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Time Varying Synchronicity in Individual Stock Returns: A Cross-Country Comparison

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Abstract:

This paper compares the synchronicity of individual stock returns in different countries. For the US, Morck et al (2000) and Campbell et al (2001) show that the US in the post war period experienced an increase in firm specific stock return variations and thus a reduction in synchronicity. We show that a similar international trend, albeit weaker, is visible for many countries. Using both regression analyses and country case studies we find the trend to be related to capital market openness but not goods market openness. Moreover, the negative relationship between capital market openness and synchronicity is magnified by institutional integrity (good government).

Time Varying Synchronicity in Individual Stock Returns:

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The price system is just one of those formations which man has learned to use (though he is still very far from having learned to make the best use of it) after he has stumbled upon it without understanding it.

Friedrich August von Hayek (1945)

1. Introduction

The extent to which individual stock prices move together is known to vary both across countries and over time. Morck *et al.* (2000) show that stock prices in low-income economies move much more synchronously than those in high-income economies in the mid 1990s. Campbell *et al.* (2001) and Morck *et al.* (2000) document a marked increase over several decades in firm-specific variation in US stock returns, and a consequent decline in the synchronicity of stock price movements in that country.

In this paper, we document analogous downward trends in the synchronicity individual stock return in some, but not all countries. Panel regressions show that falling synchronicity and rising firm-specific variation are more evident in emerging market economies with relatively open capital markets. This effect is most evident in emerging market economies with sound institutions. Indeed, capital market openness in the absence of sound institutions does not appear to lower synchronicity, and might actually raise it. Similar effects are not evident for trade openness. Detailed clinical studies of changing synchronicity in certain individual countries that

underwent substantial institutional reforms combined with financial openness show subsequent increases in firm-specific variation and declines in the synchronicity of individual stock returns.

Tobin (1982) defined the stock market as more *functional-form efficient* if stock price changes induce a more economically efficient allocation of capital goods. A key purpose of institutional reforms is increased functional form efficiency – through better corporate governance and better allocation of capital into the hands of better managers. We argue that deeper reforms should magnify differences between the stock returns of better and worse governed firms. This may reflect either greater firm-specific variation in fundamental values or a better reflection of this variation in stock returns, or both.

We therefore propose that comprehensive reforms leads to greater firm-specific variation in stock returns. Indeed, we speculate that changes in the synchronicity of individual stock returns, and increases in firm-specific return variation in particular, might be useful measures of the depth of institutional reform in different countries. Other measures of changes in institutional development certainly exist. But most are dependent on survey results, with all the attendant methodological problems. This measure, if it can be interpreted as we propose, has the advantage of being objectively observable and reproducible. It can also be estimated over any desired time frame, or for specific segments of an economy.

The remainder of the paper is arranged as follows. Section two describes our conceptual starting point, the empirical evidence supporting it, and its consistency with other work. Section three describes our methodology and section four porrects the board patterns of changes in firm-specific returns variation across countries during the 1990s. Section five presents panel regressions using openness and institutional development to explain synchronicity. Section six

presents more detailed clinic investigations of changes in the levels of firm-specific variation in the stock returns of specific countries. Section seven concludes.

2. Backgrounds and Motivation

2.1 Recent Work on Synchronicity

Synchronicity is the extent to which individual stock prices move up and down *en masse*. Synchronicity can be measured in many ways. The papers discussed below measure asynchronicity primarily by the magnitude of the variation in individual stock returns that is not explained by market returns. This can be measured either in absolute terms or as a fraction of total returns variation. In the analysis below, we use the same measures and then use the proportion of stocks moving with the majority and the average correlation of the returns of randomly selected pairs of stocks as robustness checks. High synchronicity indicates that stock prices are driven by aggregate factors, and that firm-specific determinants of value are relatively unimportant.

In recent years, differences in stock return synchronicity, or asynchronicity, have become the subject of systematic research. Campbell *et al.* (2001) and Morck *et al.* (2000) both document a substantial increase in absolute levels of firm-specific returns variation over the decades of the twentieth century in US stocks. Morck *et al.* (2000) show that firm-specific variation also rises as a fraction of total variation.

Using individual stock returns from a cross section of countries, Morck *et al.* (2000) find that firm-specific variation is a greater part of total variation in countries with well-developed financial systems; such as the, Australia, Canada, Denmark, Ireland, the United Kingdom, and the United States; and a lower part of total variation in emerging markets, such as China, India,

Pakistan, and the Philippines. They are unable to explain these differences as due to differences in macroeconomic stability, country or market size, economy structure, or fundamentals synchronicity. Rather, they show that greater official corruption is highly correlated with more synchronous stock returns and that, in countries with below average corruption, stronger investor protection laws are associated with higher firm-specific variation. They posit several explanations: Intercorporate tunneling might harmonize stock returns; better institutions might reduce the cost of gathering firm-specific information and using it to reliably value firms and make profitable firm-specific arbitrage plays; or market wide noise trader risk might be greater in countries with worse institutions. Regardless of the underlying mechanism, they posit that, all else equal, synchronicity in individual stock returns might be a sign of a murky stock market.

2.2 Why Stock Price Synchronicity Matters

Changing stock return synchronicity might be economically important for a number of reasons. These fall into two general classes.

The first class of reasons relates to how the synchronicity in individual returns affects portfolio risk calculations and option valuation. In discussing their finding of increasing firm-specific variation in individual US stocks, Campbell *et al.* (2001) note that many investors are not fully diversified, and so are exposed to greater risk when firm-specific variation is greater. They further show that greater firm-specific variation in individual asset prices means investors need larger portfolios to diversify fully. Campbell *et al.* (2001) also point out that greater firm-specific variation should affect option prices, as the Black Scholes equation and other option valuation techniques depend on the sum of firm-specific and market-related variation in the return of the underlying asset. They also point out that, as firm specific stock return variations are more

volatile, event studies become less sharp in identifying abnormal returns of a given size and incidence.

The second general class of reasons for studying stock return synchronicity has to do with its implications regarding the real economy. We now review each of these reasons in turn.

First, the synchronicity of stock returns may be symptomatic of market inefficiencies. Campbell *et al.* (2001) point out that arbitrage is more risky if firm-specific variation is greater because arbitrageurs necessarily take large undiversified stakes. However, Roll (1988) shows that firm-specific variation is not associated with public information release, and consequently argues that firm-specific stock price movements reflect trading by arbitrageurs with private information. Extending this reasoning, Morck *et al.* (2000) argue that large firm-specific price movements may be evidence of more active arbitrage.

Campbell *et al.* (2001) and Morck *et al.* (2000) are not inconsistent, for an exogenous increase in the return to arbitrage trading could lead to more arbitrage despite higher risks. Morck *et al.* (2000), viewing firm-specific variation as endogenous, posit that lower information gathering costs, better access to capital, and more secure property rights over trading profits all stimulate informed trading of the sort that Roll (1888) links to firm-specific price changes.[1] Campbell *et al.* (2001), viewing firm-specific variation as exogenous, argue that such price changes increase the risk exposure of informed arbitrageurs. Clearly, this point is correct. Whether an increase in firm-specific variation is exogenous or caused by other informed arbitrageurs, it qualifies as risk to any given investor, and so might dampen further informed arbitrage. The extent to which reductions in arbitrageurs' operating costs or increases in their

[1] Durnev et al. (2002) elaborate on this reasoning in terms of the model of costly arbitrage and definition of stock price informativeness proposed by Grossman and Stiglitz (1980).

trading profits lead, *ceteris paribus*, to the capitalization of more information into prices must reflect a tradeoff between these countervailing factors.

Second, the synchronicity of stock returns has implications for corporate governance. When a firm's stock price falls, various corporate governance mechanisms come into play. Morck *et al.* (1989) show that boards dismiss the chief executive officer (CEO) in response to negative firm-specific stock market performance, but not negative industry or market movements. They suggest that boards have difficulty assigning blame for downturns that affect more than the firm alone. Other corporate governance mechanisms, such as shareholder lawsuits, proxy contests, institutional investor pressure, executive stock options, and the like all depend on firm-specific share price changes distinguishing well-run from poorly-run companies. On the whole, corporate governance mechanisms are more effective the more differentiable firm-specific performance is from general trends.

Third, economic growth is thought to arise more from technological change than from mere capital accumulation. Technological change, as discussed by Schumpeter (1914) and modeled by e.g. Romer (1986), posits that innovative firms grow rapidly and displace established industry leaders in a process of creative destruction. The more intense this creative destruction is, the more the fundamental values of successful innovators and other firms should differ. Thus, a faster pace of creative destruction might cause larger firm-specific stock price changes. This point is not necessarily independent of the previous two, for King and Levine (1993) find evidence, consistent with the view of Schumpeter (1914), that a well-developed financial system is a prerequisite to fast-paced creative destruction.

2.3 Recent Work on Synchronicity, Arbitrage, and the Real Economy

A growing body of recent work investigates linkages between synchronicity and the real economy as well as the regulatory environment of the stock market.

Synchronicity appears to be inversely related to the quality of capital allocations decisions. Wurgler (2000) shows capital flows to be more responsive to value-added in countries where firm-specific variation is a greater part of the total variation in individual stock returns. This suggests that capital moves faster to its highest value uses where stocks move more asynchronously. That is, stock markets in which firm-specific variation is a larger fraction of total variation are more functionally efficient in the sense of Tobin (1982).

Also in this vein, Durnev *et al.* (2002b) show that US industries in which stock prices move more idiosyncratically also exhibit fewer signs of both overinvestment and underinvestment, as measured by the deviation of Tobin's marginal q ratios above and below their optimal value of approximately one. They propose that firm-specific stock return variation merits serious consideration as a measure of stock price informativeness, as defined by Grossman and Stiglitz (1980). In essence, they argue that more firm-specific information in stock prices facilitates more efficient investment. That is, the informational efficiency of the stock market matters to the real economy.

This proposal implies an empirical relationship between synchronicity and other measures of stock price informativeness, or at least of conditions plausibly inducive of informed arbitrage. Morck *et al.* (2000) speculate that stock returns might be less synchronous where institutions are stronger because strong institutions are conducive to informed risk arbitrage, which leads to more informed stock prices. A growing body of evidence appears consistent with such a linkage.

Beny (2000) finds a significant positive correlation between the stringency of a country's

prohibitions against insider trading and the asynchronicity of individual stock returns. She interprets the result as indicating that "in countries with tougher insider trading laws stock prices are more informationally efficient."

Bushman *et al.* (2002) find that stock returns exhibit greater firm-specific returns variation in countries with more developed financial analysis industries and with a freer press. This links greater firm-specific variation to cheaper and more accurate information.

Goetzmann and Masso (2002) find that stock prices exhibit greater firm-specific variation in countries that permit short sales. This links greater firm-specific variation in individual asset prices to institutional arrangements that let arbitrageurs better capture quasirents associated with private information.

Fox *et al.* (2002) find firm-specific price variation to be significantly higher in the years following a major historical tightening in US disclosure law than in prior years for the most affected stocks, but not for other stocks. This again links greater firm-specific variation to freer information flow.

Durnev *et al*. (2002a) show returns more accurately predicting future earnings changes in industries with less synchronous returns, as measured by average market model R^2 statistics. Collins *et al.* (1987), and others in the accounting literature, regard such predictive power as gauging the 'information content' of stock prices. In this sense, stock prices have greater information content when firm-specific variation is a larger fraction of total variation.

2.4 Firm-Specific Variation as Noise?

As noted above, Roll (1988) argues that firm-specific price returns variation reflects the trading of privately informed investors. However, he also concedes (p. 565) that firm-specific variation

might reflect "a frenzy unrelated to concrete information" or that a "mania is periodically gripping the investors."

If this alternative view were correct, and higher firm-specific information were associated with a greater incidence of noise trading, Campbell *et al.* (2001) and Morck *et al.* (2000) leave us with the disturbing implications that the US market has become steadily noisier over the decades of the twentieth century, and that the markets of developed economies are more afflicted by noise than are emerging markets. This seems at odds with the general perceptions that the US stock markets has not grown less efficient over time, and that the stock markets of developed countries are not less efficient than those of emerging economies. We are not aware of any theoretical or empirical basis for disputing these general perceptions.

Much of the empirical evidence cited above also undermines this alternative view. Risking being repetitious, we re-list them here: higher firm-specific variation is evident in countries with less official and insider corruption (Morck et al, 2000), more efficient capital allocation (Wurgler, 2000), more developed information transmission infrastructures (Bushman and Smith, 2002), and more scope for privately informed arbitrage (Goetzmann and Masso, 2002; Beny, 2000). Higher firm-specific variation is evident in US industries where capital allocation is more efficient (Durnev *et al.*, 2002a) and where returns better predict future earnings changes (Durnev *et al.* 2000b). Firm specific variation is higher in years following the implementation of heightened disclosure rules (Fox *et al.*, 2002). It is difficult to reconcile these findings with the view that higher firm-specific variation reflects noisier stock prices.

We cannot preclude the possibility that further work might reveal an alternative theory that explains all of the above empirical findings. However, we believe Ockham's razor, at

present, favors lines of research associated with the conceptual arguments outlined above and disfavors the view that firm-specific variation is noise.

2.5 Research Question

The findings reviewed in this section, taken together, have two tentative implications. First, the US stock market is becoming more functionally efficient over time. Second, countries with more advanced institutions (government respect for private property rights and protection of public shareholders) have less murky and more functionally efficient stock markets.

In this paper, we ask two further questions. First, we investigate whether or not the US pattern of declining synchronicity is also evident in individual stock returns in other countries. Second, if there is a global pattern in these findings, we ask what might explain that pattern.

3. Estimating the Magnitude of Firm-Specific Variation

3.1 Definitions of Main Synchronicity Measures

Our main synchronicity measures are based on market model regressions for individual securities in different countries. Let the return on stock j in time period t be $r_{jt.,}$ the domestic market return for country n at time t be r_{nt}, and let the US market return at time t be r_{mt}. To assess the synchronicity of individual stocks in country n during time interval τ, we run the ordinary least squares regression

$$r_{jt} = \beta_0 + \beta_1 \tilde{r}_{njt} + \beta_2 r_{mt} + \varepsilon_{jt} \qquad [1]$$

separately for each stock $j \in n$ and using all T_j observations $t \in \tau$. The transformed domestic market return, $\tilde{r}_{njt}$ is the equal weighted average return of all stocks in country n except stock j itself. That is,

$$\tilde{r}_{njt} \equiv \frac{J_{nt} \times r_{nt} - r_{jt}}{J_{nt} - 1} \qquad [2]$$

or, equivalently,

$$\tilde{r}_{njt} \equiv \frac{\sum_{i \in n, i \neq j} r_{it}}{J_{nt} - 1}$$

where J_{nt} is the number of stocks in country n at time t. We thus use a different domestic market return for each regressions. This is because we are interested in the comovement of stock j with other stocks, not with itself. In economies with a small number of traded stocks, this eliminates a potential upward bias in our synchronicity measures.

A simple variance decomposition lets us express the sum of squared variation in r_{jt}, which we denote $s^2_{j\tau}$, as the sum of the squared variation explained by regression [1], which we denote ${}_m s^2_{j\tau}$, and the residual variation ${}_\varepsilon s^2_{j\tau}$. The systematic variation in stock j during interval τ is ${}_m \sigma^2_{j\tau} = \frac{1}{T_j - 1} {}_m s^2_{j\tau}$, the firm-specific variation is ${}_\varepsilon \sigma^2_{j\tau} = \frac{1}{T_j - 1} {}_\varepsilon s^2_{j\tau}$, and the total variation is $\sigma^2_{j\tau} = \frac{1}{T_j - 1} s^2_{j\tau}$ where T_j is the total number of return observations for firm j in period τ.

To estimate the analogous quantities for each economy, we simply take a weighted average of the J_n firm-level measures in each country n. Thus, we have the *average absolute firm-specific return variation* for stocks in country n during time interval τ as

$${}_\varepsilon \sigma^2_{n\tau} = \frac{\sum_{j \in n} {}_\varepsilon s^2_{j\tau}}{\sum_{j \in n} T_j - J_n} \qquad [3]$$

We interpret higher values of ${}_\varepsilon \sigma^2_{n\tau}$ as signifying less synchronicity in individual stock returns.

An analogous procedure generates the *average absolute systematic return variation* for stocks in country n during time interval τ as

$$ {}_m\sigma^2_{n\tau} = \frac{\sum_{j\in n} {}_m s^2_{j\tau}}{\sum_{j\in n} T_j - J_n} \qquad [4] $$

We interpret higher values of ${}_m\sigma^2_{n\tau}$ as signifying more synchronicity in individual stock returns.

The average total variation in a country, $\sigma^2_{n\tau}$, is the sum of the average firm-specific variation and the average systematic variation in the stocks of that country. An alternative way of measuring firm-specific and systematic variation is as fractions of total variation. For an individual stock, systematic variation relative to total variation is simply the R^2 statistic of regression [1]. That is,

$$ R^2_{j\tau} \equiv \frac{{}_m s^2_{j\tau}}{s^2_{j\tau}} = \frac{{}_m \sigma^2_{j\tau}}{\sigma^2_{j\tau}} \qquad [5] $$

Similarly, the firm-specific variation of an individual stock as a fraction of total variation is one minus the R^2 statistic of regression [1]. That is,

$$ 1 - R^2_{j\tau} \equiv \frac{{}_\varepsilon s^2_{j\tau}}{s^2_{j\tau}} = \frac{{}_\varepsilon \sigma^2_{j\tau}}{\sigma^2_{j\tau}} \qquad [6] $$

As before, we can construct a measure of the importance of systematic variation as a fraction of total variation by taking an economy weighted average of [5]. Thus, we define the *average relative systematic variation* in the stocks of country *n* during time interval τ as

$$ R^2_{n\tau} \equiv \frac{{}_m s^2_{n\tau}}{s^2_{n\tau}} = \frac{{}_m \sigma^2_{n\tau}}{\sigma^2_{n\tau}} \qquad [7] $$

The *average relative firm-specific variation* in the stocks of country *n* during time interval τ is likewise defined as

$$ 1 - R^2_{n\tau} \equiv \frac{{}_\varepsilon s^2_{n\tau}}{s^2_{n\tau}} = \frac{{}_\varepsilon \sigma^2_{n\tau}}{\sigma^2_{n\tau}} \qquad [8] $$

We interpret lower values of $R^2_{n\tau}$, or higher values of 1 - $R^2_{n\tau}$, as signifying less synchronicity in individual stock returns.

3.2 Alternative Synchronicity Measures

In addition to the above measures, we employ two much simpler synchronicity measures as robustness checks.

One simple synchronicity measure is the fraction of stocks moving in the same direction during a given time period. We define

$$f_{nt} \equiv \frac{\max[n_{r_{jt}>0}, n_{r_{jt}<0}]}{n_{r_{jt}>0} + n_{r_{jt}<0}} \qquad [9]$$

where $n_{r_{jt}>0}$ is the number of firms *j* in country *n* with positive returns over time period *t* and $n_{r_{jt}<0}$ is the number of firms *j* in country *n* with negative returns over time period *t*. We drop firms with zero returns as they may not have been traded during period *t*.

A second simple synchronicity measure is constructed by randomly selecting 30 stocks from each country *n* in each time interval τ. We then estimate the simple correlation coefficients of the returns of each of the 30 × 29 = 870 possible pairs of stocks, and interpret the simple average of these, denoted $\rho_{n\tau}$, as another alternative measure of the synchronicity of individual stock returns.

3.2 Data and Sample

To construct the above synchronicity measures, we use individual stock returns from DataStream. We construct synchronicity measures for each country in each year for which data are available from 1990 through 2000. We construct a time series weekly returns for each stock, measured

from Wednesday to Wednesday, deleting returns for which the trading volume at either endpoint is zero or missing. DataStream contains coding errors, especially in Latin American data that appear to be due to misplaced decimal points. An algorithm was developed to check for such errors and to drop the affected observations. Weekly returns are used to economize on downloading time. These data are discussed in Section 4 and are used as the basis of our regression analysis in section 5.

For a subset of countries, we also download daily returns from DataStream and use them to construct a bimonthly time series of synchronicity measures for each stock using all the data available. Returns are dropped for days in which trading volume is zero or missing, or where coding errors in DataStream appear likely, as defined above. These data are used in Section 6.

The results is a panel of annual synchronicity measures for 49 countries from 1990 to 2000 containing 479 country-year observations. We work with less than a full panel because data for some countries are not available in the early 1990s. We also have bimonthly time series for the countries discussed individually in Section 6.

4. The Changing International Cross-Section of Synchronicity

In this section we present descriptive information about the broad trends in individual stock return synchronicity in different regions and countries. We then advance the argument that different countries having different degrees of integration into the global economy and different institutions to deal with the integration might partially explain these differences in synchronicity.

4.1 General Observations

Table 1 shows the average relative systematic variation of individual stocks, as measured by the R^2 of regression [1], in each of 49 countries for each year from 1990 through 2000. Of the 34 countries for which a complete time series of synchronicity is available, 25 show a decline in relative systematic variation over the decade, while only 9 show an upward trend. Table 2 shows the average absolute firm-specific variation, ${}_{\varepsilon}\sigma^2_{n\tau}$, in the same countries. Inspection of Table 2 shows 27 countries in which firm-specific variation rises over the decade, and only seven where it falls. In contrast, Table 3 shows average absolute systematic variation, ${}_{m}\sigma^2_{n\tau}$, falling in only 13 countries and rising in 21. This means that the overall decline in relative systematic variation shown in Table 1 occurs despite an increase in absolute systematic variation. The increases in absolute firm-specific variation shown in Table 2 are large enough to overcome the increased market-wide fluctuations evident in Table 3.

Figure 1 summarizes the worldwide pattern. Panel A displays the worldwide average firm-specific variations, systematic variations, and R^2s, weighting each country equally. A general decline in R^2 and rise in ${}_{\varepsilon}\sigma^2_{n\tau}$ are evident, though not monotonic. Panel B displays the worldwide average firm-specific variations, systematic variations, and R^2s, weighting each stock equally, with no regard to its country. A general rise in ${}_{\varepsilon}\sigma^2_{n\tau}$ is again apparent, and once more is not monotonic. No trend in the worldwide firm-average R^2 is evident, reflecting the large number of stocks in countries such as the United Kingdom and Canada, for which Table 1 shows no overall trend in this time window.

Also evident in Tables 1 through 3 are the main financial crisis of the decade – the Latin American crises of the mid 1990s, the Asian crises of 1997 and 1998, and the ruble and real crises at the end of the decade. Individual returns synchronicity in the affected countries, measured by

R^2, registers a sharp but temporary spike during the crises. Firm-specific variation, ${}_{\varepsilon}\sigma^2_{n\tau}$, and systematic variation, ${}_{m}\sigma^2_{n\tau}$ also both exhibit analogous surges, with the virtually always larger, ergo the spike in R^2. These observations are readily explicable, at least on the surface.[2]

Our present focus is on how openness and institutions correlate with synchronicity. These same factors surely affect the virility and incidence of crises, so crises cannot really be disentangled from them. However, a thorough analysis of the interactions of crises with institutions, openness, and stock return variation is beyond the scope of this study, though we are pursuing it elsewhere. Nonetheless, we clearly must consider transitory changes in R^2, ${}_{\varepsilon}\sigma^2_{n\tau}$ and ${}_{m}\sigma^2_{n\tau}$ during crisis when we evaluate the determinants of their more permanent levels.

4.2 A Link with Globalization?

In searching for candidate explanations for the differing decreases in the synchronicity of individual stock returns in different countries, we need to consider factors that affect many countries, but to differing degrees. One such factor is increasing integration into the global economy. We make no pretense that globalization is the only such factor. However a study of all the possible factors contributing to changing synchronicity is beyond the scope of this effort. We focus on globalization because several plausible arguments point in this direction.

First, the importance of economic openness is the theme of this conference. Second, economic openness, especially to capital flows, has clearly changed to different degrees in different countries over the course of the past decade, and in ways that can be measured – if with difficulty. Third, capital market liberalization in particular allows savers more investment

[2] Economic crises, by their very nature, are systematic. They affect broad swaths of firms and industries simultaneously, and so are apparent as elevated systematic variation. Firm-specific variation can rise too, for the

alternatives, and makes them less concerned about the idiosyncratic risk in individual companies. This may allow firms leeway to undertake more idiosyncratically risky investments in some countries without unsettling investors. Fourth, openness increases both capital and product market competition, and this creates pressure to improve standards of corporate governance. Better corporate governance should induce each firm's managers to seek ways to elevate their firms' fundamental values relative to firms run by others. Curtailing tunneling and other safety nets for poor corporate managers should likewise render poor governance more obvious. Fifth, capital market openness creates pressures on regulators to adopt international accounting standards, and to regulate stock markets in ways that better protect public investors. It also creates local demand for information professionals, such as accountants and financial analysts, who might, in turn, press for reforms to bring up their professions' standards. This might both lower the cost of private information and increase the risk-adjusted returns arbitrageurs can earn using such information. Sixth, as Caves (1986) notes, openness increases the rewards to innovators by allowing them to achieve greater economies of scale. Also, more interaction with foreign competitors conceivably leads to technology spillovers that innovative local firms can exploit. Moreover, Rajan and Zingales (2002) and Morck, Stangeland, and Yeung (2000) argue capital market openness lets entrepreneurial upstarts obtain financing from abroad. As well-financed innovative firms pull ahead of sedate rivals, firm specific differences in stock returns grow.

All of these changes doubtlessly create profitable opportunities for some firms and damage the prospects of others. This engenders increased firm-specific variation in firm fundamental values.

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crisis may affect some firms or sectors more than others, and may even present opportunities to some firms. If crises also correspond to manias and panics, market swings due to noise trading might also heighten synchronicity.

Critics of globalization argue that openness destabilized national financial systems and precipitates crises. For example, the official Bernama news agency quoted Malaysian Prime Minister Mahathir Mohamad as blaming Malaysia's economic crisis on international financiers who "robbed the Palestinians of everything, but in Malaysia they could not do so, hence they do this, depress the ringgit."[3] Perhaps more sagaciously, Bhagwati (1998) argues that capital market openness can indeed lead to financial crises, and argues that only product market openness is justified. The Malaysian Prime Minister went on to impose capital controls. Tobin (2000) argues that a small transactions tax on international currency markets would prevent rapid destabilizing financial flows.

In addition, neoclassical trade theory argues that goods market openness allows greater specialization. Openness should thus reduce an economy's diversification across industries. This, in turn, could increase the synchronicity of individual firms' stocks.

Thus, the impact of openness on synchronicity might be positive or negative. Which of these two contradictory sets of effects dominates under what circumstances is an empirical issue, to which we now turn.

We begin with a clinical examination of two major globalization events: Canada's ratification of a free trade agreement with the United States in 1989, and Mexico's accession to the North American Free Trade Agreement in 1994. The recent and sudden integration of two developed countries, Canada and the United States, contrasts with the integration of an emerging market economy, Mexico, with its two developed neighbors. This contrast provides evidence of the validity of both of the above arguments.

[3] From an October 10th 1997 speech to Muslim villagers, quoted in "Malaysia Premier Sees Jews Behind Nation's Money Crisis," by Seth Mydans, *New York Times*, October 16, 1997.

4.3 North American Markets and Economic Integration

The current North American Free Trade Area (NAFTA) was established in two discrete steps. A Free Trade Agreement (FTA) joining the American and Canadian economies took effect in 1988. This agreement was extended to include Mexico in 1994, and rechristened NAFTA.

Figure 2 displays firm-specific variation for the average Canadian stock, estimated on non-overlapping two-month periods using daily total returns. The magnitudes of firm-specific and systematic variation are on the left-hand vertical axis, while the average market model R^2 is measured on the right-hand vertical axis. Table 5 contains a list of major institutional and market events during the timeframe of this graph.

Figure 2 shows a sharp peak in both firm-specific and systematic variation in October 1987, corresponding to the international stock market crash of that month. Firm-specific variation also rose sharply as a fraction of total variation at that time. In retrospect, this is not surprising. By its nature, a market crash is a systematic variation event. However, both variation measures return to their pre-crash baseline of about 0.001 only a few months later.

This observation has two immediate implications. First, it gives us a benchmark market crash, with which we can compare other such events elsewhere. Second, it highlights the importance of studying firm-specific variation relative to total variation, as well as the simple magnitude of the former.

The Canadian market experienced two subsequent bubble episodes. In 1996 and 1997, a bubble in mining stocks developed as investors sought clones of Bre-X, a fraudulent Indonesian-Canadian mining concern. In 2000, a dot.com bubble developed and collapsed. These events are barely perceptible in Figure 2.

Rather, the main feature of Figure 2 is an apparently permanent upward revision in the baseline amount of firm-specific variation in the typical stock. Beginning in late 1988, firm-specific variation rises substantially above its previous 0.001 baseline level. This rise continues through 1989, and by 1990, firm-specific variation appears to level off at a new higher baseline level of about 0.004. A possible concern is that this reflects broader market coverage by DataStream in later years. Many smaller Canadian companies are mining concerns, with stock returns relatively independent of the business cycle. More of these firms in later years should induce greater average firm-specific variation. However, this cannot be the cause of the pattern in Figure 2. Dropping all mining and other natural resource stocks yields a similar pattern to that show. Using only stocks available for the full time window also generates a similar pattern, , though the rise in firm-specific variation is less abrupt.

The major economic event of late 1988 was an unexpected Conservative majority government with a mandate to implement a previously negotiated Free Trade Agreement (FTA) with the United States. The FTA gradually phased in free trade in goods over ten years and immediately mandated free flow of investment, beginning in January of 1989. This heightened competition in the goods and capital markets doubtless affected different firms and industries differently, and this could perhaps explain elevated firm-specific variation in subsequent years. Alternatively, the FTA might have allowed increased economies of scale in information gathering and trading, thereby facilitating more intense arbitrage using private firm-specific information.

A second upsurge in firm-specific variation begins in 1997 and continues through 1998. It is difficult to connect this upsurge with institutional changes. There were two important changes to Canadian corporate governance law during the 1990s. In 1991, the Ontario Securities Commission adopted Rule 9.1, which mandates disclosure and majority of minority shareholder

approval of large related party transactions among group firms. In 1994, the Dey Report set new corporate governance guidelines for Toronto Stock Exchange companies, stressing the importance of outside directors. Neither of these events is associated with a large permanent change in firm-specific variation, and both are too early to explain the late 1990s upsurge. Rather, the main event of 1998 was a precipitous drop in the Canadian dollar, from US$0.71 to US$0.63 in only a few months. Since the Canadian dollar remained in this low range over the subsequent years, a realignment of the economy favoring exporters over importers occurred. The depreciation also rescued numerous Canadian businesses that had difficulty competing with imports in the unified post-1988 North American economy.

In Mexico, as Panel B of Figure 2 shows, the synchronicity in individual stock returns is much higher and much more volatile than in Canada. This is because firm-specific variation in Mexican stocks is but a tiny fraction of its magnitude in Canadian stocks. NAFTA did nothing to reduce the synchronicity of Mexican stocks, as measured by the average R^2 of the market model; for this actually peaks in early 1994 when NAFTA comes into effect and Mexico's peso crisis begins. Although there is a temporary upsurge in firm-specific variation in early 1995, this quickly subsides back to the levels prevalent at the beginning of the decade.

The Mexican peso fell sharply in 1994, but unlike the Canadian dollar depreciation, this event was not followed by an obvious rise in firm-specific variation.

Indeed, no arguably permanent increase in firm-specific variation appears until 1998, when the Mexican government enacted a number of financial and corporate governance reforms, described in Table 6. Even then, the rise is small and Mexican firm-specific variation remains only a tiny fraction of that in Canada.

In summary, Canadian stocks move quite asynchronously compared to Mexican stocks. When Canada entered into free trade and capital flow with the US, its stocks exhibit an apparently permanent increase in absolute firm-specific variation. In contrast, when Mexico entered NAFTA, its stocks exhibit only a temporary surge in synchronicity. Canadian stocks exhibit another large and long-lasting increase in firm-specific variation corresponding to a sharp decline in the Canadian dollar, but a much larger decline in the Mexican peso had no similar effect on Mexican stocks. Rather, Mexican stocks exhibit a noticeable and lasting increase in firm specific variation subsequent to a revamping of Mexico's financial and corporate governance laws and regulations.

4.4 Developed Economies and Emerging Markets

Speculatively generalizing from the North American situation, we hypothesize that stocks in economies with sound institutions, like Canada, might respond differently to greater global integration than would stocks in economies with weak institutions, like Mexico. We therefore examine developed and emerging market economies separately.

Table 1 shows the 20 developed economy markets. Rising synchronicity, as measured by R^2, is evident in 12, and declining synchronicity in eight. Table 2 shows that every developed country market, without exception, exhibits higher firm-specific variation in 2000 than in 1995, though there is more heterogeneity in the earlier half of the decade. The majority of developed economies show rising systematic variation over the second half of the decade in Table 3, with number showing a sudden upsurge in absolute systematic variation in 1999 and 2000.

Figure 3 illustrates the averages of all these measures across developed countries in Panel A, and across all individual stocks in developed countries in Panel B. A distinct U shaped pattern

in ${}_{\varepsilon}\sigma^2_{n\tau}$ is evident in both panels. Firm-specific variation is high at the beginning of the decade, low in the middle, and then even higher at the end of the decade. Systematic variation follows a similar pattern, resulting in no discernable trend in R^2.

Emerging markets are quite distinct from each other by region.

All the East Asian economies except China show a decline in the R^2 synchronicity measure over the decade. This trend is interrupted by a brief upsurge in synchronicity associated with the regional financial crisis of 1997, however a downward trend sets in again shortly after. Only Malaysia shows a prolonged period of high synchronicity. With the exception of China, all the markets in East Asia show an upward trend in both absolute firm-specific variation and absolute systematic variation. The former effect swamps the latter, bringing about a general decline in synchronicity.

Figure 4 illustrates the changing average synchronicity across all East Asian economies. Intriguingly, firm-specific variation rises most sharply *after* the financial crises of 1996 and 1997, rather than during or prior to the crisis, perhaps indicating a subsequent economy restructuring with different consequences for different firms.

Stock market data for post-socialist economies is, of course, not available for the entire decade. Table 1 shows the Czech Republic, Hungary, and Poland with sharp declines in synchronicity from 1995 to 2000, with the largest drop in Poland. Poland shows a marked increase in firm-specific variation from 1995 to 2000, while Hungary shows only a modest upward trend. The Czech Republic and Poland show decreased absolute systematic variation, while Hungary shows an increase. Russia shows increasing firm-specific and systematic variation, and continued high synchronicity as measured by the market model R^2.

Figure 5 graphs the average synchronicity of the Czech, Hungarian, and Polish markets. It shows a steadily increasing level of firm-specific variation, declining systematic variation, and declining R^2s. All these trends are interrupted by spillover problems associated with the Russian ruble crisis of 1998, but resume again subsequently.

Data for many Latin American countries are also unavailable for the full decade, but every country in the region shows a downward trend in synchronicity as measured by the R^2. The decline is far from monotonic, and is least evident in Chile. Mexico shows rising firm-specific variation, however many other Latin American markets show declines in both firms-specific and systematic variation, with the latter dominating and thus inducing lower market model R^2s.

Figure 6 illustrates. The anatomy of the Latin American financial crisis of the mid 1990s, triggered by the Mexican Peso Crisis of December1994 to February 1995, resembles that of the East Asian crisis in that firm-specific variation rises during and after the crisis, and then remains elevated for several years (at least). However, the increase in firm-specific variation following the Latin American crisis is much smaller than that following the East Asian crisis, perhaps indicating a less thorough shakeout.

An additional set of emerging markets is presented at the bottoms of the tables. India shows a declining R^2, due mainly to rising firm-specific variation. However, no clear pattern is evident across the other emerging markets in Tables 1 through 3. Bangladesh, Egypt, Pakistan, and Turkey all show consistently high synchronicity, with absolute systematic variation increasing over the decade. Kenya and Morocco show increasing synchronicity. Synchronicity in South Africa fluctuates greatly. In all of Africa, only Mauritius exhibits declining synchronicity.

4.5 Summary

The synchronicity of individual stock returns fell over the 1990s in the average country's stock market. This is primarily associated with a sharp rise in the firm-specific variation in the average market in the late 1990s.

Different countries and regions of the world exhibit very different patterns of changing synchronicity. Developed economies exhibit steady synchronicity as measured by R^2, perhaps reflecting steady levels of institutional development and openness for these countries throughout the 1990s. Both firm-specific and systematic variation in individual stock returns rise during the decade in these countries, however. Emerging markets exhibits much more variegated patterns.

5. Econometric Findings

In this section, we run panel regressions to explain the patterns of individual stock return synchronicity shown in Tables 1 and 2.

5.1 Regression Framework

Motivated by our examination of North American integration, we seek to explain synchronicity with measures of openness to the global economy, taking into account the different levels of institutional development in different countries. By this, we mean that the impact of openness on synchronicity may be modified by the presence of good institutions.

We thus run panel regressions of the form

$$\begin{bmatrix} synchronicity \\ measure \end{bmatrix} = \begin{bmatrix} fixed \\ effects \end{bmatrix} + \beta_1 \begin{bmatrix} openness \\ measure \end{bmatrix} + \beta_2 \begin{bmatrix} openness \\ measure \end{bmatrix} \times \begin{bmatrix} institutional \\ development \end{bmatrix} + \eta_{n\tau} \qquad [10]$$

We now describe the variables in these regressions in detail.

Synchronicity Measures

To measure synchronicity, we follow Morck *et al.* (2000) in using as dependent variables the natural logarithm of average firm-specific returns variation, $\ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right)$, the natural logarithm of systematic variation, $\ln\left({}_{m}\sigma^2_{n\tau}\right)$, and the difference between then, which we denote by the Scandinavian letter *oy*, $\varnothing_{n\tau}$. Note that $\varnothing_{n\tau}$ can also be interpreted as a logistic transformation of the R^2 synchronicity measure.

$$\varnothing_{n\tau} \equiv \ln\left({}_{m}\sigma^2_{n\tau}\right) - \ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right) = \ln\left(\frac{R^2_{n\tau}}{1-R^2_{n\tau}}\right) \qquad [11]$$

Since ${}_{m}\sigma^2_{n\tau}$ and ${}_{\varepsilon}\sigma^2_{n\tau}$ are both bounded below by zero, and since $R^2_{n\tau}$ is bounded within the unit interval, these transformations are necessary to provide approximately normally distributed dependent variables.

Thus the synchronicity measure used in regressions [10] is either $\ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right)$, $\ln\left({}_{m}\sigma^2_{n\tau}\right)$, or $\varnothing_{n\tau}$. The other synchronicity measures introduced above are used as robustness checks. These variables are constructed using the sample described in section 3.2.

Openness Measures

We use several alternative measures to capture different aspects of openness.

Our first openness measure captures openness to international trade. We define *trade openness* measure as

$$\left[\begin{matrix} trade \\ openness \end{matrix}\right]_{n\tau} \equiv \frac{M_{n\tau}}{Y_{n\tau}} - \left(1 - \frac{Y_{n\tau}}{\sum_{n} Y_{n\tau}}\right)$$

where $M_{n\tau}$ is the total imports of country n in year τ and $Y_{n\tau}$ is its gross domestic product (GDP) for the same period.

This construction measures deviation from a hypothetical benchmark, suggested by Frankel (2000), at which national borders do not affect buying patterns. For a country at this benchmark, the share of imports in total domestic consumption equals one minus the nation's share of world production, leaving the value of the openness measure zero. In a completely closed economy the variable's value is negative one plus the country's GDP as a fraction of world GDP. As the country becomes more open, the measure rises towards zero. It is possible for an entrepôt state to have a positive trade openness measure.

We construct the variable based on data downloaded from *World Development Indicators 2000*, produced by the World Bank. For our sample, the variable is always negative. Note, however, that we exclude the city-states of Singapore and Hong Kong, which are probably the most important entrepôt countries. Hong Kong is a particularly unique case because of her switching from a UK colonial state to a Chinese special administration region during our sample period.

This measure is preferable to the traditional trade openness variable, imports plus exports as a fraction of GDP. This traditional measure tends to be larger for smaller economies. Consequently, we use this measure as a robustness check. Using it instead of our primary measure generates similar results.

Measuring capital market openness is more difficult, as investment and especially portfolio investment flow measures are often problematic as measures of capital market openness. We therefore use a carefully developed *capital market openness measure* provided by Edison *et al.* (2001), and which is available from the authors at the International Monetary Fund (IMF).

This is a direct measure of the openness of each country's stock market to foreign investors. Essentially, it reflects the value of stocks that can be purchased by foreign investors as a percentage of total domestic market capitalization.[4] The index should assume values closer to one if a market is more open and closer to zero if it is more closed.

The index is available for many emerging markets from 1990 through 2000. For some markets, the index is unavailable for the early 1990s.

As a robustness check, we use an alternative carefully nuanced measure constructed by and Abiad and Mody (2002). This index assigns a score from zero to three to each country for six aspects of capital flow openness.[5] This results in a maximum score of eighteen, with a larger value indicating a more financially open economy. Unfortunately, this measure runs from 1973 only to 1996, and so is unavailable for the latter years of our time window. It is also only available for a subsample of the countries in which we are most interested. Nonetheless, it generates results similar to those shown, but with lower significance levels.

The capital market and trade openness measures are also quite consistent. In general, countries with open capital markets have open goods markets, and the two types of openness exhibit similar time trends. Notable exceptions are Indonesia (capital market openness rose, while trade openness shows no consistent trend), Malaysia and the Philippines (capital market openness shows no consistent trends, but trade openness rises), and Pakistan (capital market openness rise while the goods market becomes more closed).

[4] This measure is based on an "investable" index, reflecting the market as available to foreign investors, divided by a "global" index, reflecting the whole market. Both are from the International Finance Corporation (IFC). To control for "asymmetric shocks to investable and non-investable stocks", the measure is adjusted using price indices computed by IFC for the two categories of stocks. Since the stocks available to foreigners may trade at different prices than the stocks available to locals, the value of stocks available to foreigners can, in theory, exceed total domestic stock market capitalization. The index used in Edison *et al.* (2002) is actually one minus this openness ratio, and measures the intensity of capital controls.

[5] These are: directed credit/reserve requirements, interest controls, entry barriers/pro-competition measures, regulation /securities markets, privatization, and international capital flows openness.

Institutional Development Measure

To assess the development of a country's institutions, we use the *good government* measure constructed by Morck *et al.* (2000). This measure is the sum of three measures constructed by La Porta *et al.* (1998) that gauge the respect a country's government show for the rule of law, the efficiency of a country's legal system, and the freedom of its government and civil service from corruption. Each of these individual measured ranges from zero to ten. The good government variable therefore must lie between zero and thirty, with higher numbers connoting better institutions.

Fixed Effects

All our regressions controlling for country fixed effects. We repeat them, first including time fixed effects, and then supplementing these with dummies for the occurrence of financial crises.

Including country fixed effects means we are essentially examining how synchronicity relates to deviations of our key independent variable, openness, from its own-country average. Country fixed effects are important, for Morck *et al.* (2000) show mean synchronicity to vary across countries for a variety of reasons having to do with economy structure, economy size, and fundamentals synchronicity. We have no reliable measures of how these factors change through time for each country, and therefore subsume them into general fixed effects. We recognize that this may not capture the full effects of changes in these variables. If such changes are correlated with changing openness, our openness variable might pick up effects that, more properly, should be ascribed to changes in these other variables. If these other effects are, themselves, also associated with economic openness, this is defensible. If they are not, we must interpret our

openness variable more broadly, as perhaps capturing part of a broader range of institutional or other changes.

We repeat our regressions including year fixed effects as well as country fixed effects. These capture global macroeconomic factors and also allow us to extract any residual time trend in our data. In a third set of regressions, we also include three crisis dummies to capture transitory changes in our synchronous measures associated with the unusual conditions prevailing in the affected markets. An Asian crisis dummy is one for East Asian countries in 1997 and 1998, and zero otherwise. A Mexican peso crisis is one for Latin American countries in 1995, and zero otherwise. Finally, a Brazilian real crisis dummy is one for Latin American countries in 1998, and zero otherwise.

Regression Sample

Panel A of Table 7 displays the sample of countries on which we can run panel regressions. We go back only to 1990s because stock return data for earlier years are unavailable on DataStream for many countries. We thus have annual synchronicity measures from 1990 to 2000. The list of countries in Table 7 is the intersection of those for which the Edison *et al.* (2002) capital openness measure, is available, those for which the good government index is available, and those for which DataStream stock returns are available. We require that five years of synchronicity data be available to include a country in our panel. Our trade openness variable is unavailable for Taiwan (ROC), and we have yet to update the variable to include 2000. The capital market openness measure is available only for emerging economies.[6]

[6] Setting this variable to one for all developed economies would perhaps be defensible, however the absence of variation renders doing so pointless in this context.

Inspection of the data in panel A shows that more advanced economies indeed have higher "good government" measures and more asynchronous stock returns than have developing economies.

Panel B reports the simple correlation of the variables. Trade openness is significantly positively correlated with our synchronicity measure the logistic transformation of R^2, $\varnothing_{n\tau}$; significantly negatively correlated with firm specific stock return variation, $\ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right)$; and uncorrelated with systematic return variation, $\ln\left({}_{m}\sigma^2_{n\tau}\right)$. In contrast, capital openness is significantly negatively correlated with $\varnothing_{n\tau}$; significantly positively correlated with $\ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right)$, and not significantly correlated with $\ln\left({}_{m}\sigma^2_{n\tau}\right)$. The observations suggest that capital and trade openness have essentially opposite relationships with synchronicity. Capital openness is associated with high synchronicity due to high firm-specific variation, while trade does the opposite by reducing firm-specific stock return variation. The former does that by raising firm specific stock return variation.

Figure 7 plots of our synchronicity and asynchronicity measures against our trade and capital openness measures. The plots illustrate the reported correlations.

Finally, Panel B also reproduces the main results of Morck *et al.* (2000). Good government is negatively correlated with synchronicity. Both firm-specific and systematic variation drop off as the quality of institutions rises, but the latter effect dominates, leading to lower R^2 synchronicity. Morck *et al.* (2000) also found firm-specific variation to be positively correlated with investor protection, but only among developed countries. Panel B also shows good government to be significantly positively correlated with trade openness and insignificantly negatively correlated with capital market openness.

5.3 Panel Regressions Results

Table 8 reports our regression results. Panel A contains country fixed effects, while Panel B contains both year and country fixed effects.

Trade openness does not have a robust significant relationship with the synchronicity measure $\varnothing_{n\tau}$. Without controlling for year fixed effects, neither the trade openness measure nor its cross term with good government has a significant regression coefficient. Only after controlling for year fixed effects as well do the regressions yield a significant coefficient, which is positive indicating that trade openness raises synchronicity. When we include both trade openness and its cross term with good government in the regressions, as in Equations 8.3a and 8.10a, trade openness has a positive coefficient but the cross term has a negative coefficient; both variables are insignificant, perhaps due to collinearity. However, the F-statistics for their joint significance, as indicated in the third to the last row, is significant. Based on the regression coefficient in regression 8.10a, the good government variable has to be above sixty for trade openness to have a negative impact on synchronicity. The maximum value for the good government measure is thirty.

Openness in trade significantly raises both firm specific stock return variations and systematic variation. The cross term between trade openness and good government is negative and sometimes statistically significant. Still, based on the regression point estimates, the impact of trade openness cannot be negative impact on either $\ln\left({}_{\varepsilon}\sigma^2_{n\tau}\right)$ or $\ln\left({}_{m}\sigma^2_{n\tau}\right)$ unless the good government variable attains a value exceeding thirty, the maximum possible.

Hence, our results suggest that openness in trade is positively significantly related firm-specific and systematic volatility, these effects may combine to produce a net positive relationship with synchronicity.

We now turn to the regressions of synchronicity measures on capital market openness. The results are almost the precise opposites to our trade openness results. Regressions 8a.4 and 8b.4 show that capital market openness is significantly related to lower synchronicity. Equations 8a.5 and 8b.5 show that, the better the institutional environment, the greater the negative impact. Equations 8a.6 and 8b.6 show that in economies with a good institutional environment (when the good government variable is higher than 18.2 and 18.8, respectively) capital market openness reduces synchronicity. Otherwise, it does the opposite. In our sample, the mean of "good government" is 23.54. The corresponding regressions in the lower two sections of Panels A and B show that, in the main, capital market openness relates to lower synchronicity through elevated firm specific stock return variation.

The regressions using trade openness include all countries for which we have data – developed and emerging market economies. In contrast, the regressions using capital openness include only emerging economies. However, rerunning the trade openness regression using the subsample of countries for which the capital openness measure is available generates virtually identical results (not shown) to those for the full sample.

In regressions 8a.7 and 8b.7 we regress synchronicity $\varnothing_{n\tau}$ on trade openness, its cross term with good government, capital market openness, and its cross term with good government. In the former, we control for only country fixed effects while in the latter we add the year fixed effects as well. Although multicollinearity may be a problem in these regressions, the results show that the impact of capital market openness on synchronicity remains: greater capital market openness is associated with lower synchronicity when the institutional environment is good; otherwise the relation flips signs. For example, regression 8b.7 implies that a good government

variable is above 19.8 is sufficient to instill a negative relationship between capital market openness and synchronicity. This is well below the good government variable's mean of 23.54.

To ascertain that our results are not due to synchronicity changes associated with crises, we repeat our regressions include the three crisis dummies described above. The results are reported in Panel C of Table 8. They are similar to their counterparts in Panels A and B. The results indicate first that trade openness is unrelated to synchronicity, and second that capital market openness is associated with lower synchronicity when institutions are well developed. If institutions are weak, the sign can flip, and capital market openness is associated with higher synchronicity.

Robustness Checks

As alternative synchronicity measures, we employ the average correlation between all possible pairs of thirty stocks, randomly selected in each country for each period, and the fraction of stocks moving with the market. Regressions explaining logistic transformations of these measures of synchronicity closely resemble the regressions explaining $\varnothing_{n\tau}$.

Substituting the capital openness variable of Abiad and Mody (2002) generates similar patterns of signs, but significance levels are lower, probably due to the much smaller intersection of that measure with our synchronicity estimates. Substituting the simple trade openness measure of imports plus exports over GDP for the trade measure in the tables generates similar patterns of signs and significance to those shown.

In Panel C of Table 8, we added dummy variables set to one for country-year observations corresponding to financial crises. If we instead drop these observations, we obtain virtually identical patterns of coefficients and significance levels.

As noted above, running the trade openness regressions on the subsample of countries for which the capital openness measure is available generates virtually identical results to those shown.

Cook's D statistics indicate that outliers are not driving our results. Tests for heteroskedasticity reject the need for modified t-tests.

6. Clinical Studies of Synchronicity Changes Surrounding Financial Crises

The importance of the interaction of openness with institutional development, as measured by the good government index, suggests that an investigation of how changes in that variable relate to synchronicity might also be fruitful. Unfortunately, gauging year-to-year changes in the aspects of institutional development shown to matter – official respect for the rule of law, judicial efficiency, and lack of corruption – is difficult. The sorts of survey measures on which these variables are based change little from year to year, and the best measures are available only in cross-sections.

One possibility is to construct our own institutional reform variables by noting the years of key institutional reforms, such as banning insider trading, enforcing international accounting standards, and the like. Our attempts to construct such variables are stymied by the drawn-out nature of reforms in many countries and by a lack of certainty regarding the extent to which new laws and regulations were actually enforced – both in general and during specific periods.

Consequently, we employ clinical studies of a small number of countries for which we exhaustively track down detailed information on institutional reforms, their enforcement, and their perceived effectiveness.

6.1 General Observations

To understand the importance of institutional changes, we must study countries whose institutions change the most. Certain countries in East Asia and Eastern Europe have arguably implemented institutional more extensive reforms than other regions. We therefore examine stock prices in specific countries in those two regions that followed differing paths of reform, or that have avoided serious reforms.

Unfortunately, most of these countries were also subjected to financial crises in the 1990s. This means that our understanding the impact of institutional changes requires an understanding of the financial crises that perhaps caused, were caused by, or merely coincided with key institutional changes.

In studying these individual countries more closely, we re-estimate the asynchronicity and synchronicity measures discussed in section three, using daily returns for all days with positive trading volume. We also use all available data from DataStream, which – in some cases – allows us to look at data back to the mid 1980s and forward to 2001. We exclude early years for some countries if the number of observations in those years is very small.

6.2 East Asian Markets and the Regional Crisis

We begin with Japan, which - like Canada - exhibits a brief surge in systematic variation and related spike in synchronicity in October 1987. However, as Panel A of Figure 8 shows, Japan exhibits an additional, and much longer, period of elevated systematic and firm-specific variation beginning in October 1990, corresponding to the collapse of that country's "bubble economy". Both firm-specific and systematic variations swing substantially until 1997, resulting in wide fluctuations in synchronicity.

A major change seems to occur in late 1997, when firm-specific variation rises substantially and then levels off at a new, higher plateau. Although systematic variation is also somewhat higher, the rise in firm-specific variation is proportionately greater, and Japan's average R^2 falls back to the levels that prevailed in the 1980s (except October 1987).

As Table 9 shows, Japan's Administrative Reform Commission, which had been circulating various draft reform proposals since 1994, finally submitted a final recommendation for comprehensive deregulation and dissolved itself, leaving the cabinet no choice but to endorse this program. In early 1998, this program was enacted, and a series of deregulation measures were implemented. We are currently trying to understand the full nature of these changes.

Korea also experienced a financial crisis, and implemented comprehensive deregulation in the 1990s. Panel B of Figure 8 shows a period of very high synchronicity in the early 1990s. In the months immediately after the July 1997 Thai bath crisis, Korean firm-specific and systematic variation both rise sharply, as does R^2 the synchronicity. Firm-specific variation then rises through early 1998, as that country implements the extensive financial, disclosure, and governance reforms listed in Table 10. Firm-specific variation remains at very high levels through the end of the decade, after which it flags somewhat. The R^2 synchronicity measure tracks an inversion of this pattern. The drop in firm-specific stock return variation, and the consequent increase in R^2 at the end of the decade coincide with a weakening of reform efforts, documented by Chiu and Joh (2002), subsequent to the collapse of two large *chaebol* groups. Many remaining smaller *chaebol* increased their risk sharing. The purpose of this co-insurance was to decrease firm-specific variation in fundamentals.

It is interesting to contrast Korea and Japan, both of which undertook comprehensive financial reforms following the onset of financial crises, with Malaysia and Thailand, which did

not. Following the crisis, Malaysia imposed a series of capital controls, which Johnson and Mitten (2003) argue benefited companies connected with leading politicians. Panels C and D of Figure 8 show that Malaysian and Thai stocks resemble Mexican stocks, in that they exhibit high synchronicity and low firm-specific variation prior to the onset of the regional financial crisis - July 1997 in this case. Both also display sharp peaks of both firm-specific and systematic variation in the very early months of the crisis, but in both markets, firm-specific variation quickly falls off.

Thus, in East Asia, as in Mexico, the beginning of a comprehensive deregulation corresponds to a prolonged period of high firm-specific variation and lower synchronicity. In Japan and Korea, however, the increase in synchronicity is much larger relative to its previous baseline than in Mexico. In Malaysia and Thailand, firm-specific variation falls off rapidly after the crisis, especially after capital market reforms slows down and openness is replaced by capital control, where whereas in Japan and Korea it remains high for many years after.

In short, the magnitude and duration of the increased firm-specific variation appear to correspond to the seriousness with which each country undertakes institutional reforms of capital markets.

6.3 Transition Economy Stock Markets and the Strength of Reform

The breadth and depth of institutional reform is perhaps nowhere more important than in the post-socialist economies of Eastern Europe and the Former Soviet Union. All of the economies we have examined so far have stock markets with at least several hundred traded stocks. Since most transition economies have no active stock markets, and the exceptions have had them for only a few years, we must proceed more tentatively in exploring these markets. Nonetheless, the

patterns that emerge in studying North American and East Asian stock markets have counterparts here.

Tables 11 and 12 display the chronologies of reform in Poland and the Czech Republic. In both countries, a flurry of new legislation in 1991 and 1992 established basic market economy institutions. However, Glaeser *et al.* (2001) show that the two countries then followed very different trajectories. The judicial systems remained underdeveloped in both countries. However, strict Polish regulatory enforcement contrasted starkly with the hands-off regulation inspired by the libertarian philosophy of the Czech government in the 1990s. Glaeser *et al.* (2001) argue that the Czech financial system was stunted relative to that of Poland by the laissez faire philosophy of Czech leaders, and stress the need for law enforcement, by either the judiciary or regulators, to make markets work.

Figure 9 shows an upward trend in firm-specific variation in Poland and a downward trend in the Czech Republic in the latter years of the 1990s. Thus, the interrupted rise in asynchronicity we observed in Figure 4 for Eastern European stocks as a whole actually reflects a rise in the asynchronicity of Polish stocks superimposed upon the falling asynchronicity of Czech stocks.

As with Mexico and East Asia, the magnitude and duration of increased firm-specific variation appear to correspond to the gravity of institutional reforms.

6.4 Robustness Checks

As robustness checks, we also examine two measures of synchronicity. These are the average correlation between all possible pairs of thirty stocks, randomly selected in each country for each period, and the fraction of stocks moving with the market. Both correspond closely to the R^2 synchronicity measure shown in the figures.

7. Conclusions

To gauge the degree of synchronicity or asynchronicity in individual stocks in different countries, we employ the market model, a popular tool in asset pricing, which regresses individual stock returns on market returns. We measure synchronicity by the average R^2 statistic of these regressions for individual stocks in the country in question. A high R^2 means much of the variation in individual stock returns corresponds to variation in the overall market, and hence in other stocks. In contrast, a low R^2 indicates that each stock moves largely on its own – asynchronously. The average systematic (explained by the regression model) variation in individual stock returns is a second measure of synchronicity, while the average firm-specific (residual) variation measures the asynchronicity of individual stock price movements.

We measure the degree of synchronicity or asynchronicity in individual stocks in a wide range of countries, and find that individual stocks are becoming more synchronous in the average country. However, there is considerable disparity among countries in the sign and magnitude of this trend.

To better understand this disparity, we examine the changing synchronicity of individual stocks in a variety of countries. We find that an opening up of the economy in Canada, a country with well-developed institutions, was followed by a large and apparently permanent increase in firm-specific stock return variation. In contrast, a similar opening of the Mexican economy was coincident with greatly increased synchronicity of individual stocks. However, a subsequent series of reforms of Mexican financial regulations was followed by a prolonged period of slightly higher firm-specific returns variation. We then show that the implementation of comprehensive institutional reforms in the 1990s in certain East Asian economies was followed by very large and lasting increases in the firm-specific variation in individual stocks in those countries. In contrast,

East Asian economies that failed to enact reforms during the 1990s show continued high synchronicity in individual stock returns. Finally, the magnitude of firm-specific variation in Polish stocks rises sharply in the late 1990s, while that in Czech stocks falls, consistent with the view of Glaezer *et al.* (2001) that Czech reforms were not enforced while Polish reforms were.

We believe that these findings suggest a new and potentially useful measure of the effectiveness of reforms in different countries. We propose that the extent to which stock return synchronicity decreases, or asynchronicity increases, be regarded as a possible gauge of the actual extent of real institutional reform.

The longevity and continued access to capital of poorly run companies may well underlie many chronic economic problems in emerging and transition economies. Effective institutional reforms *should* let better run companies flourish and worse run companies flag. Such firm-specific differences in the quality of management should become evident in greater firm-specific variation in firms' stock prices. Moreover, institutional reforms should also dampen market-wide economic fluctuations, and this should reduce systematic stock price variation. Thus, institutional reforms should reduce the overall synchronicity of individual stock prices.

This view is not new. In the *Pure Theory of Capital*, Hayek (1941, p. 6) argues that "[The] stock of capital is not an amorphous mass, but possesses a definite structure, that it is organized in a definite way, and that its composition of essentially different items is much more important than its aggregate 'quantity'." In a healthy economy, Hayek argues, different companies undertake different investments because their managers possess different levels of entrepreneurial ability, openness to innovation, and foresight. Some firms succeed and others fail as the economy grows through this ongoing process of creative destruction. An efficient stock

market reflects these changes in firm fundamental value as asynchronous (that is, firm specific) changes in stock prices.

In proposing this new use for stock market prices, we draw attention to two caveats. First, we explicitly avoid any attribution of cause and effect. We simply propose that less synchronous stock prices prevail in better functioning economies. Second, highly synchronous stock returns might reflect either synchronous fundamentals or a stock market whose prices fail to reflect asynchronous fundamentals. The former might be symptomatic of managerial herding and lethargic creative destruction. The latter could occur if the stock market functions poorly. Since King and Levine (1993) argue that creative destruction requires a well-functioning financial system and Shleifer and Vishny (1997) document the role of stock prices in engendering good corporate governance, the latter and former possibilities are probably not cleanly separable.

Finally, we recognize that our case is based on an array of circumstantial evidence. We invite alternative explanations of the patterns we detect, and welcome ideas about how to distinguish such possibilities from the economic underpinnings we propose.

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Table 1
Individual Stocks Synchronicity Measured by Average Market Model R^2 Statistics

	Country	90	91	92	93	94	95	96	97	98	99	00
Developed	Australia	0.08	0.06	0.07	0.10	0.12	0.06	0.07	0.13	0.08	0.07	0.17
	Austria	0.49	0.43	0.28	0.18	0.16	0.08	0.10	0.09	0.15	0.09	0.07
	Belgium	0.23	0.17	0.17	0.13	0.16	0.12	0.12	0.10	0.12	0.07	0.07
	Canada	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.05	0.09
	Denmark	0.15	0.10	0.10	0.09	0.16	0.09	0.06	0.12	0.12	0.07	0.08
	Finland	0.16	0.21	0.38	0.17	0.21	0.13	0.11	0.18	0.21	0.08	0.20
	France	0.16	0.12	0.09	0.07	0.10	0.07	0.07	0.09	0.14	0.08	0.20
	Germany	0.24	0.17	0.16	0.08	0.13	0.13	0.09	0.12	0.18	0.11	0.19
	Greece	0.24	0.18	0.19	0.27	0.34	0.21	0.11	0.25	0.22	0.39	0.57
	Ireland	0.06	.	.	.	0.14	0.05	0.15	0.08	0.22	0.07	0.14
	Israel	0.29	0.19	0.13	0.15	0.46	0.32	0.21	0.26	0.13	0.10	0.24
	Italy	0.42	0.32	0.32	0.23	0.27	0.19	0.15	0.18	0.35	0.14	0.21
	Japan	0.47	0.26	0.39	0.27	0.20	0.25	0.18	0.23	0.33	0.13	0.14
	Netherlands	0.20	0.16	0.10	0.09	0.14	0.12	0.10	0.15	0.22	0.09	0.15
	New Zealand	0.06	0.11	0.08	0.08	0.11	0.06	0.07	0.13	0.14	0.10	0.08
	Norway	0.23	0.19	0.13	0.12	0.15	0.10	0.08	0.17	0.21	0.14	0.17
	Portugal	0.19	0.16	0.07	0.14	0.09	0.07	0.05	0.10	0.16	0.14	0.10
	Spain	0.41	0.30	0.24	0.16	0.21	0.16	0.11	0.19	0.26	0.18	0.20
	Sweden	0.20	0.10	0.15	0.13	0.21	0.15	0.13	0.13	0.23	0.09	0.16
	Switzerland	0.22	0.17	0.16	0.09	0.14	0.15	0.12	0.19	0.26	0.14	0.14
	United Kingdom	0.16	0.15	0.21	0.09	0.13	0.07	0.08	0.08	0.14	0.09	0.16
East Asia	China	.	.	0.65	0.61	0.82	0.67	0.50	0.48	0.31	0.42	0.31
	Hong Kong	0.42	0.19	0.31	0.18	0.26	0.18	0.12	0.34	0.41	0.23	0.26
	Indonesia	0.19	0.19	0.19	0.17	0.16	0.11	0.07	0.24	0.20	0.33	0.18
	Korea	0.57	0.30	0.33	0.33	0.23	0.31	0.26	0.38	0.28	0.17	0.19
	Malaysia	0.56	0.36	0.26	0.24	0.54	0.45	0.26	0.59	0.57	0.48	0.47
	Philippines	0.28	0.19	0.15	0.14	0.21	0.12	0.09	0.24	0.32	0.17	0.17
	Singapore	0.42	0.23	0.15	0.17	0.29	0.24	0.15	0.40	0.49	0.45	0.27
	Taiwan	0.70	0.62	0.42	0.43	0.27	0.47	0.18	0.28	0.34	0.23	0.40
	Thailand	0.47	0.36	0.21	0.21	0.25	0.31	0.22	0.22	0.25	0.26	0.22
E. Europe	Czech Republic	.	.	.	.	0.26	0.21	0.12	0.08	0.12	0.08	0.05
	Hungary	.	.	0.06	0.07	0.34	0.12	0.14	0.17	0.31	0.11	0.11
	Poland	.	.	0.29	0.43	0.66	0.45	0.25	0.35	0.30	0.20	0.16
	Romania	.	.	.	.	.	.	.	.	0.16	0.09	0.05
	Russia	.	.	.	.	.	.	0.19	0.25	0.34	0.30	0.27
Lat. America	Argentina	0.71	0.59	0.42	0.28	0.29	0.44	0.21	0.33	0.32	0.32	0.24
	Brazil	.	.	.	.	.	0.25	0.09	0.21	0.20	0.19	0.13
	Chile	.	0.15	0.13	0.23	0.14	0.23	0.12	0.13	0.24	0.14	0.14
	Colombia	.	.	0.19	0.12	0.21	0.17	0.12	0.11	0.33	0.27	0.12
	Mexico	0.22	0.20	0.30	0.23	0.39	0.37	0.17	0.22	0.29	0.21	0.17
Other Developing	Bangladesh	.	.	0.33	0.09	0.24	0.13	0.33	0.39	0.30	0.14	0.31
	Egypt	.	.	.	.	.	0.05	0.10	0.23	0.15	0.21	0.21
	India	0.33	0.28	0.43	0.27	0.20	0.24	0.20	0.24	0.24	0.19	0.15
	Kenya	.	.	.	0.04	0.30	0.09	0.04	0.12	0.06	0.10	0.07
	Mauritius	.	.	.	.	.	.	.	.	0.23	0.16	0.05
	Morocco	.	.	.	.	0.06	0.08	0.04	0.11	0.10	0.10	0.15
	Pakistan	.	.	.	0.16	0.18	0.24	0.19	0.37	0.15	0.12	0.18
	South Africa	0.12	0.14	0.09	0.16	0.10	0.08	0.08	0.09	0.15	0.07	0.07
	Turkey	0.36	0.50	0.24	0.27	0.45	0.34	0.23	0.34	0.42	0.37	0.48

Table 2
Individual Stocks Asynchronicity Measured by Average Firm-Specific Return Variation (x 100)

	Country	90	91	92	93	94	95	96	97	98	99	00
Developed	Australia	1.18	1.15	0.72	0.79	0.43	0.49	0.56	0.64	0.86	0.96	0.92
	Austria	0.21	0.15	0.15	0.17	0.13	0.16	0.13	0.15	0.20	0.25	0.36
	Belgium	0.19	0.17	0.17	0.17	0.11	0.13	0.21	0.38	0.60	0.71	0.82
	Canada	2.76	3.00	2.78	1.96	1.38	1.63	1.49	1.48	2.12	2.38	2.23
	Denmark	0.17	0.17	0.28	0.35	0.29	0.18	0.21	0.18	0.27	0.25	0.33
	Finland	0.37	0.36	0.49	0.54	0.33	0.39	0.28	0.31	0.35	0.56	0.62
	France	0.26	0.26	0.39	0.39	0.29	0.27	0.36	0.38	0.45	0.49	0.69
	Germany	0.23	0.20	0.27	0.30	0.22	0.21	0.30	0.38	0.57	0.68	1.10
	Greece	1.03	0.63	0.55	0.45	0.39	0.25	0.28	0.39	0.66	1.08	0.45
	Ireland	1.11				0.19	0.06	0.11	0.32	0.32	0.38	0.83
	Israel	0.62	0.63	0.51	0.59	0.64	0.49	0.47	0.48	0.45	0.66	0.71
	Italy	0.11	0.12	0.25	0.27	0.30	0.18	0.25	0.24	0.36	0.26	0.36
	Japan	0.34	0.26	0.31	0.25	0.21	0.27	0.18	0.34	0.46	0.57	0.48
	Netherlands	0.16	0.21	0.24	0.29	0.12	0.14	0.19	0.21	0.33	0.39	0.44
	New Zealand	0.58	0.63	0.77	0.59	0.37	0.36	0.30	0.29	0.50	0.37	0.42
	Norway	0.33	0.46	0.86	0.65	0.24	0.25	0.27	0.29	0.50	0.61	0.63
	Portugal	0.25	0.35	0.42	0.52	0.34	0.42	0.37	0.36	0.51	0.32	0.56
	Spain	0.19	0.21	0.30	0.29	0.29	0.23	0.22	0.24	0.32	0.15	0.25
	Sweden	0.31	0.50	0.65	0.55	0.26	0.19	0.18	0.23	0.40	0.48	0.72
	Switzerland	0.18	0.21	0.22	0.27	0.18	0.15	0.19	0.18	0.25	0.23	0.33
	United Kingdom	0.35	0.41	0.45	0.40	0.25	0.25	0.28	0.32	0.42	0.55	0.66
East Asia	China			0.28	0.32	0.37	0.19	0.44	0.27	0.21	0.23	0.23
	Hong Kong	0.33	0.18	0.31	0.40	0.26	0.30	0.37	0.69	0.88	0.99	1.02
	Indonesia	0.64	0.54	0.41	0.43	0.50	0.64	0.66	0.73	2.83	1.94	0.96
	Korea	0.13	0.16	0.41	0.22	0.40	0.27	0.38	0.83	1.86	2.12	1.89
	Malaysia	0.26	0.17	0.22	0.59	0.29	0.21	0.32	0.41	0.80	0.37	0.36
	Philippines	0.69	0.64	0.68	0.71	0.65	0.55	0.57	0.82	1.48	1.30	1.14
	Singapore	0.34	0.26	0.40	0.45	0.36	0.28	0.17	0.33	0.82	0.54	0.38
	Taiwan	0.53	0.21	0.18	0.21	0.21	0.17	0.18	0.34	0.28	0.41	0.53
	Thailand	0.51	0.38	0.36	0.33	0.27	0.24	0.30	1.08	2.01	1.06	0.60
E. Europe	Czech Republic					0.60	0.35	0.40	0.48	0.55	0.54	0.37
	Hungary			0.42	0.99	0.75	0.33	0.67	0.70	0.71	0.58	0.89
	Poland			0.54	1.19	0.75	0.29	0.36	0.37	0.48	0.34	0.43
	Romania									0.83	0.81	0.77
	Russia							1.23	1.19	2.92	1.25	1.36
Lat. America	Argentina	1.08	1.21	0.82	0.48	0.48	0.51	0.37	0.30	0.42	0.42	0.26
	Brazil						0.75	0.67	0.77	1.00	1.07	0.72
	Chile		0.80	0.33	0.24	0.42	0.31	0.17	0.21	0.39	0.30	0.22
	Colombia			0.60	0.35	0.41	0.37	0.32	0.57	0.49	0.47	0.29
	Mexico	0.30	0.29	0.31	0.21	0.25	0.57	0.34	0.31	0.49	0.50	0.43
Other Developing	Bangladesh			0.42	0.22	0.67	0.34	1.35	0.63	0.54	0.42	0.30
	Egypt						0.26	0.41	0.42	0.28	0.31	0.42
	India	0.61	0.61	1.03	0.60	0.78	0.38	0.59	0.71	0.84	1.30	1.06
	Kenya				0.81	0.93	0.50	0.41	0.40	0.59	0.47	0.40
	Mauritius									0.12	0.07	0.04
	Morocco					0.23	0.12	0.17	0.20	0.10	0.21	0.19
	Pakistan				0.48	0.69	0.64	0.81	0.60	0.88	0.99	0.94
	South Africa	0.50	0.39	0.44	0.62	0.62	0.42	0.63	0.67	1.22	1.13	1.44
	Turkey	1.09	0.75	0.66	1.18	1.40	0.83	0.71	0.73	0.79	0.85	0.68

Table 3
Individual Stocks Synchronicity Measured by Average Market-Related Return Variation (x 100)

	Country	90	91	92	93	94	95	96	97	98	99	00
Developed	Australia	0.10	0.08	0.05	0.09	0.06	0.03	0.04	0.10	0.08	0.07	0.19
	Austria	0.21	0.11	0.06	0.04	0.03	0.01	0.01	0.02	0.04	0.02	0.03
	Belgium	0.06	0.03	0.04	0.02	0.02	0.02	0.03	0.04	0.08	0.05	0.06
	Canada	0.19	0.19	0.17	0.12	0.08	0.10	0.11	0.12	0.15	0.12	0.23
	Denmark	0.03	0.02	0.03	0.03	0.06	0.02	0.01	0.02	0.04	0.02	0.03
	Finland	0.07	0.09	0.30	0.11	0.09	0.06	0.03	0.06	0.10	0.05	0.15
	France	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.04	0.07	0.04	0.17
	Germany	0.07	0.04	0.05	0.03	0.03	0.03	0.03	0.05	0.13	0.08	0.26
	Greece	0.32	0.14	0.13	0.16	0.20	0.06	0.04	0.13	0.18	0.70	0.60
	Ireland	0.08				0.03	0.00	0.02	0.03	0.09	0.03	0.14
	Israel	0.26	0.15	0.08	0.11	0.54	0.23	0.12	0.16	0.07	0.07	0.23
	Italy	0.08	0.05	0.12	0.08	0.11	0.04	0.04	0.05	0.19	0.04	0.10
	Japan	0.30	0.09	0.20	0.09	0.05	0.09	0.04	0.10	0.23	0.09	0.08
	Netherlands	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.04	0.09	0.04	0.08
	New Zealand	0.04	0.08	0.07	0.05	0.05	0.02	0.02	0.04	0.08	0.04	0.04
	Norway	0.10	0.11	0.12	0.09	0.04	0.03	0.02	0.06	0.13	0.10	0.13
	Portugal	0.06	0.07	0.03	0.08	0.03	0.03	0.02	0.04	0.10	0.05	0.06
	Spain	0.13	0.09	0.10	0.05	0.08	0.04	0.03	0.06	0.11	0.03	0.06
	Sweden	0.08	0.06	0.11	0.08	0.07	0.03	0.03	0.04	0.12	0.05	0.14
	Switzerland	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.09	0.04	0.06
	United Kingdom	0.06	0.07	0.12	0.04	0.04	0.02	0.02	0.03	0.07	0.06	0.13
East Asia	China			0.52	0.50	1.65	0.38	0.43	0.25	0.09	0.17	0.10
	Hong Kong	0.24	0.04	0.14	0.09	0.09	0.07	0.05	0.36	0.61	0.29	0.36
	Indonesia	0.15	0.13	0.10	0.09	0.10	0.08	0.05	0.23	0.71	0.97	0.22
	Korea	0.16	0.07	0.20	0.11	0.12	0.12	0.13	0.50	0.71	0.42	0.45
	Malaysia	0.34	0.09	0.07	0.19	0.34	0.18	0.11	0.61	1.05	0.34	0.32
	Philippines	0.26	0.15	0.12	0.11	0.18	0.08	0.06	0.26	0.70	0.27	0.23
	Singapore	0.24	0.08	0.07	0.09	0.15	0.09	0.03	0.22	0.78	0.44	0.14
	Taiwan	1.26	0.35	0.13	0.16	0.08	0.15	0.04	0.13	0.14	0.12	0.36
	Thailand	0.45	0.21	0.10	0.09	0.09	0.11	0.08	0.31	0.69	0.38	0.17
E. Europe	Czech Republic					0.21	0.09	0.05	0.04	0.08	0.05	0.02
	Hungary			0.03	0.07	0.38	0.04	0.11	0.14	0.32	0.07	0.10
	Poland			0.22	0.91	1.45	0.23	0.12	0.20	0.21	0.08	0.08
	Romania									0.16	0.08	0.04
	Russia							0.29	0.40	1.50	0.53	0.49
Latin America	Argentina	2.67	1.74	0.60	0.19	0.19	0.41	0.10	0.15	0.20	0.20	0.08
	Brazil						0.24	0.07	0.21	0.25	0.26	0.11
	Chile		0.14	0.05	0.07	0.07	0.09	0.02	0.03	0.12	0.05	0.04
	Colombia			0.14	0.05	0.11	0.08	0.04	0.07	0.24	0.18	0.04
	Mexico	0.08	0.07	0.14	0.06	0.16	0.33	0.07	0.09	0.20	0.14	0.09
Other Developing	Bangladesh			0.20	0.02	0.21	0.05	0.66	0.40	0.23	0.07	0.13
	Egypt						0.01	0.05	0.13	0.05	0.08	0.11
	India	0.30	0.24	0.78	0.22	0.19	0.12	0.15	0.22	0.26	0.31	0.19
	Kenya				0.04	0.41	0.05	0.02	0.06	0.04	0.06	0.03
	Mauritius									0.04	0.01	0.00
	Morocco					0.01	0.01	0.01	0.03	0.01	0.02	0.03
	Pakistan				0.09	0.15	0.20	0.19	0.35	0.15	0.14	0.21
	South Africa	0.07	0.06	0.05	0.12	0.07	0.03	0.05	0.07	0.22	0.09	0.12
	Turkey	0.61	0.75	0.21	0.44	1.14	0.43	0.22	0.38	0.56	0.49	0.64

Table 4
Sample Sizes

Country	90	91	92	93	94	95	96	97	98	99	00
Australia	482	483	529	582	716	739	991	1037	1029	1037	1217
Austria	82	99	110	128	138	145	138	138	146	133	123
Belgium	368	374	349	343	329	332	326	339	339	348	345
Canada	2427	2307	2366	2654	2839	2808	2797	2968	3213	3252	3334
Denmark	170	159	193	210	219	219	247	248	239	231	232
Finland	81	84	86	79	83	111	115	139	144	158	172
France	918	1007	996	971	952	930	958	1008	991	1029	1049
Germany	654	701	632	642	673	694	776	961	874	931	1380
Greece	106	159	170	189	210	247	267	280	278	298	343
Israel	184	170	194	363	506	529	543	544	563	522	539
Italy	313	322	332	324	322	296	292	305	305	313	334
Japan	2089	2331	2397	2477	2609	2821	2985	3099	3163	3245	3332
Netherlands	247	234	229	217	218	220	233	269	349	369	350
New Zealand	66	69	90	109	129	141	143	146	153	151	161
Norway	129	130	124	128	151	177	184	216	236	212	207
Portugal	98	100	94	96	97	106	99	96	108	101	96
Spain	134	135	132	140	149	145	148	157	160	158	160
Sweden	312	295	246	234	270	308	317	364	390	418	450
Switzerland	357	555	527	496	475	467	464	458	442	414	414
United Kingdom	1441	1422	1345	1395	1542	1538	1579	1904	1901	1751	1704
China	.	.	21	84	256	280	342	620	765	850	950
Hong Kong	272	292	347	407	481	492	523	578	605	620	704
Indonesia	43	94	107	120	131	137	181	217	205	214	212
Korea	744	781	807	808	818	840	885	1057	1031	1145	1348
Malaysia	345	385	443	494	538	611	674	758	811	714	727
Philippines	70	79	81	96	131	161	194	211	173	189	169
Singapore	305	319	340	369	396	399	407	429	431	357	410
Taiwan	183	204	238	287	311	350	446	506	590	675	755
Thailand	223	263	325	384	426	467	513	476	427	385	343
Czech Republic	.	.	.	.	63	104	106	108	106	97	88
Hungary	.	.	13	15	24	29	32	36	44	51	56
Poland	.	.	5	6	7	18	26	63	126	167	187
Romania	.	.	.	.	.	.	.	.	61	65	64
Russia	.	.	.	.	.	.	39	58	46	36	76
Argentina	21	23	28	30	66	57	70	69	59	53	55
Brazil	.	.	.	.	.	187	191	217	194	268	287
Chile	.	119	129	138	146	146	143	153	143	146	138
Colombia	.	.	26	30	36	34	31	34	26	23	18
Mexico	53	61	109	122	143	123	128	143	117	113	98
Bangladesh	.	.	49	66	81	95	122	150	167	183	192
Egypt	.	.	.	.	.	19	26	62	71	86	82
India	393	423	451	497	587	593	633	635	609	634	662
Kenya	.	.	.	27	37	32	38	40	41	38	36
Mauritius	.	.	.	.	.	.	.	.	9	9	9
Morocco	.	.	.	.	24	41	40	46	46	53	40
Pakistan	.	.	.	111	121	117	116	112	110	134	153
South Africa	339	324	297	327	377	402	495	526	563	610	558
Turkey	81	118	138	144	164	194	213	235	268	269	289
World	13730	14621	15095	16339	17991	18901	20216	22215	22867	23255	24648

Table 5
A Brief Chronology of Institutional Changes in Canada

Date	*Event*
November 1988	Contrary to opinion polls predictions, the pro-free-trade Conservative Party is re-elected with a majority government and a mandate to implement the previously negotiated Free Trade Agreement (FTA) with the US
January 1989	Implementation of the FTA requires immediate removal of all barriers to free capital flow between Canada and the US, and begins decade-long process of tariff removal
January (?) 1991	Rule 9.1 requires disclosure and 'majority of minority shareholder approval for all substantial related party transactions
December 1992	Canada signs North American Free Trade Agreement (NAFTA), removing barriers to trade and investment with Mexico
January 1994	The North American Free Trade Agreement (NAFTA) goes into force, initiating the removal trade and investment barriers between the US, Canada and Mexico
December 1994	The Dey Report recommendations on corporate governance reform are released and subsequently endorsed by the Toronto Stock Exchange
May 1996	The mining stock bubble associated with Bre-X peaks
March 1997	Bre-X bubble collapses
March 1998	Canadian dollar abruptly drops from US$0.71 in March to US$0.63 in August.
August 2000	The high tech bubble associated with Nortel Networks peaks
November 2000	Nortel dot.com bubble bursts

Source: Morck, Stangeland, and Yeung (2000).

Table 6
A Brief Chronology of Institutional Changes in Mexico

Date	*Event*
October 1987	Restrictions on foreign investment relaxed
March 1989	Brady Plan
May 1989	Restrictions on foreign direct investment liberalized substantially
November 1989	Foreigners allowed to purchase voting share through trusts
January 1991	Dividend taxes eliminated, income taxes reduced sharply
Throughout 1991	Bank privatizations. Banking liberalization begins, continues over several years
December 1992	Mexico signs North American Free Trade Agreement (NAFTA)
November 1993	Tequila Crisis begins
January 1994	NAFTA goes into force Anarchist Zapatista armed insurrection in Chiapas state
December 1994	Mexican peso depreciates sharply
January 1995	Mexican banks financial positions deteriorate markedly
February 1995	US lends Mexico $13.5 million
March 1995	Foreign ownership rules for banks liberalized
October 1996	Big business, labor, and government pact on wages and prices renewed for 1997
December 1996	All firms must distribute 10% of net income to their employees in Jan. 1997
January 1997	Mexico completes repayment of US loan
Late 1998	Congress passes financial reforms to promote shareholder diversity, including: One fourth of directors to be independent; audit committee to examine all related party transactions; minority shareholders representing 10% of the votes may appoint a director; minority shareholders representing 20% of the votes have veto at AGM.
March 1998	President Ernesto Zedillo announces plans for financial sector reforms
January 1999	Restrictions on foreign ownership of banks relaxed
July 1999	National Action Party candidate, Vincente Fox, elected president, ending 71 years of Institutional Revolutionary Party rule.
December 1999	Congress passes laws allowing banks to seize collateral on unpaid loans

Source: Geert Bekaert and Campbell R. Harvey Chronology of Economic, Political and Financial Events in Emerging Markets.

Table 7.
Panel Regression Sample Descriptive Statistics

The synchronicity measures are $\varnothing_{n\tau}$, a logistic transformation of the average market model R^2; $\ln_{\varepsilon}\sigma^2_{n\tau}$, the logarithm of average firm-specific return variation; and $\ln_{m}\sigma^2_{n\tau}$, the logarithm of systematic return variation. Capital openness is value-weighted fraction of the market open to foreign investors. Trade openness is imports over GDP relative to GDP over world GDP. Good government is a cross-section index taking low values where corruption is worse. Data are for 1990 through 2000.

Panel A. Univariate Statistics

Country	$\varnothing_{n\tau}$	$\ln_{\varepsilon}\sigma^2_{n\tau}$	$\ln_{m}\sigma^2_{n\tau}$	Capital openness[a]	Trade openness	Good government
Australia	-2.41	-4.94	-7.35		-0.79	26.50
Austria	-1.54	-6.39	-7.93		-0.59	27.86
Belgium	-1.88	-6.06	-7.94		-0.31	27.93
Brazil	-1.51	-4.78	-6.29	0.72	-0.87	20.24
Canada	-2.74	-3.90	-6.65		-0.64	28.63
Chile	-1.63	-5.75	-7.38	0.81	-0.70	19.60
Colombia	-1.81	-5.53	-7.34	0.66	-0.79	18.97
Denmark	-2.16	-6.08	-8.25		-0.68	28.98
Finland	-1.57	-5.55	-7.12		-0.72	28.82
France	-2.24	-5.67	-7.91		-0.73	27.89
Germany	-1.92	-5.75	-7.67		-0.67	28.60
Greece	-1.20	-5.28	-6.48	0.79	-0.74	21.01
India	-1.07	-4.95	-6.02	0.17	-0.86	18.44
Indonesia	-1.55	-4.90	-6.45	0.54	-0.72	15.40
Italy	-1.11	-6.12	-7.23		-0.75	24.65
Japan	-1.04	-5.80	-6.84		-0.76	27.88
Korea	-0.81	-5.44	-6.25	0.32	-0.67	22.20
Malaysia	-0.31	-5.73	-6.03	0.73	-0.13	22.76
Mexico	-1.07	-5.69	-6.76	0.64	-0.73	18.61
Netherlands	-1.90	-6.15	-8.05		-0.46	29.33
New Zealand	-2.30	-5.37	-7.67		-0.72	28.98
Norway	-1.78	-5.51	-7.29		-0.67	29.59
Pakistan	-1.43	-4.95	-6.38	0.59	-0.78	13.47
Peru	-1.60	-4.88	-6.48	0.99	-0.83	14.92
Philippines	-1.51	-4.87	-6.38	0.49	-0.56	12.94
Portugal	-2.13	-5.56	-7.69	0.68	-0.63	24.85
South Africa	-2.14	-5.09	-7.23	1.00	-0.79	23.07
Spain	-1.31	-6.04	-7.34		-0.75	25.30
Sweden	-1.75	-5.69	-7.44		-0.67	28.98
Taiwan (China)	-0.46	-5.91	-6.37	0.21		25.13
Thailand	-0.98	-5.29	-6.28	0.37	-0.56	20.17
Turkey	-0.63	-4.74	-5.37	0.98	-0.77	18.13
United Kingdom	-2.06	-5.64	-7.69		-0.69	28.44
Mean	-1.56	-5.45	-7.02	0.63	-0.68	23.6
Std	0.58	0.53	0.72	0.26	0.15	5.18
Minimum	-2.74	-6.39	-8.25	0.17	-0.87	12.9
Maximum	-0.31	-3.90	-5.37	1.00	-0.13	29.6

a. For developed economy markets, this measure is essentially always one (not shown).

Panel B. Correlation Matrix of Time Series Means

	$\varnothing_{n\tau}$	$\ln_{\varepsilon}\sigma^2_{n\tau}$	$\ln_{m}\sigma^2_{n\tau}$	Capital openness	Trade openness
$\ln_{\varepsilon}\sigma^2_{n\tau}$	-0.12 (0.04)				
$\ln_{m}\sigma^2_{n\tau}$	0.70 (0.00)	0.63 (0.00)			
Capital openness	-0.26 (0.00)	0.25 (0.00)	-0.03 (0.68)		
Trade openness	0.14 (0.02)	-0.22 (0.00)	-0.06 (0.31)	-0.04 (0.67)	
Good government	-0.41 (.02)	-0.47 (.01)	-0.68 (.00)	-0.08 (0.74)	0.23 (.20)

Numbers in parenthesis denotes p-values.

Table 8. Panel Regressions

Independent variables include *capital openness*, a value-weighted fraction of the market open to foreign investors; *trade openness*, imports over GDP relative to GDP over world GDP; and interactions with *good government*, a cross-section index taking low values where corruption is worse. The Peso crisis dummy is one for Latin American countries in 1995, and zero otherwise. The Asian Crisis dummy is one for Asian countries in 1997 and 1998, and zero otherwise. The Real crisis dummy is one for Latin American countries in 1998, and zero otherwise. Data are for 1990 through 2000. The dependent variables are as indicated. Numbers in parentheses are coefficient standard errors.

Panel A. Panel regressions with country fixed effects

Dependent variable is logistic transformation of market model R^2

Regression	8a.1	8a.2	8a.3	8a.4	8a.5	8a.6	8a.7
Trade openness	.07		2.13				-1.54
	(.72)		(2.66)				(3.82)
Trade openness x good government		-.00	-.10				.12
		(.03)	(.12)				(.21)
Capital openness				-.40*		2.92*	2.47
				(.24)		(1.56)	(1.83)
Capital openness x good government					-.02**	-.16**	-.13
					(.01)	(.07)	(.09)
F Statistic for openness terms	.01	.01	.33	2.70*	3.84**	3.71**	.85
Regression R^2	.6371	.6371	.6380	.5955	.5986	.6079	.6048

Dependent variable is logarithm of average firm-specific variation

Regression	8a.8	8a.9	8a.10	8a.11	8a.12	8a.13	8a.14
Trade openness	2.13***		4.98**				1.28
	(.68)		(2.52)				(3.91)
Trade openness x good government		.09***	-.14				.05
		(.03)	(.12)				(.21)
Capital openness				1.25***		.82	.31
				(.23)		(1.50)	(1.87)
Capital openness x good government					.06***	.02	.04
					(.01)	(.07)	(.09)
F Statistic for openness terms	9.82***	7.23***	5.60***	29.3***	29.0***	14.6***	6.20***
Regression R^2	.6449	.6416	.6467	.5059	.5051	.5062	.4734

Dependent variable is logarithm of average systematic variation

Regression	8a.15	8a.16	8a.17	8a.18	8a.19	8a.20	8a.21
Trade openness	2.21**		7.11**				-.26
	(.98)		(3.61)				(5.63)
Trade openness x good government		.08*	-.24				.18
		(.05)	(.16)				(.30)
Capital openness				.85**		3.74*	2.78
				(.35)		(2.24)	(2.69)
Capital openness x good government					.04**	-.14	-.09
					(.02)	(.11)	(.13)
F Statistic for openness terms	5.12**	3.22*	3.57**	5.95**	4.84**	3.84**	3.46***
Regression R^2	.6149	.6122	.6178	.4530	.4490	.4592	.5033

Sample	300	300	300	167	167	167	141
Degrees of freedom	267	267	266	149	149	148	121

Panel B. Panel regressions with country and year fixed effects

Dependent variable is logistic transformation of market model R^2

Regression	8b.1	8b.2	8b.3	8b.4	8b.5	8b.6	8b.7
Trade openness	2.16***		3.18				-.75
	(.76)		(2.19)				(3.31)
Trade openness x good government		.09***	-.05				.17
		(.04)	(.11)				(.18)
Capital openness				-.43*		3.19**	3.76**
				(.27)		(1.44)	(1.66)
Capital openness x good government					-.03**	-.17***	-.19**
					(.01)	(.07)	(.08)
F Statistic for openness terms	8.12***	6.21***	4.18**	2.61	4.22**	4.63***	2.69**
Regression R^2	.7675	.7658	.7677	.7014	.7048	.7150	.7345

Dependent variable is logarithm of average firm-specific variation

Regression	8b.8	8b.9	8b.10	8b.11	8b.12	8b.13	8b.14
Trade openness	.68		6.05***				1.07
	(.76)		(2.17)				(3.63)
Trade openness x good government		-.00	-.28***				.04
		(.04)	(.10)				(.20)
Capital openness				.83***		-.32	-1.07
				(.27)		(1.46)	(1.82)
Capital openness x good government					.04***	.054	.09
					(.01)	(.07)	(.09)
F Statistic for openness terms	.81	.00	3.88**	9.84***	10.5***	5.22***	2.42**
Regression R^2	.7444	.7436	.7511	.5987	.6004	.6006	.5922

Dependent variable is logarithm of average systematic variation

Regression	8b.15	8b.16	8b.17	8b.18	8b.19	8b.20	8b.21
Trade openness	2.83***		9.24***				.32
	(1.01)		(2.90)				(4.83)
Trade openness x good government		.09*	-.33**				.20
		(.05)	(.14)				(.26)
Capital openness				.40		2.87	2.70
				(.37)		(2.05)	(2.42)
Capital openness x good government					.01	-.12	-.10
					(.02)	(.09)	(.12)
F Statistic for openness terms	7.86***	3.27*	6.76***	1.16	.70	1.33	2.58**
Regression R^2	.7603	.7561	.7653	.6153	.6140	.6194	.6719

Sample	300	300	300	167	167	167	141
Degrees of freedom	258	258	257	139	139	138	112

Panel C. Panel regressions with country and year fixed effects as well as crisis dummy variables

Dependent variable is logistic transformation of market model R^2

Regression	8.15a	8.16a	8.17a	8.18a	8.19a	8.20a	8.21a
Trade openness	2.06***		2.60				-1.49
	(.75)		(2.29)				(3.26)
Trade openness x good government		.09***	-.03				.20
		(.04)	(.11)				(.18)
Capital openness				-.50*		2.90**	3.32**
				(.26)		(1.42)	(1.64)
Capital openness x good government					-.03**	-.16**	-.17**
					(.01)	(.07)	(.08)
Peso Crisis Dummy	.68***	.68***	.68***	.61***	.61***	.59***	.61***
	(.19)	(.19)	(.19)	(.24)	(.23)	(.23)	(.22)
Asian Crisis Dummy	.07	.11	.06	.21	.21	.18	.14
	(.12)	(.12)	(.12)	(.17)	(.17)	(.17)	(.17)
Real Crisis Dummy	.14	.16	.13	.37	.36	.34	.28
	(.21)	(.21)	(.21)	(.27)	(.27)	(.27)	(.25)
F Statistic for openness terms	7.62***	6.36***	3.83**	3.56*	5.32**	4.81***	2.57**
Regression R^2	.7792	.7782	.7793	.7199	.7234	.7317	.7550

Dependent variable is logarithm of average firm-specific variation

Regression	8c.8	8c.9	8c.10	8c.11	8c.12	8c.13	8c.14
Trade openness	.19		3.07				-1.10
	(.73)		(2.23)				(3.47)
Trade openness x good government		-.01	-.15				.12
		(.03)	(.11)				(.19)
Capital openness				.71***		-.73	-2.02
				(.26)		(1.42)	(1.74)
Capital openness x good government					.03***	.07	.13
					(.01)	(.07)	(.08)
Peso Crisis Dummy	.34*	.34*	.34*	.40*	.41*	.41*	.36
	(.18)	(.18)	(.18)	(.23)	(.23)	(.23)	(.23)
Asian Crisis Dummy	.54***	.55***	.49***	.39**	.40**	.40**	.55***
	(.11)	(.11)	(.12)	(.17)	(.17)	(.17)	(.18)
Real Crisis Dummy	-.16	-.16	-.19	-.14	-.13	-.13	-.19
	(.20)	(.20)	(.20)	(.27)	(.27)	(.27)	(.26)
F Statistic for openness terms	.07	.04	.97	7.49***	8.33***	4.27**	1.96
Regression R^2	.7707	.7707	.7724	.6303	.6324	.6331	.6464

Dependent variable is logarithm of average systematic variation

Regression	8c.15	8c.16	8c.17	8c.18	8c.19	8c.20	8c.21
Trade openness	2.25**		5.67**				-2.59
	(.96)		(2.94)				(4.53)
Trade openness x good government		.08*	-.17				.32
		(.05)	(.14)				(.25)
Capital openness				.21		2.17	1.30
				(.36)		(1.96)	(2.27)
Capital openness x good government					.01	-.09	-.04
					(.02)	(.09)	(.10)
Peso Crisis Dummy	1.02***	1.02***	1.02***	1.01***	1.01***	1.00***	.97***
	(.24)	(.24)	(.24)	(.32)	(.32)	(.32)	(.30)
Asian Crisis Dummy	.61***	.65***	.54***	.60***	.61***	.58**	.69***
	(.15)	(.15)	(.16)	(.24)	(.24)	(.24)	(.24)
Real Crisis Dummy	-.02	.00	-.06	.23	.23	.21	.10
	(.27)	(.27)	(.27)	(.37)	(.37)	(.37)	(.35)
F Statistic for openness terms	5.49**	3.26*	3.51**	.36	.16	.70	1.93
Regression R^2	.7906	.7888	.7918	.6606	.6601	.6632	.7264
Sample	300	300	300	167	167	167	141
Degrees of freedom	255	255	254	136	136	135	109

Table 9
A Brief Chronology of Institutional Changes in Japan

Date	*Event*
October 1990	Collapse of "bubble economy"
April 1993	Financial System Reform (FSR) allows greater use of bonds for debt financing by corporations
December 1994	Administrative Reform Commission (ARC) inaugurated, various proposals submitted to cabinet and revised over next three years
March 1995	Cabinet approves Program for Promoting Deregulation
December 1995	ARC submits First Report on Deregulation
March 1996	Cabinet revises Program for Promoting Deregulation
December 1996	ARC submitted Second Report on Deregulation
March 1997	Cabinet further revises Program for Promoting Deregulation
July 1997	Thai currency collapse begins East Asian financial crisis
December 1997	ARC submits Final Report to cabinet and dissolves. Cabinet approves comprehensive deregulation
February 1998	Deregulation Committee (DC) of the Cabinet Headquarters for the Promotion of Administrative Reform (HQPAR) inaugurated
March 1998	Cabinet approves Three-Year Program for Promoting Deregulation, addressing 624 deregulation measures
April 1999	Deregulation Committee (DC) reinforced and reorganized into Regulatory Reform Committee (RRC).
December 1999	DC submits First Report on Deregulation; HQPAR revises the Three-Year Program accordingly

Source: *Three-Year Programme for Promoting Deregulation*, published by the Executive Office of the Regulatory Reform Committee, Administrative Management Bureau, Management Coordination Agency of the Government of Japan.

Table 10
A Brief Chronology of Institutional Changes in Korea

Date	*Event*
January 1992	Foreigners may own up to 10% of Korean companies; Koreans may invest limited funds abroad after registering. Permission needed for large investments abroad
January (?) 1994	Foreign ownership limits relaxed (?)
February 1995	Forex concentration system suspended, residents may hold foreign currency without registering at banks; limits on allowable investments abroad greatly increased
March 1996	Korean stock market peaks
April 1997	Shareholder proposal rights enacted
July 1997	Thai currency collapse begins East Asian financial crisis
May 1996	Korean government fund to buy shares so as to stabilize market
February 1998	Listing requirements amended to require 25% independent directors; representation requirement for derivative lawsuits lowered to 0.01 percent (two stages, in Feb. and Mar.); new bankruptcy laws streamline workouts, increase creditor rights, and impose a one year deadline on reorganizations, after which liquidation is triggered
April 1998	Financial Supervisory Commission (FSC) established to improve disclosure. Its reforms include: 1. Financial statements must be audited in accordance with FSC rules. 2. Intercorporate holdings must be marked to market. 3. Listed companies with subsidiaries must file consolidated balance sheets. All to apply to 1999 balance sheets. In addition, Large related-party transactions, investments, or guarantees must be disclosed within 1 day also, all listed companies and certain top 30 Chaebol companies must have outsider committees to select auditors
May 1998	Stocks reach bottom and begin rising
June 1998	Government orders top 30 Chaebols to abolish group headquarters, increase managerial independence, and phase out cross-subsidization
September 1998	Abolition of shadow voting regulations for financial institutions
October 1998	Korea eliminates percentage ceiling on foreign ownership and liberalizes rules governing takeovers by foreigners in almost all industries
March 2000	Cross-guarantees among Chaebol firms must be resolved by now

Source:

Table 11
A Brief Chronology of Institutional Changes in Poland

Date	*Event*
1991 and 1992	Competition Law, Privatization Law, Insurance Law, Securities Law, Banking Law, Securities Law and Insider Trading Law enacted enacted; T-bill market, Stock Exchange open
May 1995	Managed float with fluctuation bounds introduced
June 1995	Current Account convertibility
July 1995	State-owned enterprises allocated to national Investment Funds (NIFs); WTO entry
August 1996	Privatization Law enacted, Gdansk Shipyard declared bankrupt
November 1996	OECD membership
February 1997	Investment in other OECD stock markets allowed, with some limitations
June 1997	NIFs begin trading on Warsaw Stock Exchange (WSE)e, Securities Law amended
September 1997	WSE tightens initial public offering (IPO) requirements
January 1998	New Banking Act harmonizes with EU rules; foreign banks allowed in Poland; Bankruptcy Law amended
February 1998	Investment Fund Law enacted; Independent Monetary Policy Council formed
November 1998	Zloty convertible
December 1998	National treatment for OECD financial institutions
January 1999	New Foreign Exchange Law; new pension regulations
April 1999	SEC announces mandatory disclosure rule for stakes > 5% and for changes > 2%
September 1999	Zloty falls to record low
January 2000	Corporate tax law reform
April 2000	Managed float adopted
December 2000	WSE starts new WARSET trading system
January 2001	New commercial legislation enacted

Source:

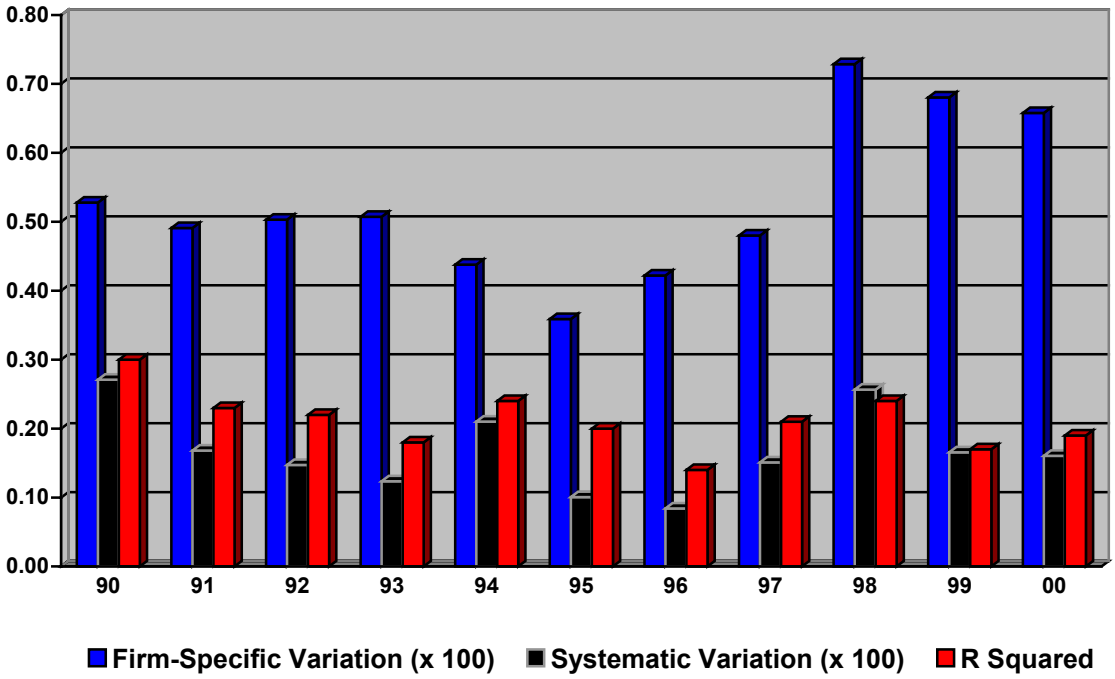
Table 12
A Brief Chronology of Institutional Changes in the Czech Republic

Date	*Event*
1991 and 1992	Competition Law, Bankruptcy Law, Commercial Code, Banking Law, Investment Companies Law, Insurance Law, Securities Law, and Insider Trading Law enacted; voucher mass privatization begins
September 1994	Rules governing investment abroad loosened
January 1995	WTO entry
October 1995	Current account convertibility (not capital account)
December 1995	OECD membership
July 1996	Vaclav Klaus takes office, libertarian ideology of minimal regulatory enforcement
January 1997	Off market stock transactions must be published
May 1997	Managed float adopted
February 1998	Banks prohibited from owning non-financial corporations
April 1998	Securities Commission Act removes most restrictions in old Securities Act
May 1998	Market maker system adopted
June 1998	Regulations forcing misvalued closed end funds to open
January 1999	Restrictions of foreign securities and
May 2000	New Bankruptcy Law
January 2001	New Capital markets Law

Source:

Figure 1
Worldwide Changes in Individual Stock Return Synchronicity

Panel A. Worldwide Averages Across Countries



Panel B. Worldwide Averages Across Individual Stocks

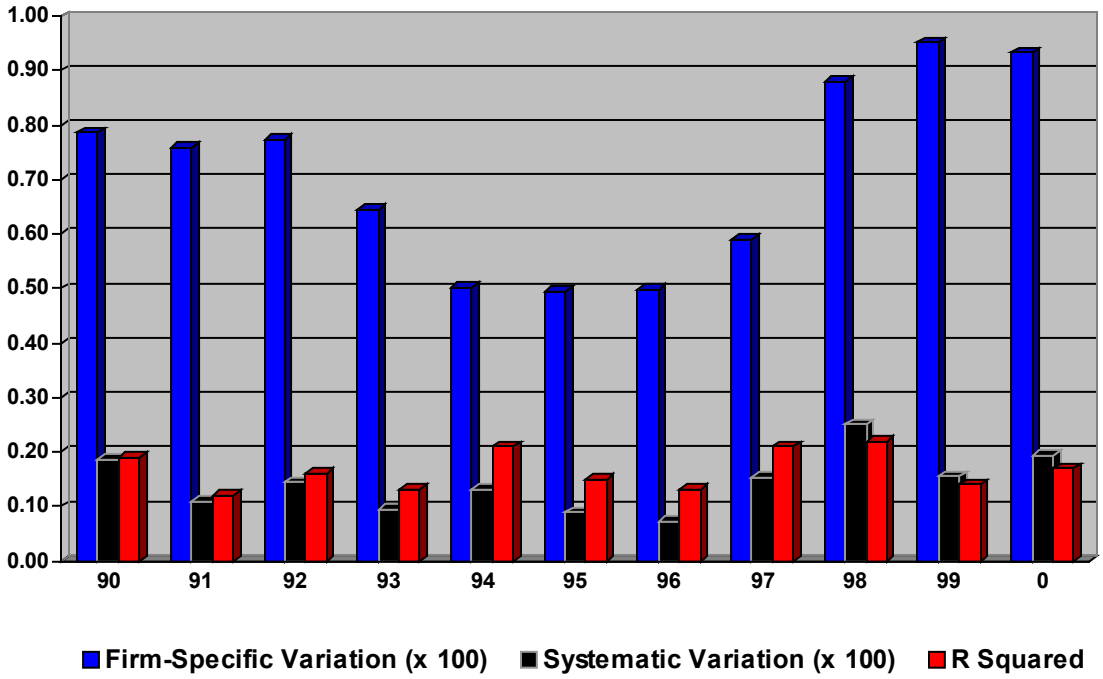
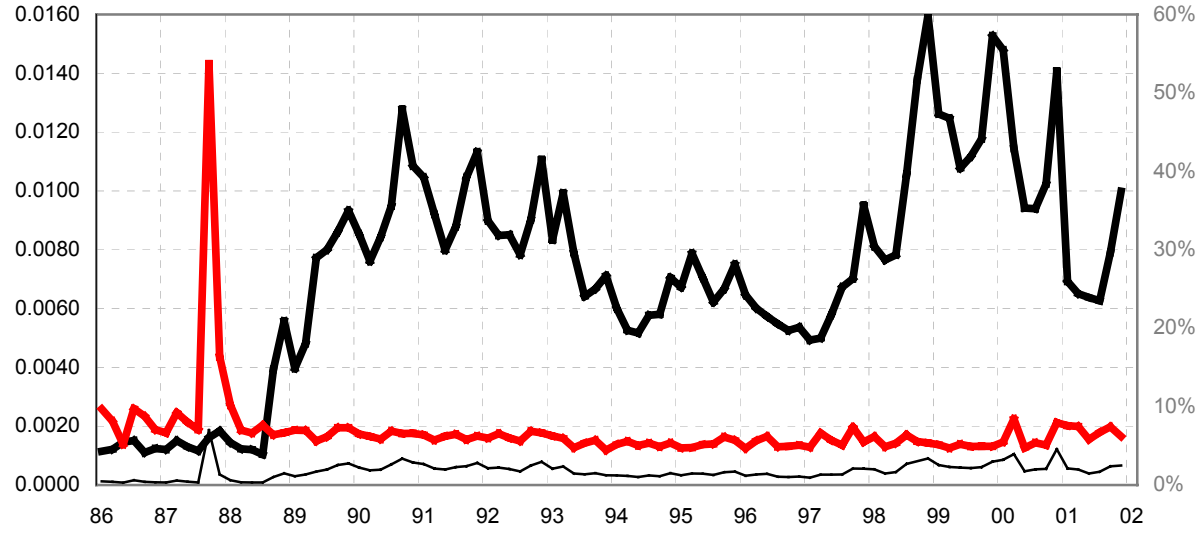


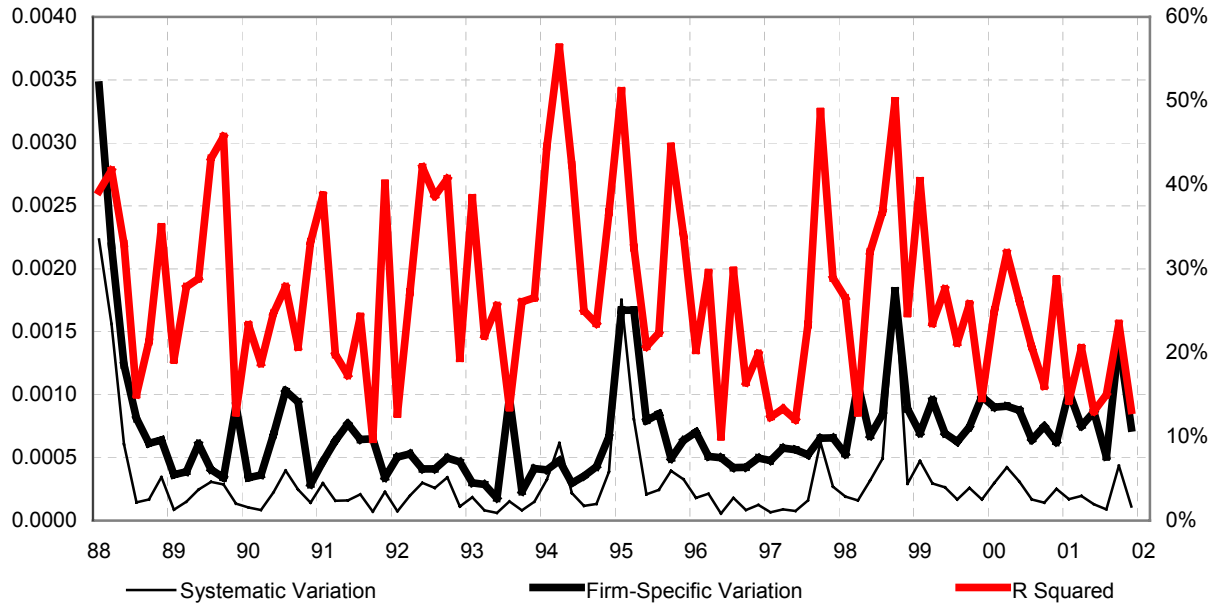
Figure 2

Synchronicity of Price Fluctuations in the Average Canadian and Mexican Stocks
Bimonthly synchronicity measures are derived from market model regressions of individual stock returns on domestic and US market returns, and include the average regression R^2, the systematic (explained) variation in the average stock's returns, and the firm-specific (residual) variation in the average stock's returns.

Panel A. Canada



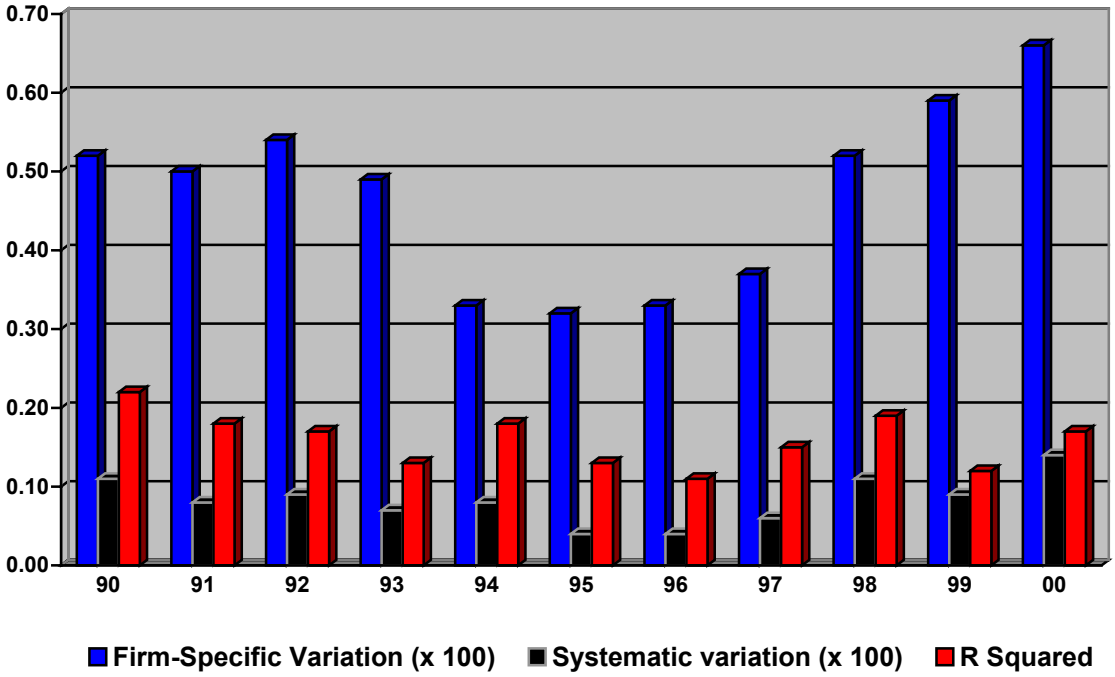
Panel B. Mexico



Source: DataStream

Figure 3
Changing Synchronicity in Developed Economies

Panel A. Averages Across Countries



Panel B. Averages Across Individual Stocks

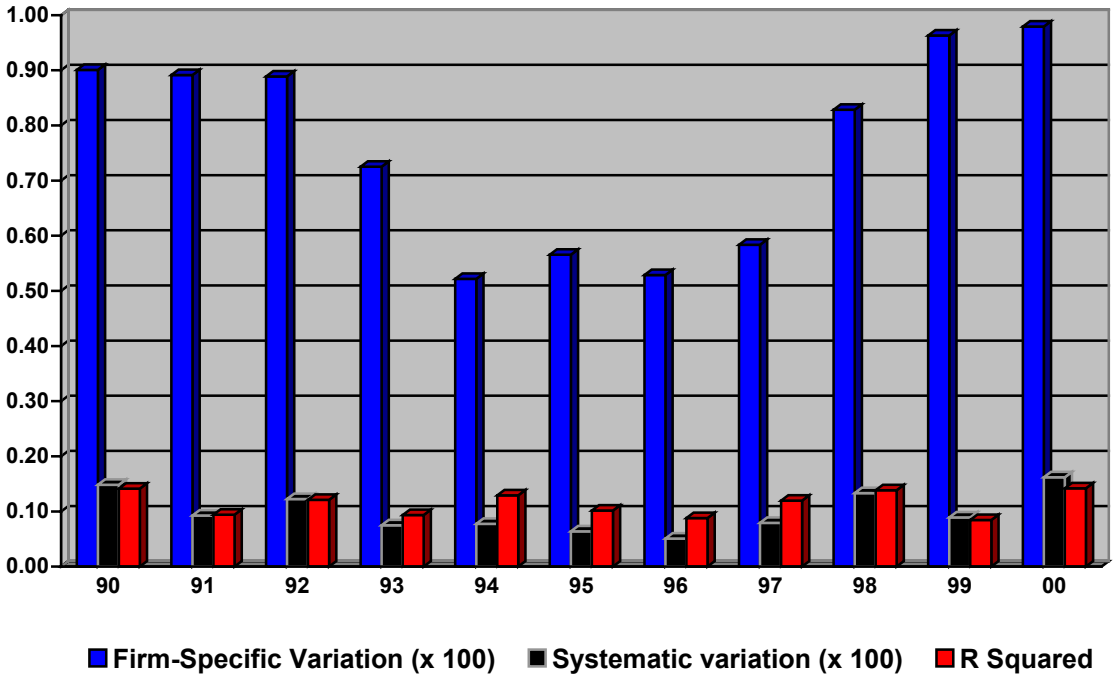
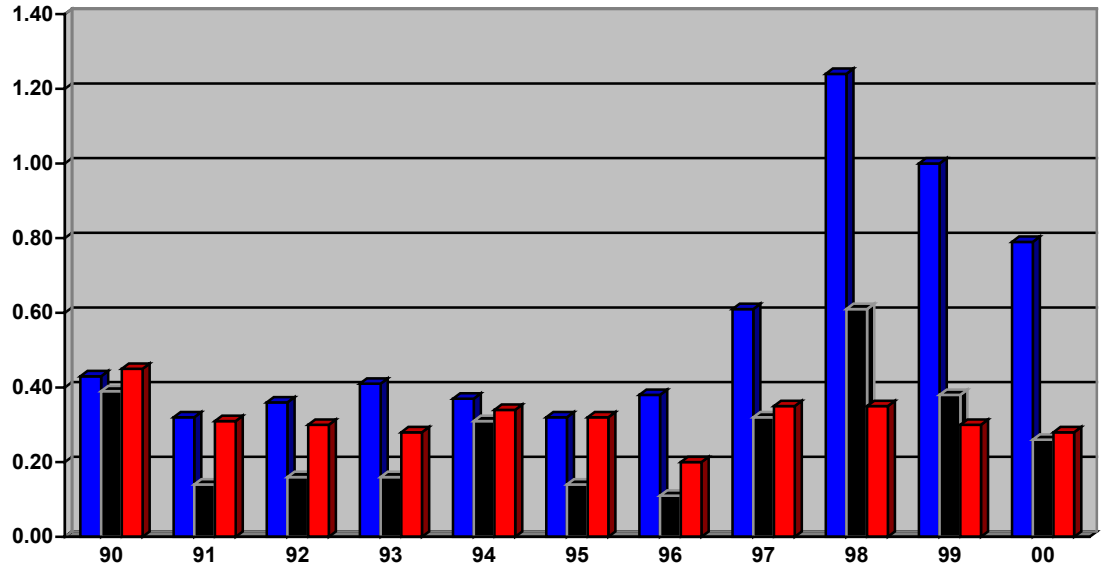
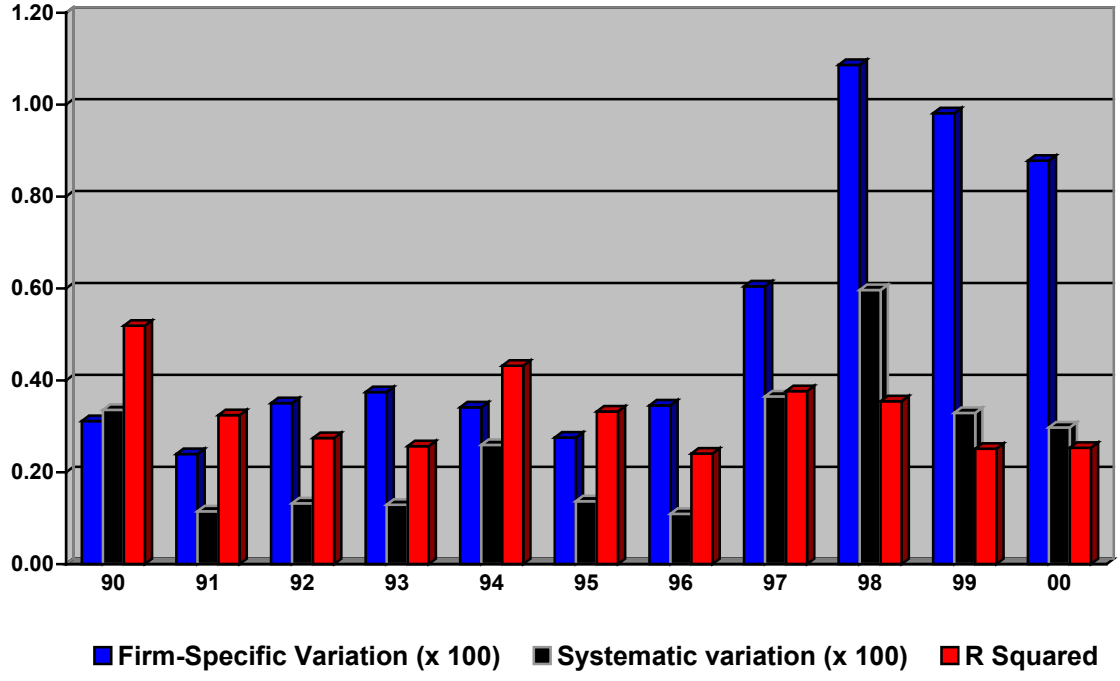


Figure 4
The Anatomy of the East Asian Financial Crisis

Panel A. Averages Across Countries



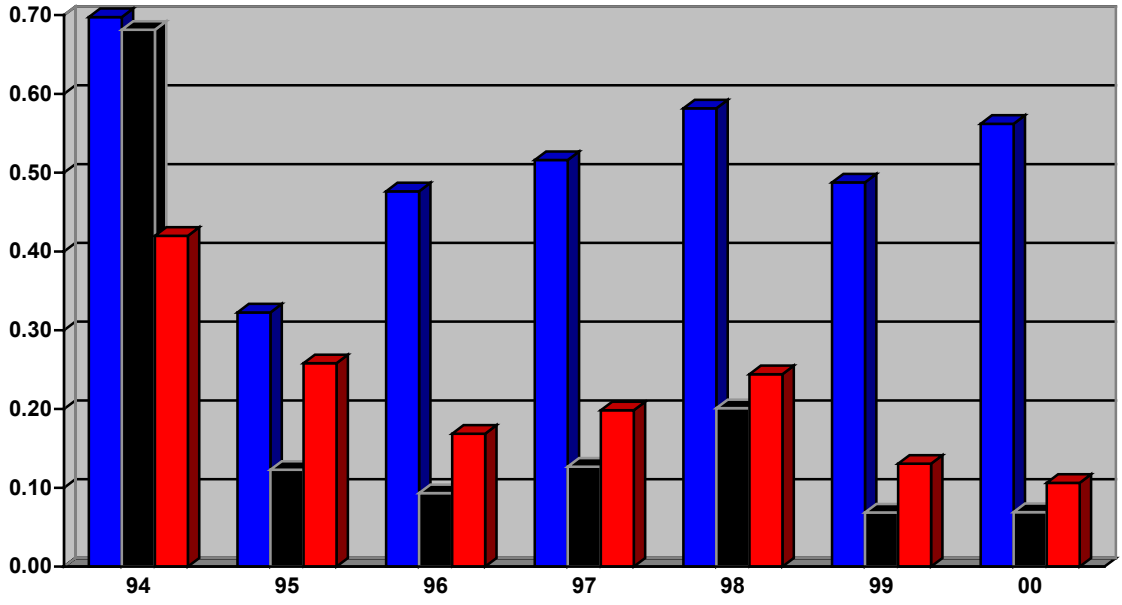
Panel B. Averages Across Individual Stocks



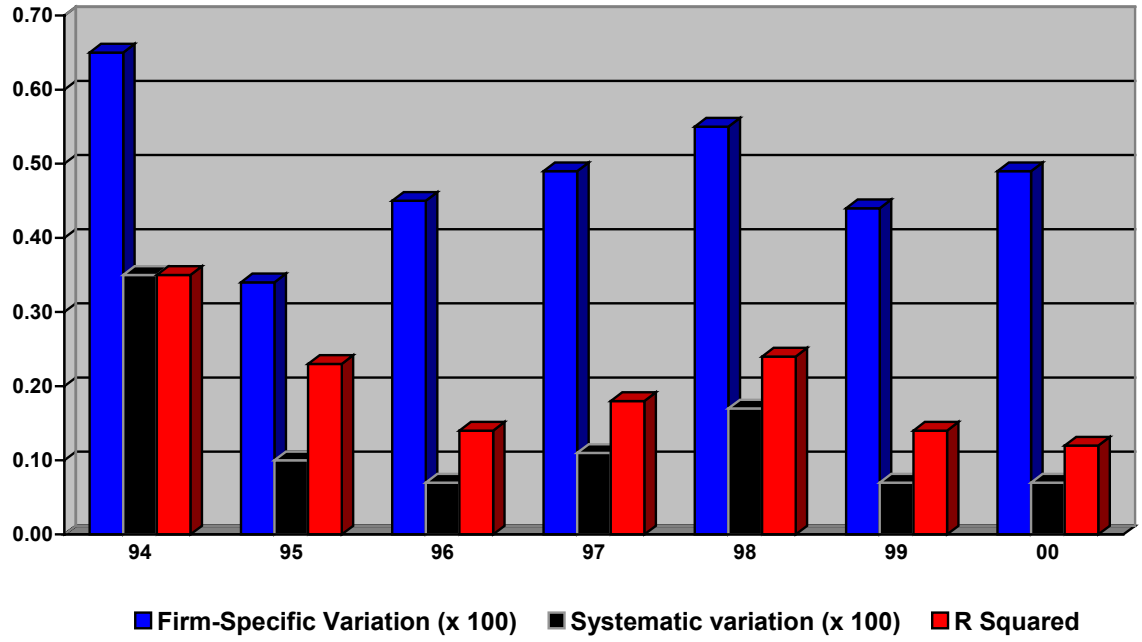
Countries include all those listed in Table 1.

Figure 5
The interrupted Decline in Synchronicity in Eastern European Markets

Panel A. Averages Across Countries



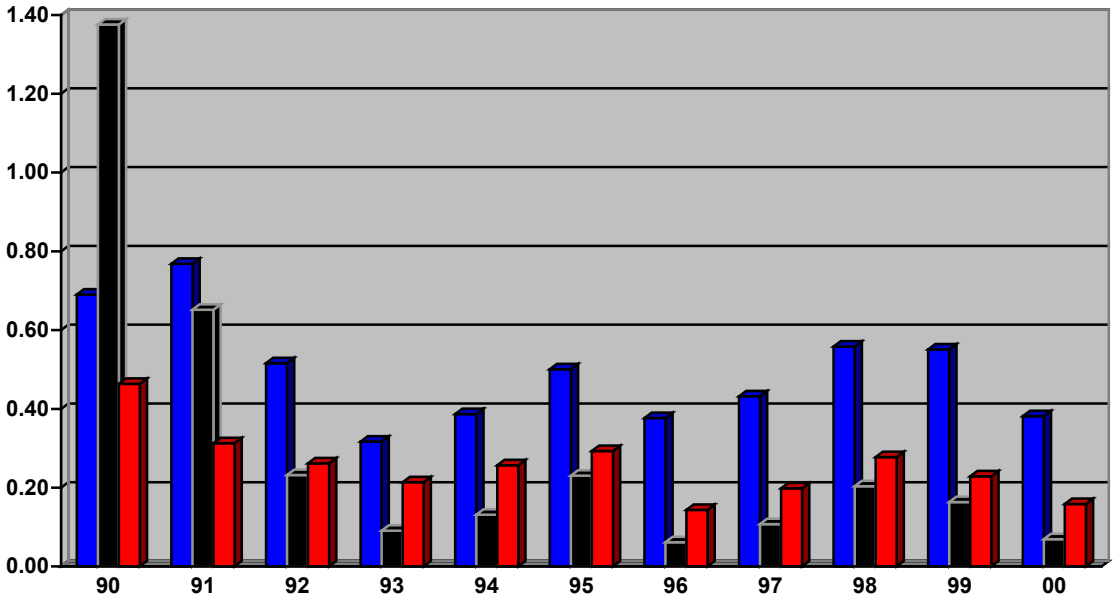
Panel B. Averages Across Individual Stocks



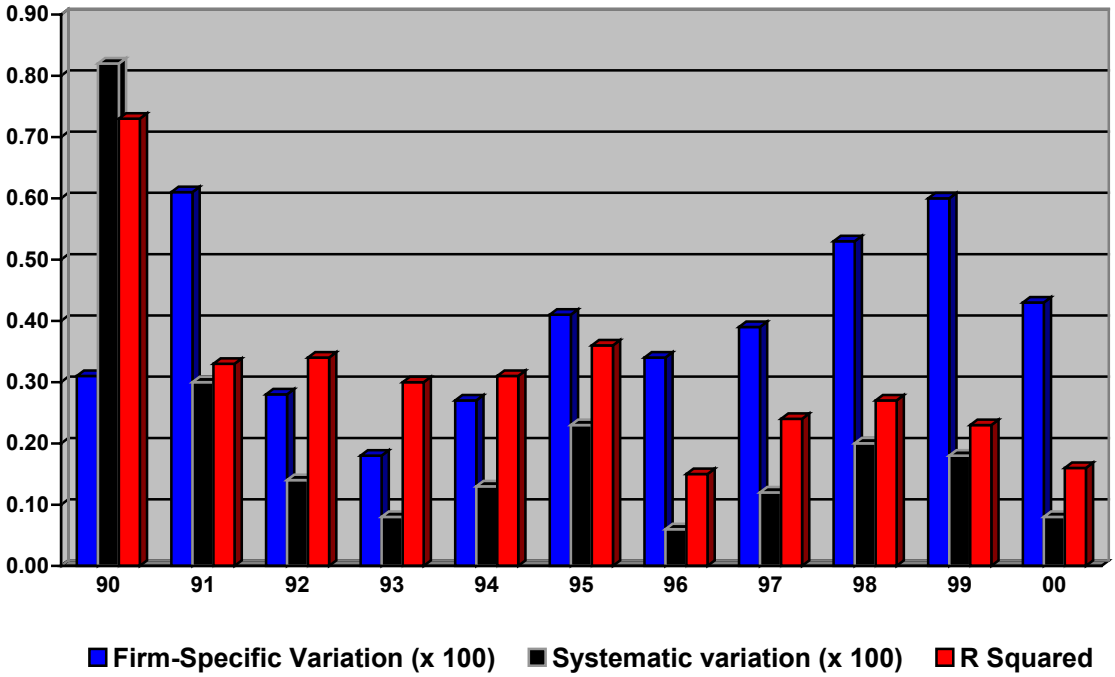
Countries include the Czech Republic, Hungary, Poland, and Russia.

Figure 6
Synchronicity in Latin American Markets

Panel A. Averages Across Countries



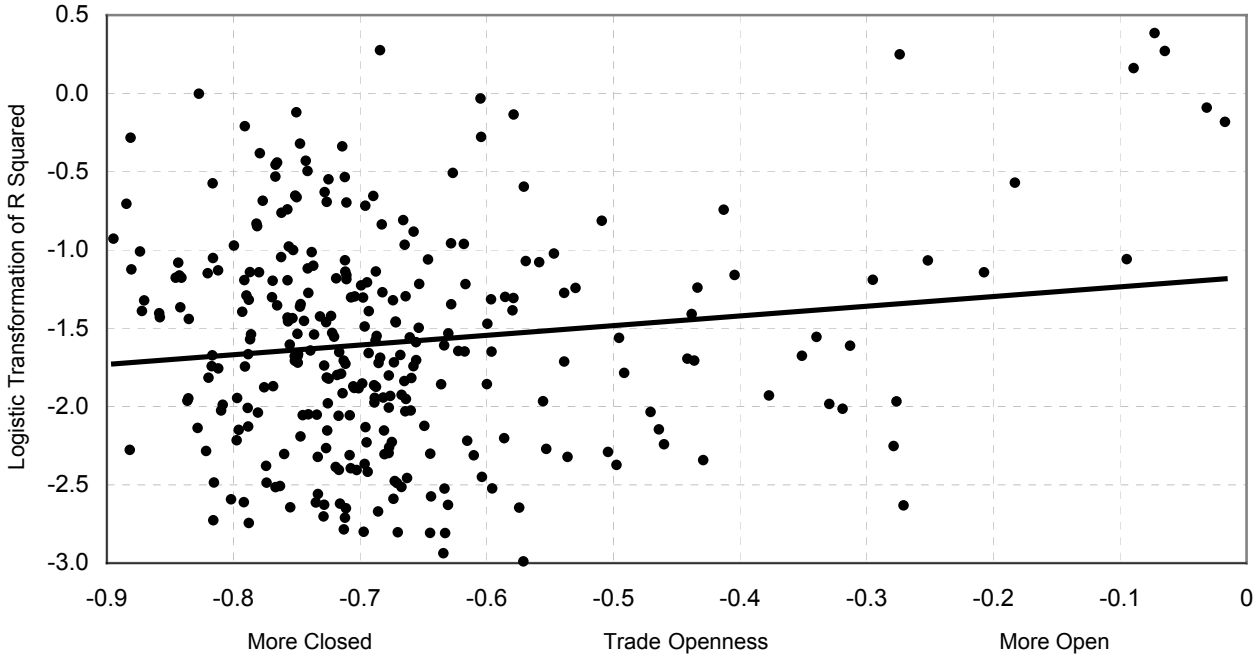
Panel B. Averages Across Individual Stocks



Countries include Argentina, Chile, Colombia, Brazil, Ecuador, Mexico, and Venezuela

Figure 7. Synchronicity versus Openness

Panel A. Synchronicity is a logistic transformation of the average market model R^2. T*rade openness* is imports over GDP relative to GDP over world GDP. Data are described in Table 7.



Panel B. Synchronicity is a logistic transformation of the average market model R^2. *Capital openness* is an index proportional to the value-weighted fraction of the market open to foreign investors. Data are described in Table 7.

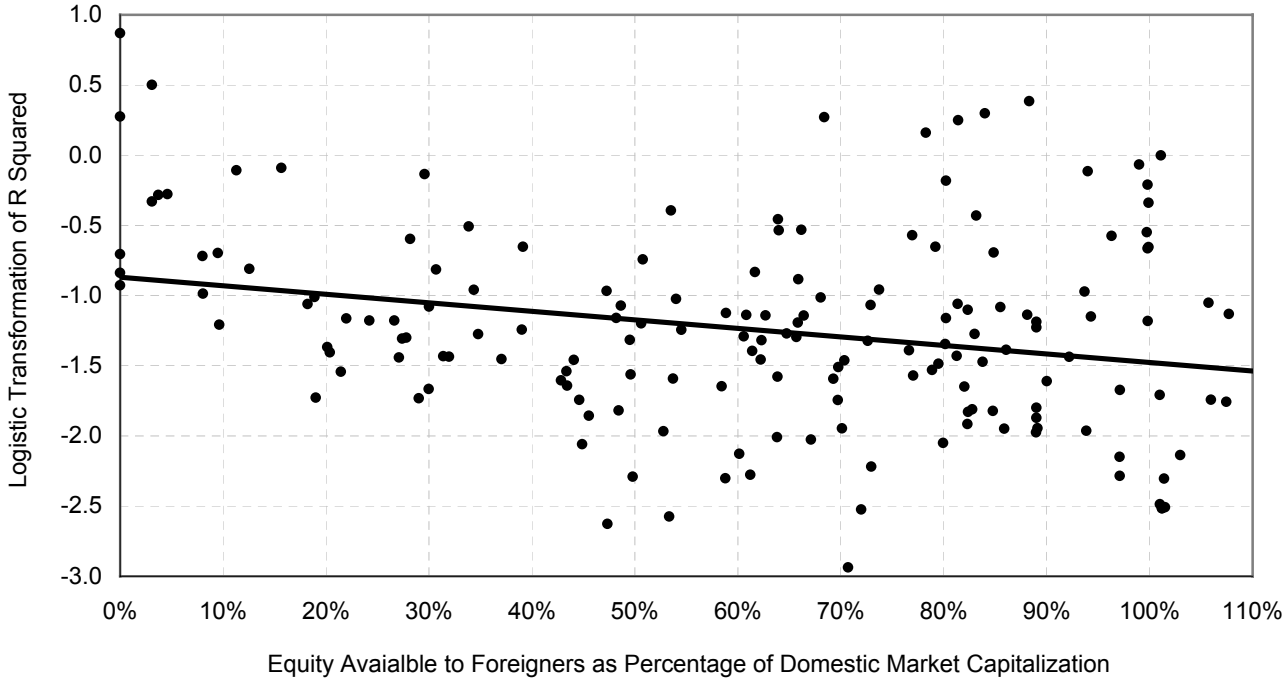
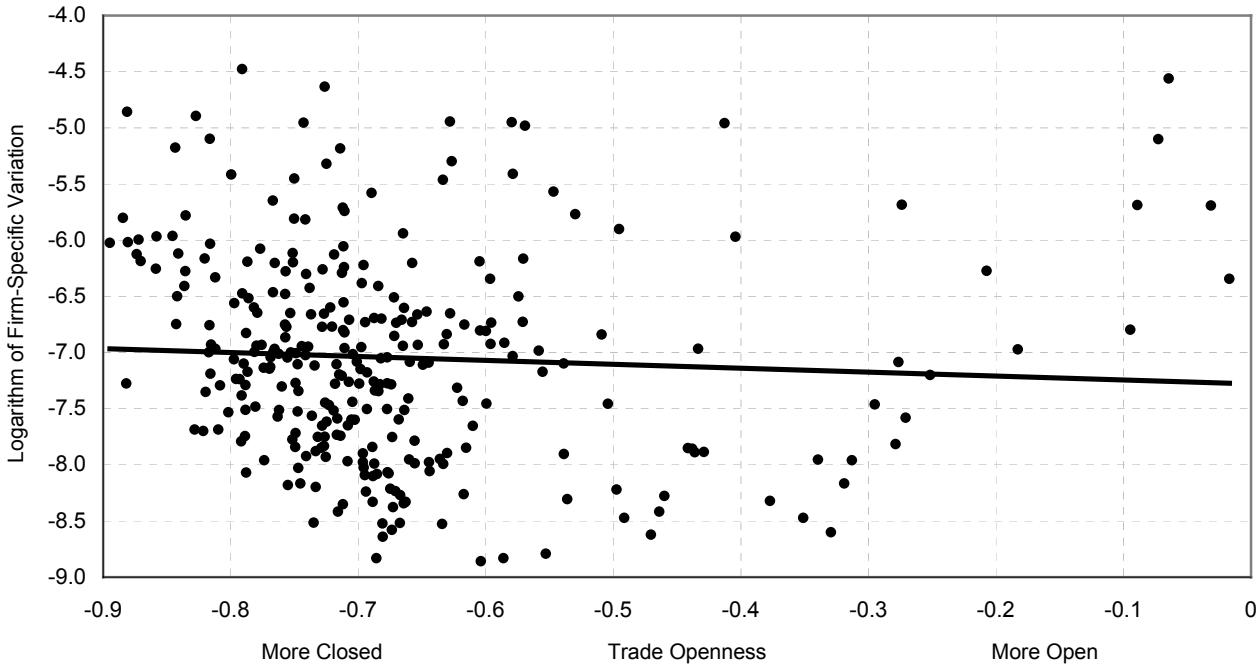


Figure 7 (Continued)

Panel C. Asynchronicity is the logarithm of average firm-specific variation in individual stock returns. T*rade openness* is imports over GDP relative to GDP over world GDP. Data are described in Table 7.



Panel D. Asynchronicity is the logarithm of average firm-specific variation in individual stock returns. *Capital openness* is an index proportional to the value-weighted fraction of the market open to foreign investors. Data are described in Table 7.

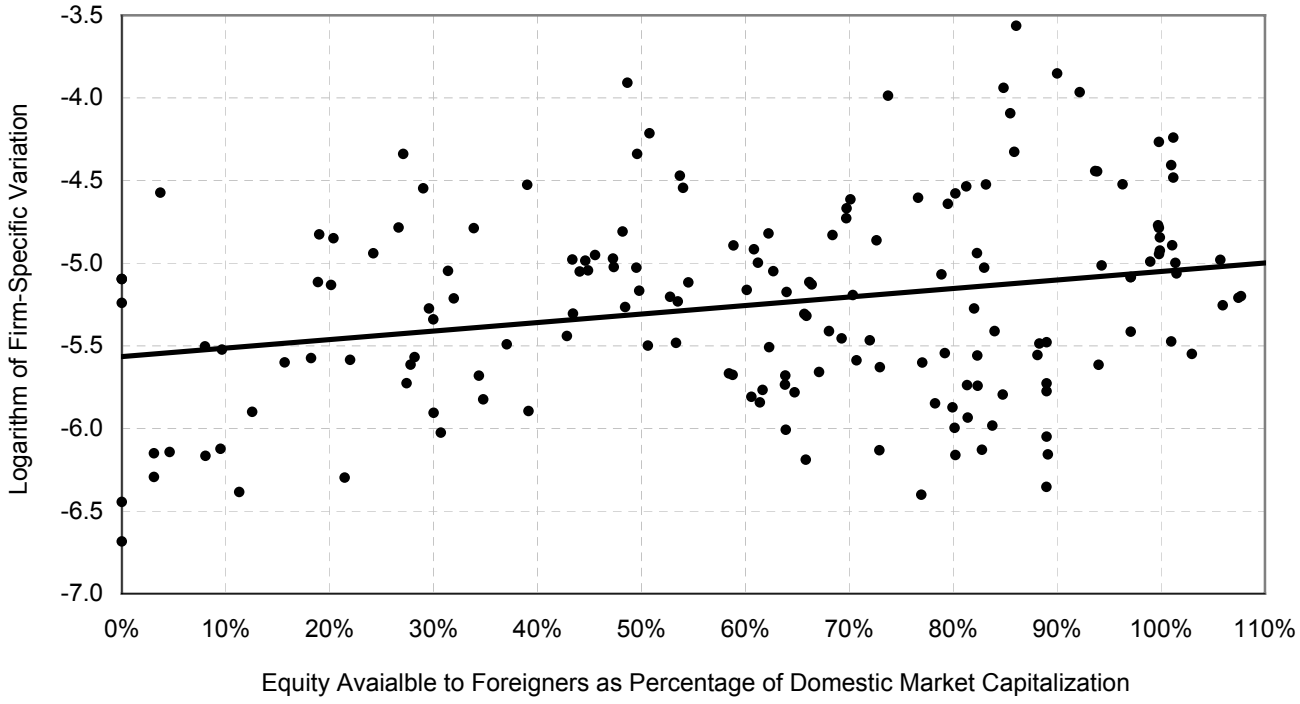
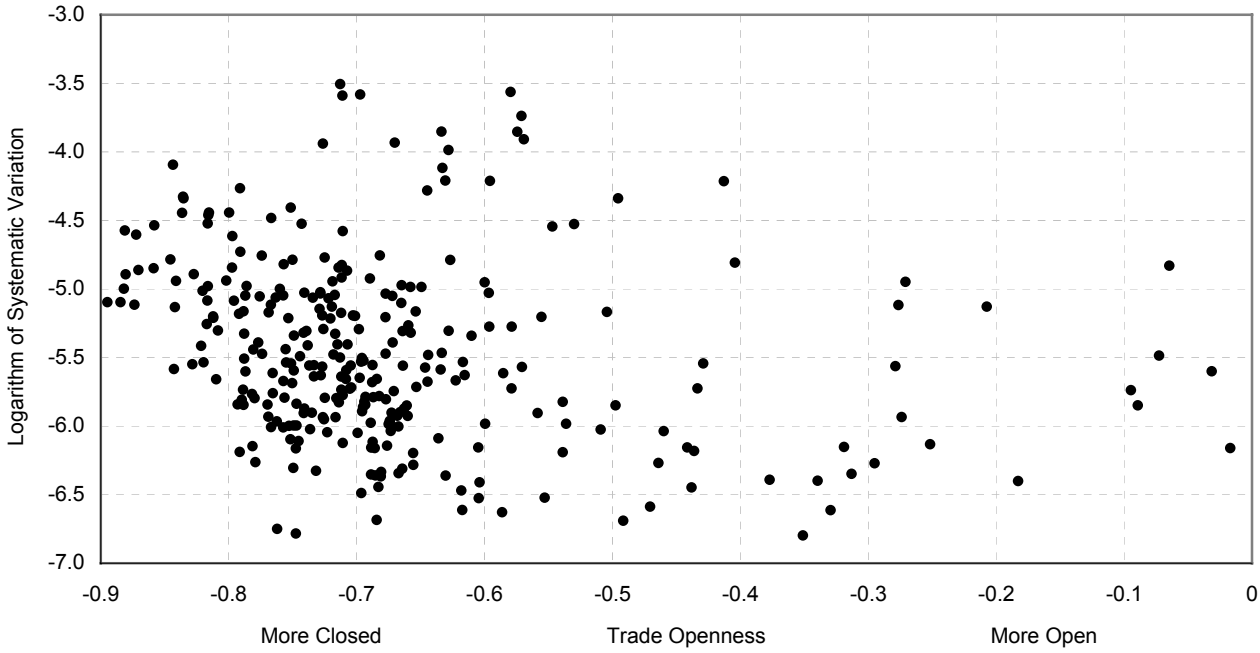


Figure 7 (Continued)

Panel E. Synchronicity is the logarithm of average systematic variation in individual stock returns. T*rade openness* is imports over GDP relative to GDP over world GDP. Data are described in Table 7.



Panel F. Synchronicity is the logarithm of average systematic variation in individual stock returns. *Capital openness* is an index proportional to the value-weighted fraction of the market open to foreign investors. Data are described in Table 7.

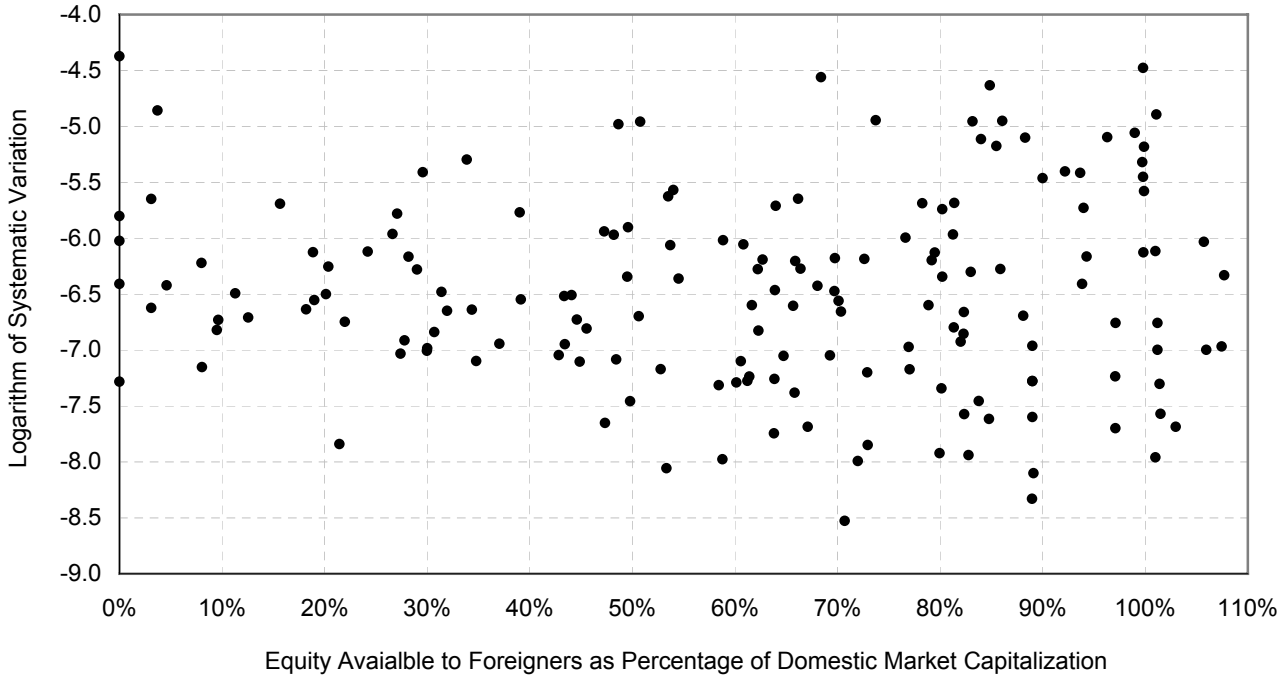
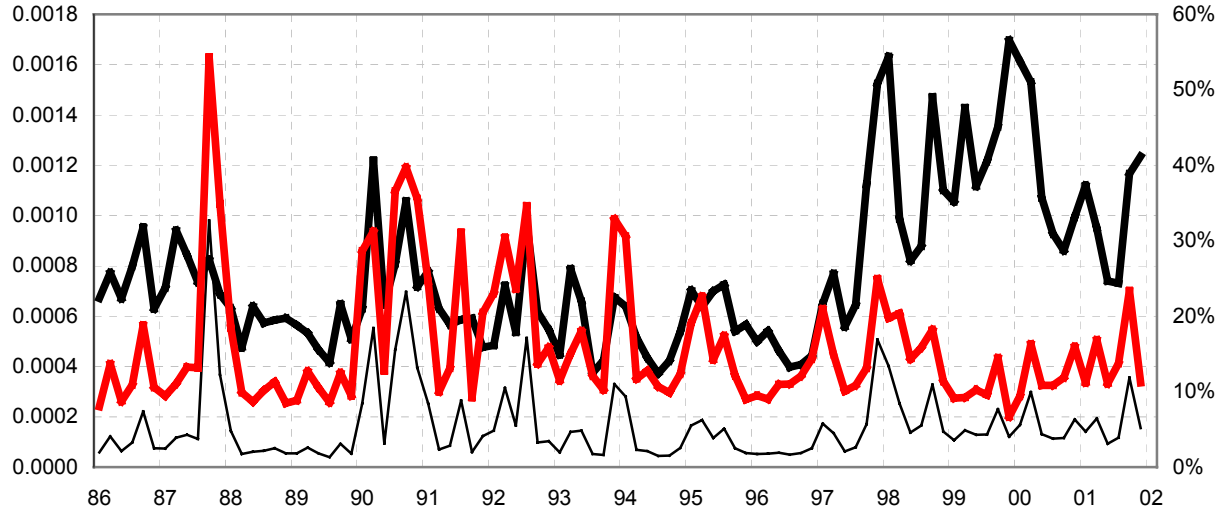


Figure 8

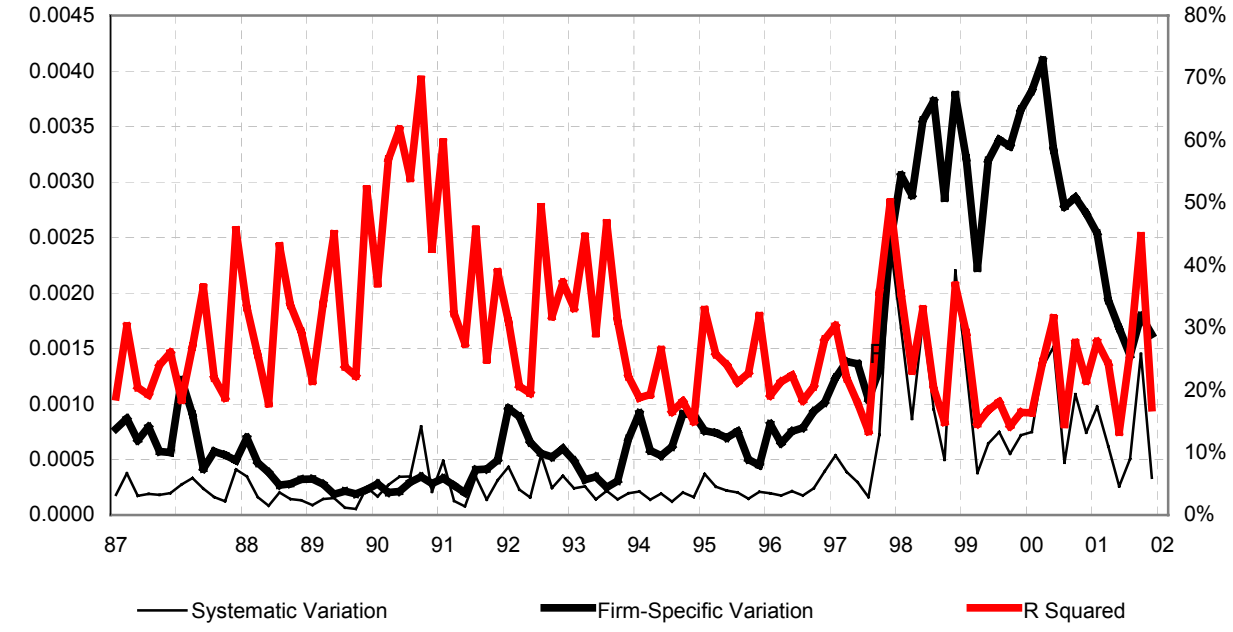
Synchronicity of Price Fluctuations in East Asian Stocks

Bimonthly synchronicity measures are derived from market model regressions of individual stock returns on domestic and US market returns, and include the average regression R^2, the systematic (explained) variation in the average stock's returns, and the firm-specific (residual) variation in the average stock's returns.

Panel A. Japan



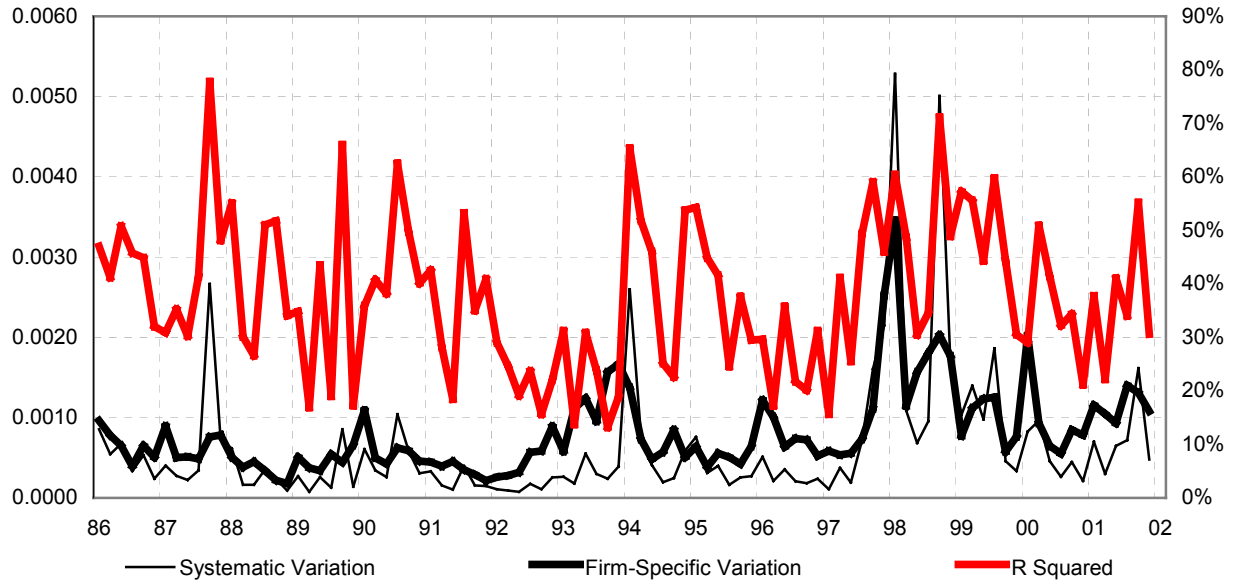
Panel B. Korea



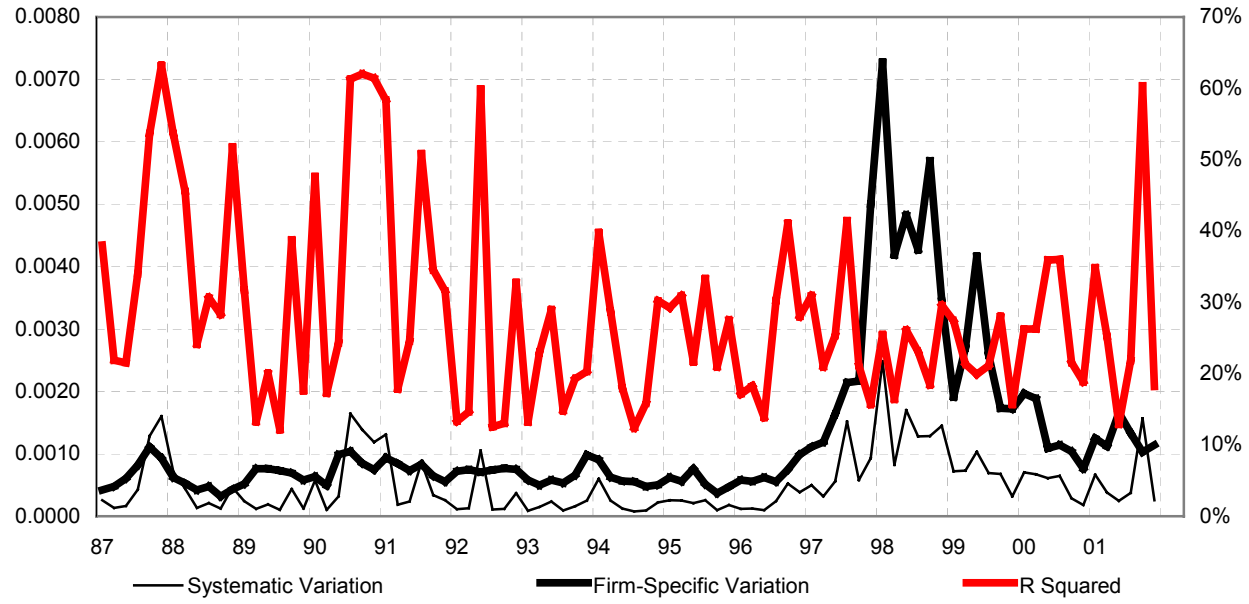
Source: DataStream

Figure 8 (Continued)

Panel C. Malaysia



Panel D. Thailand



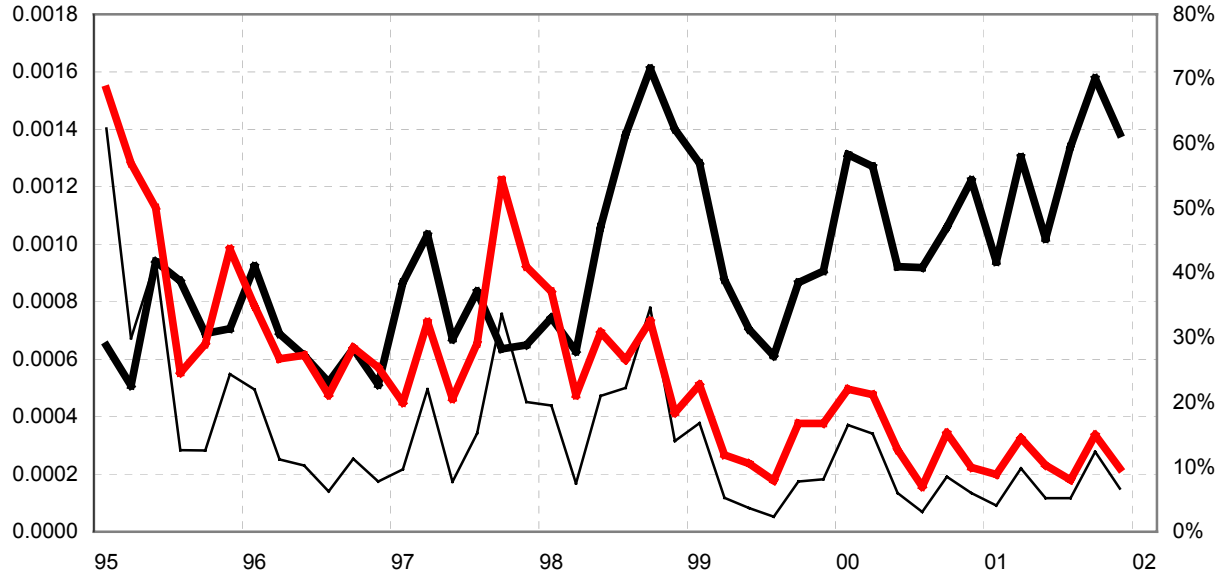
Source: DataStream

Figure 9

Synchronicity of Price Fluctuations in Transition Economy Stocks

Bimonthly synchronicity measures are derived from market model regressions of individual stock returns on domestic and US market returns, and include the average regression R^2, the systematic (explained) variation in the average stock's returns, and the firm-specific (residual) variation in the average stock's returns.

Panel A. Poland



Panel B. The Czech Republic