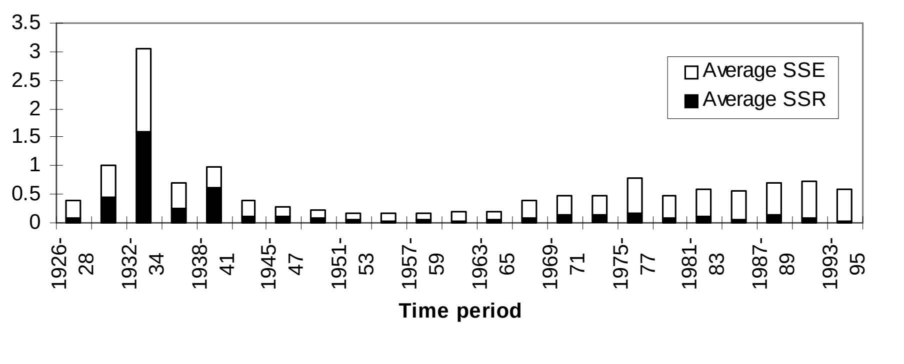


Figure 5a: The Harmony in Stock Price Movements in Various Countries

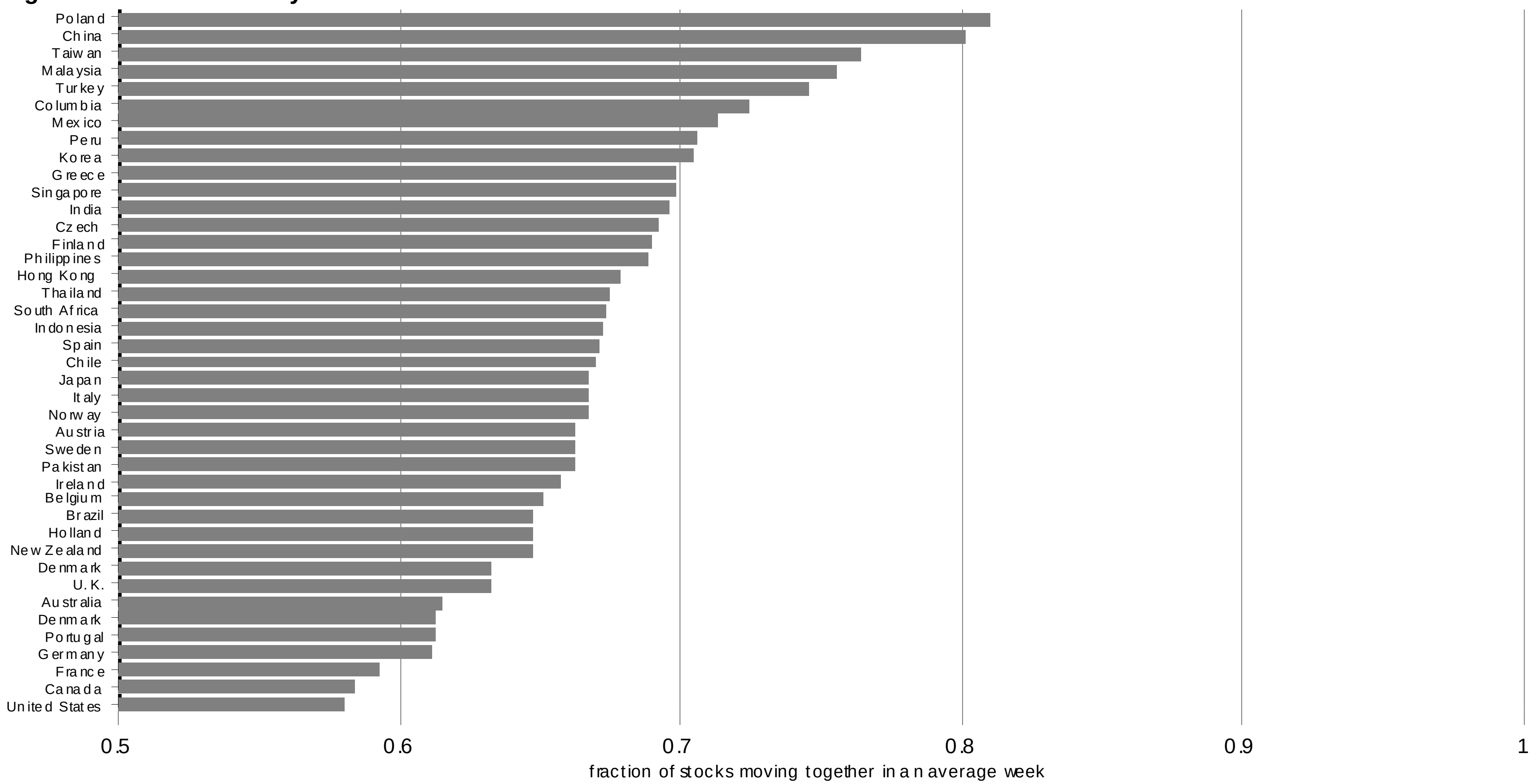


Figure 5b: Average Fraction of Stock Price Variation Explained by the Market

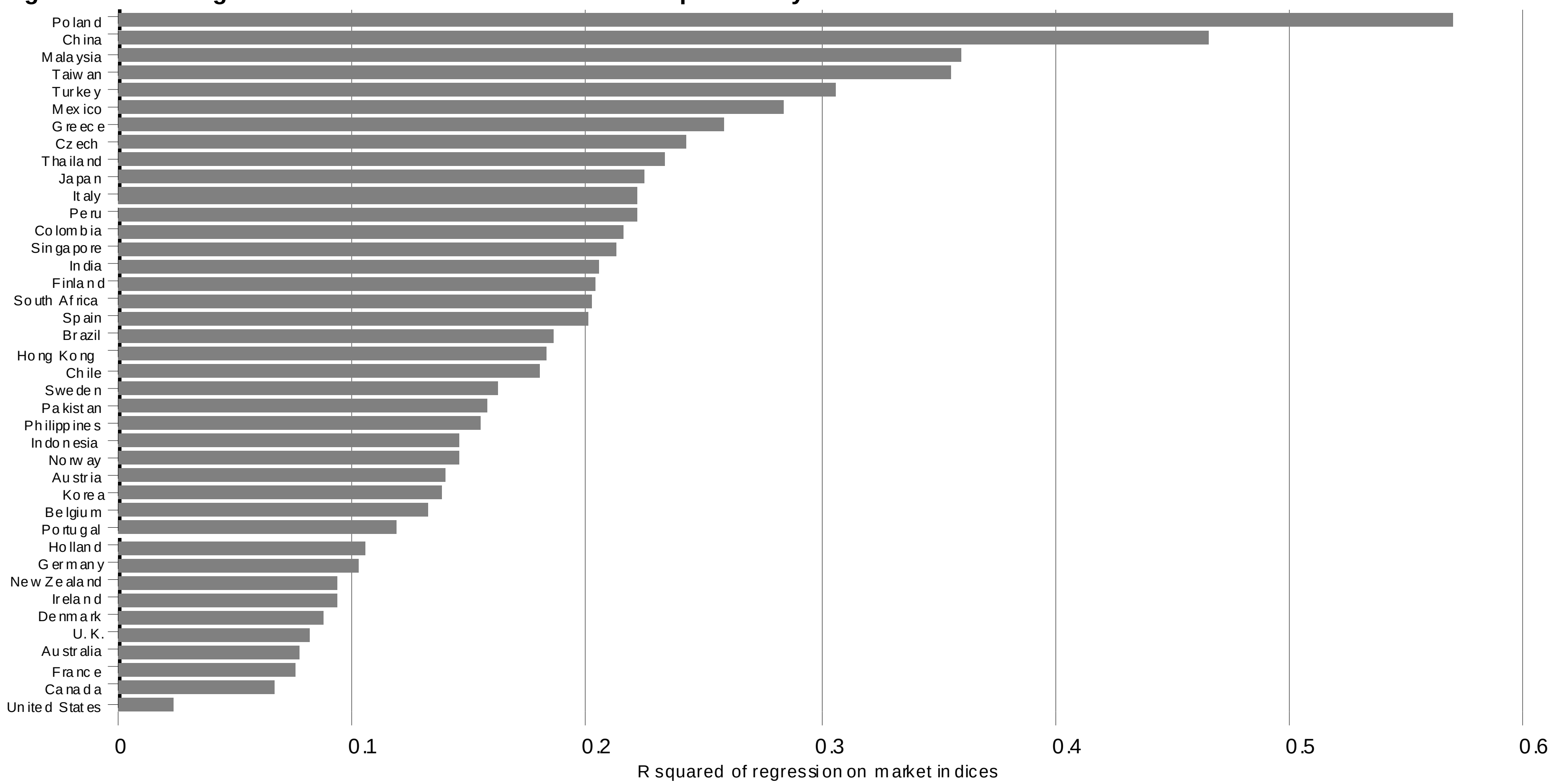


Figure 6a: Harmony in Stock Markets vs. Per Capita GDP

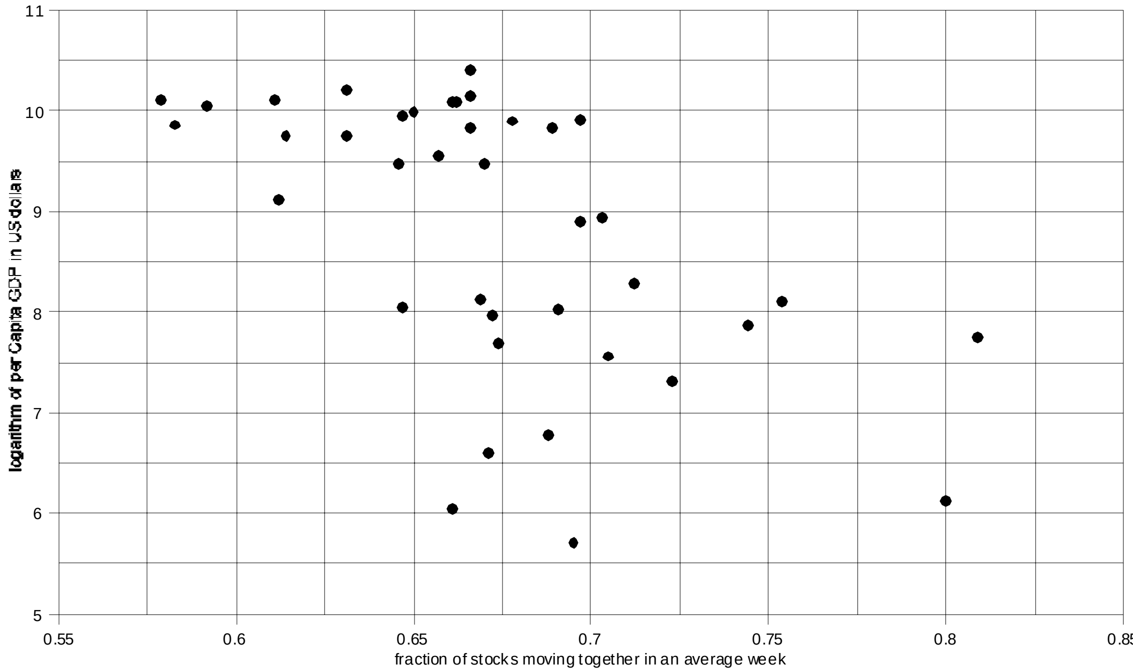


Figure 6b: The Importance of Market Returns vs. Per Capita GDP

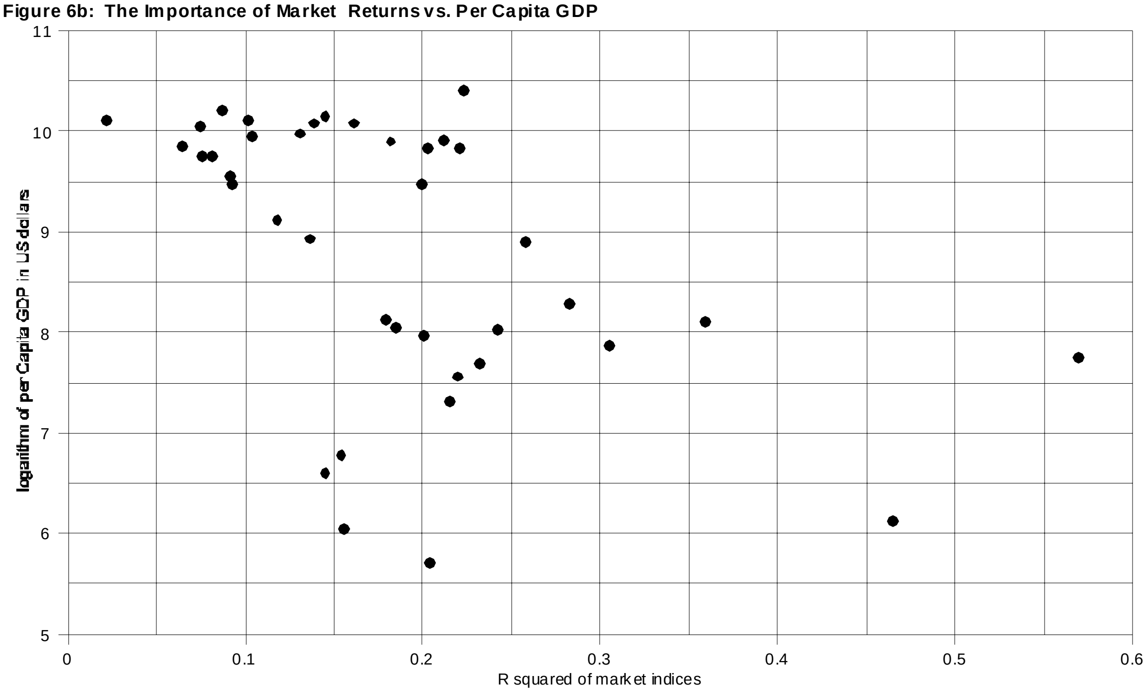
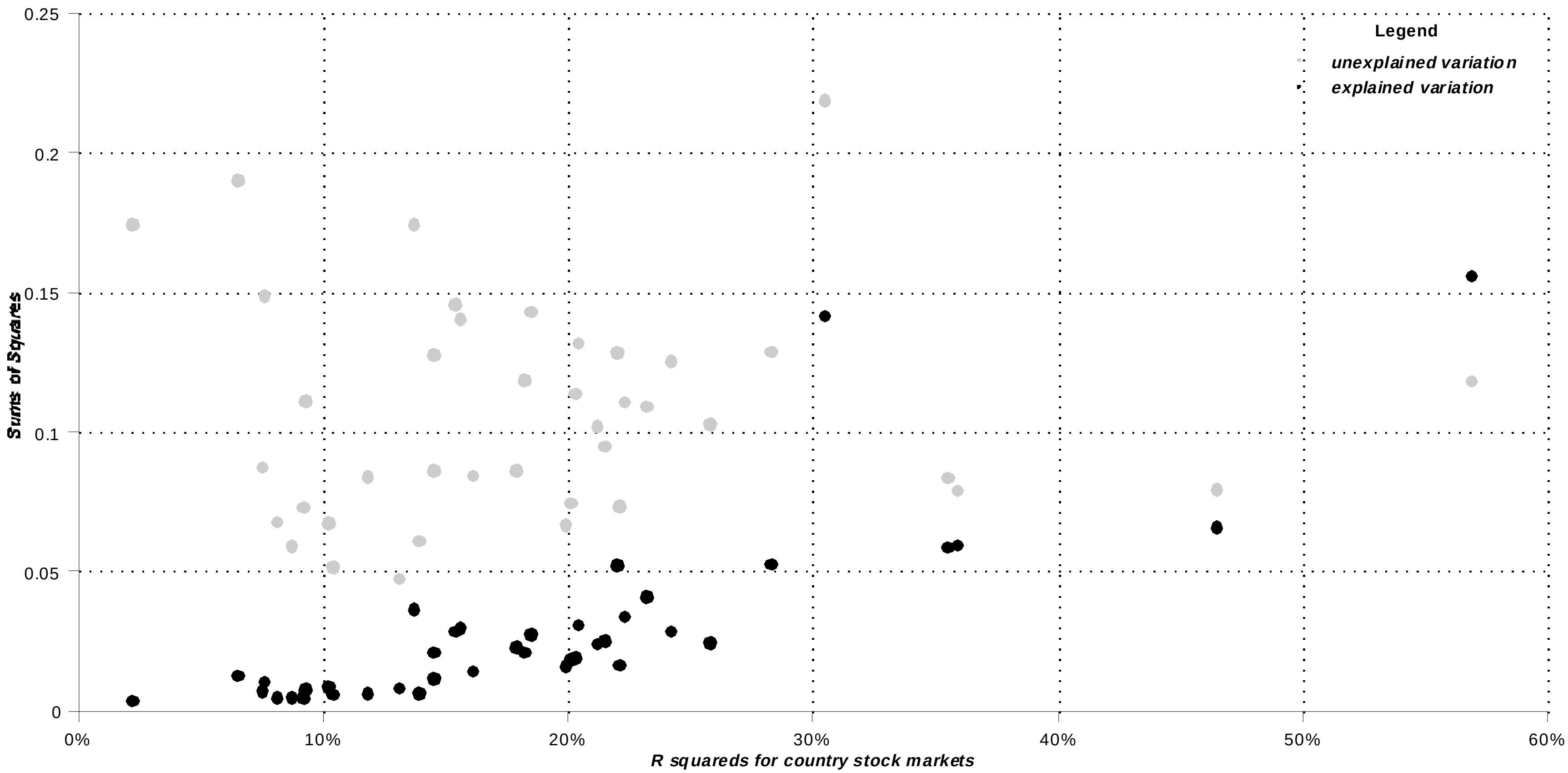


Figure 7. Explained Variation (σ_m^2) and unexplained variation (σ_ε^2) versus R^2s for regressions of stock returns on market indices. Each observation is for one country.



Notes

1. At present we only have a long panel of returns for the US. We are beginning our exploration of other advanced economies' historical patterns.

2. We calculate $f_{jt} = \frac{\max[n_{jt}^{up}, n_{jt}^{down}]}{n_{jt}^{up} + n_{jt}^{down}}$ where n_{jt}^{up} is the number of stocks in country j whose prices rise in week t and n_{jt}^{down} is the number of stocks whose prices fall. For each country j we calculate f_{US} - f_j. The variance of the estimate is approximately $\frac{f_{US}(1-f_{US})}{n_{US}} + \frac{f_j(1-f_j)}{n_j}$, assuming that f_{US} and f_j are uncorrelated. By the Central Limit Theorem, the statistic $(f_{US} - f_j)\left[\frac{f_{US}(1-f_{US})}{n_{US}} + \frac{f_j(1-f_j)}{n_j}\right]^{-1/2}$ is approximately normal for sample sizes n_{US} and n_j sufficiently large.

3. The impact of macroeconomic information on firm prices varies according to industry and firm specific characteristics, however. For instances, the opening up of trade conceivably increases the stock prices of firms in exporting sector and does the opposite to firms in import substitute sectors. The more investors know about firm specific characteristics, the more the impact varies across firms.

4. By averaging over several years, we reduce the transitory noise. Our GDP per capita variable is averaged over 1992 to 1994 instead of 1993 to 1995 because we do not have a complete set of 1995 GDP data.

5. We include only stocks which are actively traded at least 30 out of 52 weeks. We need to have sufficient observations to reliably assess the market returns explanatory power on each stock. Thus, we are losing information on newly traded stocks which have been traded for roughly less than five months in a year and stocks which are about to be delisted. When trading of a stock is suspended, the returns data during the suspension period are coded as missing and excluded from our regressions.