ELSEVIER

Journal of International Money and Finance
21 (2002) 879–903

Journal of International Money and Finance

www.elsevier.com/locate/econbase

Measuring financial and economic integration with equity prices in emerging markets

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Abstract

This paper examines real and financial links simultaneously at the regional and global level for a group of Pacific-Basin countries by analysing the covariance of excess returns on national stock markets over the period 1980–1998. We find overwhelming evidence at the regional and global level and for all sub-periods that financial integration is accompanied by economic integration. This seems to suggest that economic integration provides a channel for financial integration, which explains, at least partly, the high degree of financial integration found in this study and in other studies for this region even in the presence of foreign exchange controls. This result has important implications for the use of restrictions to isolate capital markets from world influences.

JEL classification: F36; G15

Keywords: Capital market integration; Emerging markets; Pacific-Basin capital markets

1. Introduction

The recent emergence of new capital markets and the relaxation of foreign capital controls, which has opened the possibility of international investment and portfolio diversification, have increased the interest of academics and practitioners in studying the degree of financial integration of these markets. In this paper, the analysis is

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0261-5606/02/$ - see front matter.
PII: S0261-5606(02)00027-X

focused on the Pacific-Basin region, which constitutes an important part of emerging capital markets. The countries in our sample are: Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand. In 1998, these markets constituted 43 percent of emerging markets capitalisation, while in 1999 this figure had risen to 47 percent.[1]

Financial integration is measured by testing the law of one price to financial assets with the same risk. For our selected group of countries work has concentrated on testing the international parity conditions. For example, Bhoocha-Oom and Stansell (1990) look at interest rates (adjusted and unadjusted for exchange rates changes) between Hong Kong and Singapore versus US. Faruquee (1992) examines the uncovered interest rate differential between Singapore, Korea and Thailand versus the Japanese LIBOR—taken to represent the world rate of interest. Dooley and Mathieson (1994) look at seven Pacific Basin countries versus US using an analytical framework for interest rate determination, where the prevailing interest rate represents a weighted average of open (US interest rate adjusted for the change in the exchange rate) and closed economy rates that would have existed otherwise. Reisen and Yeches (1993) using the same framework examine Korea and Taiwan by applying the Kalmar Filter technique to capture changes in the degree of integration over time.

The results of these studies support the view that there is substantial integration between domestic and international financial markets in Hong Kong, Singapore, Malaysia, Philippines and Indonesia, while the views are divided for Korea and Thailand. In Taiwan capital market integration with world financial markets was found to be limited. Using, however, a different method of measuring capital mobility based on a portfolio balance model, Chinn and Maloney (1998) found evidence of a greater degree of openness in Taiwan since early 1989. The extensive capital market integration in the Pacific Basin Region has also been supported by Phylaktis (1999), when in addition to looking at long-run comovements of real interest rates, another indicator of the degree of capital market integration was used, namely the speed of adjustment of real interest rates to long-run equilibrium following a shock in one of the markets. Thus, even in countries like Taiwan and to a lesser extent Korea, where controls were substantial in both countries, extensive linkages have been found with world capital markets.

Similar conclusions have been found in studies, which have looked at stock markets and tested whether stocks with the same risk i.e. exposure to a common world factor, have identical expected returns irrespective of the market. In the case when a market is segmented from the rest of the world however, its covariance with a common world factor will not be able to explain its expected return. Bekaert and Harvey (1995) allowed conditionally expected returns in a country to be affected by their covariance with a world benchmark portfolio when the market is perfectly

[1] See “Emerging Stock Market Fact Book”, (1998,1999) published by the International Finance Corporation. Excluding Hong Kong and Singapore, which might not be considered as emerging markets, the figures still remain high at 30 percent and 32 percent in 1998 and 1999, respectively.

integrated and by the variance of the country returns when it is completely segmented. Using a conditional regime-switching model to account for periods when national markets were segmented from world capital markets and when they became integrated later in the sample, they applied the model to a group of emerging capital markets including Korea, Taiwan, Malaysia and Thailand over the period 1975 to 1992. They found that integration was substantial for the entire period not only for Malaysia, which had less investment restrictions, but also for Korea and Taiwan, which had substantial foreign ownership restrictions. In the case of Thailand, a large shift in the degree of integration was noted in 1987 when foreign ownership restrictions were relaxed.

The current paper attempts to provide an explanation for the high degree of financial market integration, which has been found even in the presence of foreign exchange controls, by examining whether economic integration plays a role in linking the financial markets. Real economic integration has been measured in many ways and refers to the international trade links between countries. Frequent measures include the degree of openness calculated as the ratio of exports and/or imports between countries to national output; the amount of price and quantitative restrictions on traded goods; and the extent of contemporaneous movement of output growth between countries, which is based on the theory that substantial trade interdependence transmits economic activity from one country to the other producing a common business cycle.

However one measures economic integration, it can provide channels in linking the financial markets even in the presence of foreign exchange restrictions on international capital flows. For example, economic integration, if that is measured by the contemporaneous movement of output growth of countries, provides a channel for financial integration through the effects of expected economic activity on the expected cash flows of firms and their stock prices. Thus, if two countries experience a comovement in their output then their cash flows will move together and so will their stock markets. Empirical studies have confirmed the long-run positive relationship between economic activity and stock prices (see e.g. Schwert, 1990; Roll, 1992; for the US and Canova and DeNicole, 1995 for the European countries).

A look at the list of indicators of economic integration for our group of countries does not provide a clear picture of whether they are integrated with other countries, such as Japan and the US. Exports and imports of each Pacific Basin country (PBC) versus Japan and the US as a percent of GDP are in the region of 5 to 25 percent. In the absence of a benchmark, however, one cannot be certain of the degree of economic integration. Neither does the amount of tariffs on trade seem to provide an accurate picture of real economic integration as non-tariff barriers to trade might be in existence. Finally, the computed correlations of contemporary monthly industrial production for the period 1990–98 are on the whole not very big (see Table 1). Contemporaneous movements of output might, however, underestimate the degree of economic integration because of lags in the international transmission of shocks.

The current paper contributes to the literature in the following ways. First it uses a different way to measure financial and economic integration to previous studies on the PBCs based on the framework developed by Ammer and Mei (1996) for

Table 1
Correlations of monthly industrial production: 1990.01-1998.12

	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand	US
Hong Kong[a]	**−0.130**							**0.167**
Indonesia[a]	**0.181**							**−0.022**
Japan	–							
Korea	0.266	–						
Malaysia	0.241	0.199	–					
Philippines	−0.029	0.191	0.021	–				
Singapore	0.039	0.378	0.517	0.198	–			
Taiwan	0.042	0.454	0.530	0.066	0.847	–		
Thailand	0.249	0.362	0.150	−0.134	0.200	0.306	–	
US	0.025	0.123	0.102	−0.081	−0.059	0.012	−0.069	–

[a] For Hong Kong and Indonesia correlations are quarterly and only with Japan and the US are reported due to data availability. They are reported in bold.

Europe and the US, which measures both types of integration by analysing the covariance of excess returns on national stock markets. The framework uses the Campbell and Shiller (1988) approximate present value model to decompose excess stock return innovations between different countries into news about excess returns, dividend growth rates, interest rates and exchange rates. Comovements of dividend news between two countries is taken as an indicator of real economic integration. A real economic shock originating in one country will have a similar effect on the economic growth of the other country through trade interdependencies, causing corporate earnings and dividends of both countries to move together if they are assumed as proxies for long-term real economic activity. Comovement in innovations in future expected stock returns is taken as an indicator of financial integration because if asset returns in different countries are conditionally multivariate normal so that the Capital Asset Pricing Model (CAPM) holds, the conditional means of these excess returns must move together as linear combinations of a set of common risk premiums. In the case of one factor model with fixed factor loadings (betas), any variation over time in mean returns would have to be correlated across assets.[2]

This approach has several advantages. It examines financial integration by studying the comovement of future returns aggregated over a long horizon instead of the comovement of one period expected returns as used in studies by Bakaert and Harvey (1995, 2000). As Ammer and Mei stress, this methodology could detect small but persistent comovements in expected returns and more accurately measure the degree of financial integration than one-period stock returns regression models. Similar comments can be made about the proposed measure of real economic integration com-

[2] See Campbell and Hamao (1992). In our study, we have divided the sample period into two subperiods, pre and post capital control liberalisation, to increase the possibility of having constant betas.

pared to measures based on the contemporaneous movements in output.[3] Another advantage of the framework used in this paper is that both types of integration can be examined simultaneously and that is important for examining the role of economic integration in financial integration.

Another contribution of the paper is the examination of the relationship between foreign investment restrictions and the integration of capital markets since the emerging markets in our sample differ in the degree of capital market openness. As Bekaert and Harvey (2000) point out liberalisation may not be enough to induce foreign investors to actually invest in the country. Home bias or other concerns, such as lack of information on company stocks, may impede international investment (see Bekaert, 1995 and Levine and Zervos, 1996). A third contribution of the paper is the examination of the issue of regional integration, i.e. integration amongst the PBCs, including the more developed stock market of Japan as a possible driving force, in addition to examining integration with world markets as represented by the US. Answers to the above questions have important policy implications for the use of restrictions to isolate capital markets from world influences. This research comes at a time when many countries, and especially the East Asian countries, are contemplating the reintroduction of foreign restrictions on international capital flows in the aftermath of the Asian crisis.

The paper is structured as follows. Section 2 draws from Ammer and Mei (1996) and describes the decomposition of domestic and foreign excess stock returns and their variances. Section 3 explains the estimation procedure, while Section 4 applies it to the US and PBCs data over the period 1980 to 1998. Section 5 reports the empirical results concerning real and financial links for PBCs at both the regional and global level and Section 6 tests the robustness of these empirical findings to the Asian financial crisis. The final section offers some concluding remarks.

2. Decomposition of excess stock returns and of their variances

2.1. The components of domestic and foreign excess stock returns

This section contains a brief description of the decomposition of domestic and foreign excess stock returns, which is based on the log–linear approximate asset pricing framework of Campbell (1991) and Campbell and Ammer (1993). The domestic unexpected excess stock return can be expressed as a linear function of news about future dividend growth rates, real interest rates, and excess stock returns as follows:

$$e_{t+1}-E_t\, e_{t+1} = (E_{t+1}-E_t)\{\sum_{j=0}^{\infty}\rho^{\,j}\Delta d_{t+1+j}-\sum_{j=0}^{\infty}\rho^{j}r_{t+1+j}-\sum_{j=1}^{\infty}\rho^{j}e_{t+1+j}\}, \quad (1)$$

[3] A disadvantage of our method, which also applies to output-based measures of economic integration, is that the positive covariance in economic activity may occur because of a common exogenous shock.

where e_{t+1} is the excess return on a stock held from the end of period t to the end of period $t+1$, relative on the one-period interest rate, d_{t+1} the real dividend paid during period $t+1$, and r_{t+1} the real interest rate from t to $t+1$.[4] Here E_t denotes an expectation formed at the end of period t, conditional on an information set, which includes at least the history of stock prices and dividends, while Δ denotes a one-period backward difference. All variables are measured in real terms and in logs. The parameter ρ is a constant of linearization; it assumes a value a little smaller than one.[5,6] In order to simplify the notation in equation (1), we define the three news components as

$$\tilde{e} = \tilde{e}_d - \tilde{e}_r - \tilde{e}_e. \tag{2}$$

In a similar way, the unexpected foreign excess stock return, when expressed in dollars and over the domestic interest rate ($\tilde{f}$), can be decomposed into news about the future dividend growth ($\tilde{f}_d$), real interest rates ($\tilde{f}_r$), excess stock returns ($\tilde{f}_f$), and changes in the real exchange rate ($\tilde{f}_q$) as shown in equation (3) below:

$$\tilde{f} = \tilde{f}_d - \tilde{f}_r - \tilde{f}_q - \tilde{f}_f. \tag{3}$$

In equations (2) and (3) news of an increase of future dividends are associated with a capital gain today, while an increase in expected future returns is associated with a capital loss today, other things being equal. The latter effect is due to the fact that higher future returns can only be generated by future price appreciation from a lower current price. In equation (3) we have the additional term of the innovations related to real exchange rate changes, which is negatively related to unexpected stock returns. The arrival of information that the dollar will appreciate sometime in the future will reduce expected dollar returns on foreign assets at some point in time. The loss will occur today in the absence of information regarding future expected excess returns.

So far we have stated a number of identities relating innovations in long-term asset returns to revisions in investors' expectation of future dividends, real interest rates, real exchange rates and excess long-term asset returns. Our major objectives are: (i) to use these identities to estimate the relative importance of the different components for the historical behaviour of asset returns; and (ii) to measure the degree of financial and economic integration between two economies by evaluating the correlation between the long-run components in equations (2) and (3), of their excess stock returns. In particular, real economic integration between two countries is measured by the correlation between the future domestic dividend innovations,

[4] Equation (1) is derived by taking a first-order Taylor approximation of the equation relating the log stock returns to log stock prices and dividends. The approximate equation is based on the condition that the log dividend–price ratio does not follow an explosive process (see Campbell and Shiller, 1988).

[5] The parameter ρ is defined as $1/(1+\exp(d-p))$, where $(d-p)$ represents the sample mean of the log dividend–price ratio.

[6] In our empirical work the coefficient ρ assumes a range of values from 0.9584 to 0.9921, for the analysed countries. Campbell and Ammer (1993) testing for the accuracy of equation (1), found that the approximation holds quite well for a wide range of possible values of ρ.

$\tilde{e}_d$, and the future foreign dividend innovations, $\tilde{f}_d$, and financial integration by the correlation between the future domestic expected excess returns innovations $\tilde{e}_e$ and the future foreign expected excess returns innovations, $\tilde{f}_f$.[7]

There could be two extreme situations. One where there is real economic integration and no financial integration and will be characterised by a high correlation between $\tilde{e}_d$ and $\tilde{f}_d$, and zero correlation between $\tilde{e}_e$ and $\tilde{f}_f$. In that case, macroeconomic shocks affect output and profits in each country and through the flow of goods, information and labour, effects are transmitted and expected corporate earnings (dividends) are correlated internationally. The other extreme situation is when there is financial integration and no real economic integration. In this case, capital markets are open, but there is no trade of goods between the two countries and no international labour mobility. Thus, there will be zero correlation between $\tilde{e}_d$ and $\tilde{f}_d$ but perfect correlation between $\tilde{e}_e$ and $\tilde{f}_f$. Changes in the stock market risk premium reflect variation in the price of risk and are driven by a common world market factor.

There will be interactions between financial and economic integration if there is correlation between $\tilde{e}_d$ and $\tilde{e}_e$, in which case the stock market premium in the domestic country (cost of capital) is related to the production or long-term profits; and/or if there is correlation between $\tilde{e}_e$ and $\tilde{f}_d$, i.e. the cost of capital in the domestic country (i.e. the US in our study) is related to the production and long-term profits in the foreign country (i.e. Pacific-Basin country).

2.2. Variance decomposition and covariances between components of domestic and foreign excess stock returns.

Before calculating the correlations between the long-term components of excess stock returns of the US and PBCs we focus our attention on the decomposition of the variances of excess stock returns and the covariances between components of domestic and foreign excess stock returns. Thus, using the decomposition of equation (2), the variance of the domestic excess return innovation can be defined as the sum of six terms:

$$\begin{aligned}\mathrm{Var}(\tilde{e}) = {} & \mathrm{Var}(\tilde{e}_d) - 2\mathrm{Cov}(\tilde{e}_d,\tilde{e}_r) + \mathrm{Var}(\tilde{e}_r) - 2\mathrm{Cov}(\tilde{e}_d,\tilde{e}_e) + \mathrm{Var}(\tilde{e}_e) \\ & + 2\mathrm{Cov}(\tilde{e}_r,\tilde{e}_e).\end{aligned} \tag{4}$$

Similarly, using the decomposition of equation (6), the variance of the foreign excess return innovation can be defined as the sum of ten elements:

$$\begin{aligned}\mathrm{Var}(\tilde{f}) = {} & \mathrm{Var}(\tilde{f}_d) - 2\mathrm{Cov}(\tilde{f}_d,\tilde{f}_r) - 2\mathrm{Cov}(\tilde{f}_d,\tilde{f}_q) - 2\mathrm{Cov}(\tilde{f}_d,\tilde{f}_f) + \mathrm{Var}(\tilde{f}_f) \\ & + 2\mathrm{Cov}(\tilde{f}_r,\tilde{f}_q) + 2\mathrm{Cov}(\tilde{f}_r,\tilde{f}_f) + \mathrm{Var}(\tilde{f}_q) + 2\mathrm{Cov}(\tilde{f}_q,\tilde{f}_f) + \mathrm{Var}(\tilde{f}_f).\end{aligned} \tag{5}$$

[7] It should be noted that dividend correlations may be affected by industry dividend policies and as a result be a poor measure of real economic integration across different countries. Changes in dividend policies, however, will have a greater effect on short-term horizon analysis than in our framework, which captures persistent long-term comovements.

Finally, from both equations (2) and (3), the covariance of domestic and foreign excess stock returns is decomposed as follows:

$$\begin{aligned}\mathrm{Cov}(\tilde{e},\tilde{f}) = {} & \mathrm{Cov}(\tilde{e}_d,\tilde{f}_d)-\mathrm{Cov}(\tilde{e}_d,\tilde{f}_r)-\mathrm{Cov}(\tilde{e}_d,\tilde{f}_q)-\mathrm{Cov}(\tilde{e}_d,\tilde{f}_f)-\mathrm{Cov}(\tilde{e}_r,\tilde{f}_d)\\ & + \mathrm{Cov}(\tilde{e}_r,\tilde{f}_r) + \mathrm{Cov}(\tilde{e}_r,\tilde{f}_q) + \mathrm{Cov}(\tilde{e}_r,\tilde{f}_f)-\mathrm{Cov}(\tilde{e}_e,\tilde{f}_d) + \mathrm{Cov}(\tilde{e}_e,\tilde{f}_r) \quad (6)\\ & + \mathrm{Cov}(\tilde{e}_e,\tilde{f}_q) + \mathrm{Cov}(\tilde{e}_e,\tilde{f}_f).\end{aligned}$$

3. Estimation procedure

To estimate multiperiod expectations composed of domestic and foreign excess stock returns, we combine the asset-pricing framework, described in Section 2, with a vector autoregression system (VAR) in long-term asset returns, interest rates, real exchange rates and other information that helps to forecast these variables.

The application of this technique permits one to write the unobserved components of returns as linear combinations of innovations to observable variables. The coefficients in these linear combinations are identified by using a time-series model to construct forecasts of the discounted value of future dividends, real interest rates, excess returns and real exchange rates. Revisions in these forecasts are then used as proxies for revisions in investors' expectations.[8] In order to improve the forecasting power of multiperiod expectations of components of excess stock returns, we include instrumental variables in the estimation of the VAR system, such as, dividend yields for each stock market and the change of nominal domestic interest rate (see e.g. Ferson and Harvey, 1991).[9]

We begin the procedure by defining a vector of state of variables, z_t, of which the first four elements are domestic excess stock return, e, foreign excess stock returns, f, domestic real interest rate, r, and changes of real exchange rate, q. These variables are chosen to be stationary and for notational convenience we treat them as having zero means.[10] We assume that the state vector follows a first-order VAR process:

$$z_{t+1} = Az_t + \omega_{t+1}, \quad (7)$$

where the matrix A is the coefficient matrix of the VAR, and ω_{t+1} is the error vector. The assumption that the VAR is first-order is not restrictive. Higher-order VAR models are handled by augmenting the state vector and reinterpreting the matrix A as the companion matrix of a system (see e.g. Campbell and Shiller, 1988).

Using the fact that

[8] Monte Carlo simulations of Campbell (1991) show that VAR systems have better finite-sample properties than direct regression methods with long-horizon variables.

[9] Another variable, which might have been added to the list of instruments, is the average size of listed companies to account for the size effect, which has been found to be related to a firm's average stock returns (see Banz, 1981). Such a series, however, was not available for our sample of countries.

[10] In this empirical work sample means are removed from all variables before estimating the VAR process.

$$(E_{t+1}-E_t)z_{t+1+j} = A^J\omega_{t+1}, \tag{8}$$

we estimate each component of stock returns as a linear combination of the elements of the error vector ω_{t+1}. We estimate the components denoting innovation of future dividend growth as a residual of the elements of equations (2) and (3). For instance, the innovations of future domestic dividend growth is computed as in the equation

$$\tilde{e}_d = \tilde{e} + \tilde{e}_r + \tilde{e}_e. \tag{9}$$

It is important to underline that this procedure permits one to overcome the problem of seasonality and low frequency observations of dividend yield.

In accordance with Campbell (1991), the coefficients of the VAR system and the elements of the variance–covariance matrix of VAR innovations are jointly estimated using the Generalised Method of Moments (GMM) estimator of Hansen (1982). This is to correct for any heteroskedasticity that may be present in the error terms. The GMM parameter estimates are numerically identical to standard OLS estimates, but GMM delivers a heteroskedasticity-consistent variance–covariance matrix for the entire set of parameters (see White, 1984).

We evaluate the statistical significance of variances of the components of excess stock returns, their covariances and correlations, estimating the standard errors of these statistics. Denote the vector of the entire set of estimated parameters as θ and the heteroskedasticity adjusted variance–covariance matrix of the estimate of these parameters V. Any statistic such as the correlation between the components attributed to news about future domestic and foreign dividend growth can be written as a non-linear function $f(\theta)$ of the vector of parameters θ. The standard error for the statistic is then estimated as $\sqrt{f_\theta' V f_\theta}$, where f_θ is the gradient of the statistic with respect to the vector of parameters θ.

4. An application to the US and PBCs

4.1. Data

The sample of countries examined in the paper includes: Japan, the US, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand. The sample period varies for each country depending on the availability of data. For Japan, Singapore, Thailand and the US the sample period is 1980.01 to 1998.12; for Hong Kong 1981.01 to 1998.12; and for Malaysia, Indonesia, Korea, Philippines and Taiwan 1990.01 to 1998.12. The data consist of end of the month observations.[11]

[11] The data include stock market index prices, expressed in domestic currency, bilateral spot exchange rates expressed as US dollar per Pacific-Basin country currency, dividend yield, CPI, industrial production index, expressed at constant prices, one month Treasury Bill for the US and the one month Gensaki rate for Japan. The data were obtained from Datastream with the exception of the CPI for Hong Kong, which was obtained from the Monthly Statistical Bulletin published by the Hong Kong Monetary Authority; the one month Gensaki rate in Japan, which was obtained from the Economic Monthly Statistics Bulletin published by the Bank of Japan; and the one month Treasury Bill rate in the US, which was obtained from Ibbotson Associates. The logarithm of real exchange rate (q) is defined as $\ln CPI_t^i - \ln e_t^{PBC} - \ln CPI_t^{PBC}$, where CPI_t^{PBC} is the consumer price index for the Pacific Basin country, e_t^{PBC} is the nominal exchange rate and CPI_t^i is the consumer price index for the US.

4.2. Stock market liberalisation

Restrictions affecting stock market participation can take many different forms. They can affect, for example, foreign ownership, the purchase of foreign assets by domestic institutional investors and the amount of dividends that can be repatriated. They can also be indirect such as the withholding taxes on dividends. The countries in our sample have liberalised their stock markets at different times. In Table 2A, we summarize three different signals of liberalisation for each country: the official liberalisation date (OLD), which is based on information obtained from a variety of sources reported in the table, the First Country Fund (FCF) and the First ADR. The latter two signals signify indirect ways of foreign participation in the local stock markets, which are usually available prior to the lifting of various restrictions on foreign investors. What is clear from these various signals of liberalisation is that all countries had either liberalised or started the process of liberalisation by the beginning of the 1990s. Furthermore, in order to show the extent of liberalisation in these countries we present in Table 2B various indicators of direct and indirect barriers for institutional investors at the end of 1989.[12] As it can be seen our countries differ in the degree of foreign exchange restrictions. We have on the one hand, Hong Kong and Singapore, which have virtually no foreign exchange controls and foreign ownership regulations throughout the period, i.e. they have open markets, and on the other hand, Indonesia, Philippines and Thailand, which maintained restrictions even after they have opened their markets to foreign investors. Malaysia was a closed market until 1989 and completely open until September 1998. The controls are even more stringent in the case of Taiwan and Korea.

Thus, dividing the sample period into two sub-periods, the pre-liberalisation ending in December 1989, and the post-liberalisation sub-period covering the period

Table 2A
Comparison of different signals of stock market liberalisation

Country	Official liberalisation date	First country fund	First ADR
Hong Kong	1.73[a]	–	–
Indonesia	9.89[b]	2.89[b]	4.91[c]
Malaysia	12.88[b]	12.87[b]	8.92[b]
Philippines	6.91[c]	5.86[b]	3.91[b]
Singapore	6.78[a]	–	–
Thailand	9.87[c]	7.85[b]	1.91[b]
Korea	1.92[b]	8.84[b]	11.90[b]
Taiwan	1.91[b]	5.86[b]	12.91[b]

Sources: [a]Exchange Arrangements and Restrictions, IMF publications, (various issues). [b]Bekaert and Harvey (1998). [c]Bekaert and Harvey (2000).

[12] We chose that date because many liberalisations clustered in the late 1980s.

Table 2B
Emerging stock markets—Direct and indirect barriers for institutional investors (end-1989)

	Foreign ownership limit	Dividends repatriation	Capital repatriation	Withholding taxes on dividend	Taxes on capital gains
Hong Kong	100%	Free	Free	0%	0%
Indonesia	49% (25%)[a]	Free	Free	20%	20%
Malaysia	100%[b]	Free	Free	35% (0%)	0%
Philippines[c]	40%[d]	Free	Free	15%	0.25%
Singapore	100%	Free	Free	0%	0%
Thailand	49% (25%)[e]	Free	Free	20% (10%)	25% (10%)
Korea	10% (8%)[f]	Some Restrictions[g]	Some Restrictions[g]	25% (10–21.5%)	0% (11–27%)
Taiwan[c]	Special Funds only[h]	Free	Free	20%	0.6%

Sources: IFC's Factbook, Harrison, 1994, the Euromoney Annual Report and the Exchange Arrangements and Restrictions, IMF. Rates shown in brackets on withholding taxes on dividends and capital gains apply only to approved new Country Funds, where these may be different from normal treatment. [a]The limit is reduced to 25% of own capital for foreign exchange banks and non-bank financial institutions. [b]Foreign acquisition of investments exceeding M$ 5 million in value or equivalent of 15% or more of voting power in a Malaysian company requires the prior approval of the Foreign Investment Committee. [c]Taxes on gross transaction value. [d]Foreign participation beyond 40% needs prior approval. [e]The limit is reduced to 25% of own capital for commercial banks and finance companies. [f]Foreign ownership restriction of up to 10% of market capitalisation for "non-limited" industries and of up to 8% of market capitalisation for "limited" industries. [g]The repatriation of initial capital, capital gains and dividends is subject to approval by the Ministry of Finance. [h]Foreign investors who open an account in a local brokerage house may only invest in three listed funds—Kwang Hua Growth Fund, NITC Fuyuan Fund and Citizen Fund.

between January 1990 and December 1998, seems appropriate for examining the effect of stock market liberalisation on financial links between the countries.

4.3. Variance decomposition for US and Pacific Basin excess stock returns

In the first part of the study, we examine the variance decomposition of excess stock returns of the US and each Pacific Basin Country (PBC). Table 3 presents the results for the decomposition of US excess stock returns when the PBC is Hong Kong for the two sub-periods. The results were not quantitatively different if the foreign country was another PBC.[13] Comparing the variance between the two sub-periods one notes that it is lower in the second sub-period. The components of the variance are presented as proportions of the total variance. The biggest contribution to aggregate volatility comes from variation in dividends, in long-term profits,[14] while the contribution of the equity risk premium is much smaller.

[13] The lag structure of one lag was selected using the Akaike Information Criterion. Higher lags did not produce qualitatively different results.

[14] In fact the proportion is higher than one to offset the negative covariances.

Table 3
Variance of US excess stock returns
The table gives the variance decomposition of the US stock excess returns using a VAR specification. The VAR is in excess return on US stocks, excess return on Hong Kong stocks, the US real interest rate, change in the US nominal interest rate, the US dividend yield and Hong Kong dividend yield. Excess returns are measured in dollars relative to the one-month Treasury Bill rate. Dividend yields are computed as the sum of dividends over the last 12 months divided by the current price. The components of the variance are given in equation (7). The standard errors of each statistic are in parentheses. All variables are measured in logs. Variables are measured in real terms unless otherwise stated. ∗denotes significance at the 10% level and ∗∗at the 5% level.

	1981.01–1989.12	1990.01–1998.12
$\mathrm{Var}(\tilde{e})$	0.179∗∗ (0.047)	0.086 (0.036)
	Proportion (%)	Proportion (%)
$\mathrm{Var}(\tilde{e}_{\mathrm{d}})$	1.382∗∗ (0.421)	1.681∗∗ (0.333)
$-2\ \mathrm{cov}(\tilde{e}_{\mathrm{d}}, \tilde{e}_{\mathrm{r}})$	−0.074 (0.069)	−0.124∗∗ (0.025)
$\mathrm{Var}(\tilde{e}_{\mathrm{r}})$	0.025∗∗ (0.008)	0.008∗∗ (0.001)
$-2\ \mathrm{cov}(\tilde{e}_{\mathrm{d}}, \tilde{e}_{\mathrm{e}})$	−0.540∗∗ (0.070)	−1.119∗∗ (0.025)
$\mathrm{Var}(\tilde{e}_{\mathrm{e}})$	0.192 (0.200)	0.551∗∗ (0.232)
$2\ \mathrm{cov}(\tilde{e}_{\mathrm{r}}, \tilde{e}_{\mathrm{e}})$	0.015 (0.045)	0.074∗∗ (0.017)

Table 4 presents the variance decomposition for the PBCs. The variance of excess stock returns is higher in the second subperiod in two of the four countries (Japan and Thailand) that we have data for both subperiods. This could reflect the effects of the Asian crisis. The main source of variation is also the long-term profits while the contribution of risk premium is smaller. In a similar fashion to the US, we find the contribution of the covariance between $\tilde{f}_d$ and $\tilde{f}_e$ to be substantial. These results differ from those in Campbell (1991), Campbell and Ammer (1993) and Ammer and Mei (1996), who found that for some of the sample periods the contribution of the equity risk premium was higher than that of the dividends and the covariance between $\tilde{f}_d$ and $\tilde{f}_e$ was close to zero.

5. Real and financial links between the US and the Pacific Basin countries

5.1. Covariance decomposition

The covariance of domestic and foreign stock returns are decomposed in 12 components as shown in equation (6). The covariance was estimated not only for the US and each PBC but also for every possible pair for our sample of countries, for the two sub-periods, 1980.01–1989.12 and 1990.01–1998.12.

The major contribution to the covariance of domestic and foreign stock returns comes from correlated news about future dividend growth in the two countries. The other important component comes from the correlated news about future excess returns and news of the interaction between future domestic excess return and future foreign dividend news. The covariance concerning interest rate news makes a rela-

Table 4A
Variance decomposition of PBC excess stock returns.
The table gives the variance decomposition of each PBC excess stock returns using a VAR specification. The VAR is in excess return on US stocks, excess return on PBC stocks, US real interest rates, change in the US nominal interest rate, the real exchange rate, the US dividend yield and PBC dividend yield. Excess returns are measured in dollars relative to the one-month Treasury Bill rate. Dividend yields are computed as the sum of dividends over the last 12 months divided by the current price. The components of the variance are given in equation (8). All variables are measured in logs and are in real terms unless otherwise stated. ∗ denotes significance at the 10% level and ∗∗at the 5% level

	Hong Kong		Japan	
	1981.01–1989.12	1990.01–1998.12	1980.01–1989.12	1990.01–1998.12
$Var(\tilde{f})$	1.23∗∗ (0.113)	0.721∗∗ (0.085)	0.365∗∗ (0.060)	1.78∗∗ (0.077)
	Proportion (%)	Proportion (%)	Proportion (%)	Proportion (%)
$Var(\tilde{f}_d)$	1.066∗∗ (0.219)	0.881∗∗ (0.148)	1.536∗∗ (0.409)	1.029∗∗ (0.432)
$-2\ cov(\tilde{f}_d, \tilde{f}_r)$	0.014 (0.025)	0.002 (0.006)	−0.086∗∗ (0.044)	−0.040∗∗ (0.009)
$-2\ cov(\tilde{f}_d, \tilde{f}_q)$	0.004∗∗ (0.000)	0.000 (0.000)	0.012∗∗ (0.000)	0.001∗∗ (0.000)
$-2\ cov\ (\tilde{f}_d, \tilde{f}_f)$	−0.154 (0.155)	0.098 (0.099)	−0.712∗∗ (0.349)	−0.112 (0.330)
$Var(\tilde{f}_r)$	0.004 (0.145)	0.001 (0.541)	0.011 (1.077)	0.000 (0.001)
$2\ cov(\tilde{f}_r, \tilde{f}_q)$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.008)
$2cov(\tilde{f}_r, \tilde{f}_f)$	0.018 (0.015)	−0.002 (0.004)	0.076∗∗ (0.032)	0.006∗∗ (0.000)
$Var(\tilde{f}_q)$	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	−0.000 (0.000)
$2\ cov(\tilde{f}_q, \tilde{f}_f)$	−0.001∗∗ (0.000)	−0.000 (0.000)	−0.002 (0.122)	−0.000 (0.226)
$Var(\tilde{f}_f)$	0.048 (0.044)	0.020∗ (0.011)	0.165 (0.122)	0.116 (0.226)

Table 4B
Variance decomposition of PBC excess stock returns—continued

	Singapore		Thailand	
	1980.01–1989.12	1990.01–1998.12	1980.01–1989.12	1990.01–1998.12
$Var(\tilde{f})$	0.693∗∗ (0.084)	0.436∗∗ (0.067)	0.402∗∗ (0.065)	1.32∗∗ (0.119)
	Proportion (%)	Proportion (%)	Proportion(%)	Proportion (%)
$Var(\tilde{f}_d)$	1.232∗∗ (0.179)	1.070∗∗ (0.257)	1.744∗∗ (0.765)	1.456∗∗ (0.272)
$-2\ cov(\tilde{f}_d, \tilde{f}_r)$	0.016∗∗ (0.000)	0.002 (0.009)	0.002 (0.072)	0.004 (0.006)
$-2\ cov(\tilde{f}_d, \tilde{f}_q)$	0.010 (0.022)	0.002∗∗ (0.000)	0.008∗∗ (0.000)	0.012∗∗ (0.005)
$-2\ cov\ (\tilde{f}_d, \tilde{f}_f)$	−0.318∗∗ (0.135)	−0.096 (0.190)	−0.870 (0.671)	−0.530∗∗ (0.214)
$Var(\tilde{f}_r)$	0.005 (1.790)	0.001 (0.311)	0.009 (5.321)	0.000 (0.006)
$2\ cov(\tilde{f}_r, \tilde{f}_q)$	0.000 (0.032)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$2cov(\tilde{f}_r, \tilde{f}_f)$	0.020 (0.016)	−0.008 (0.006)	−0.004 (0.016)	0.000 (0.005)
$Var(\tilde{f}_q)$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.005)
$2\ cov(\tilde{f}_q, \tilde{f}_f)$	0.000 (0.000)	0.000 (0.000)	−0.002∗∗ (0.000)	−0.002 (0.004)
$Var(\tilde{f}_f)$	0.044 (0.054)	0.029 (0.045)	0.113 (0.192)	0.060∗ (0.032)

Table 4C
Variance decomposition of PBC excess stock returns—continued

	Indonesia	Korea	Malaysia	Philippines	Taiwan
	1990.01–1998.12	1990.01–1998.12	1990.01–1998.12	1990.01–1998.12	1990.01–1998.12
$Var(\tilde{f})$	1.41** (0.130)	1.22** (0.118)	1.340** (0.118)	1.08** (0.109)	1.49** (0.125)
	Proportion (%)	Proportion (%)	Proportion (%)	Proportion (%)	Proportion (%)
$Var(\tilde{f}_d)$	1.544** (0.401)	1.305** (0.345)	1.110** (0.335)	1.763** (0.435)	1.166** (0.217)
$-2\ cov(\tilde{f}_d, \tilde{f}_r)$	0.013** (0.002)	0.014** (0.005)	0.017** (0.006)	0.008 (0.009)	−0.001 (0.003)
$-2\ cov(\tilde{f}_d, \tilde{f}_q)$	0.022** (0.003)	0.012** (0.002)	0.012** (0.005)	0.006** (0.001)	−0.000 (0.000)
$-2\ cov\ (\tilde{f}_d, \tilde{f}_f)$	−0.754** (0.370)	−0.496 (0.374)	−0.205 (0.274)	−0.923** (0.405)	−0.229 (0.173)
$Var(\tilde{f}_r)$	0.000 (0.260)	0.001 (0.032)	0.001 (0.018)	0.000 (0.531)	0.000 (0.031)
$2\ cov(\tilde{f}_r, \tilde{f}_q)$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$2cov(\tilde{f}_r, \tilde{f}_f)$	−0.012* (0.007)	−0.007** (0.003)	0.011** (0.005)	−0.006 (0.007)	−0.008** (0.003)
$Var(\tilde{f}_q)$	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
$2\ cov(\tilde{f}_q, \tilde{f}_f)$	−0.006** (0.003)	0.001** (0.000)	−0.002 (0.003)	−0.002** (0.000)	0.000 (0.000)
$Var(\tilde{f}_f)$	0.193 (0.158)	0.170 (0.138)	0.056 (0.086)	0.151 (0.148)	0.072 (0.071)

Table 5A
Covariance decomposition of the US and PBCs: 1980.01–1989.12
This table reports the major contributions to the excess covariance among US and PBCs. The VAR is in excess return on US stocks, excess return on PBC stocks, US real interest rates, change in the US nominal interest rate, the real exchange rate, the US dividend yield and PBC dividend yield. Excess returns are measured in dollars relative to the one-month Treasury Bill rate. Dividend yields are computed as the sum of dividends over the last 12 months divided by the current price. The components of the variance are given in equation (9). All variables are measured in logs and are in real terms unless otherwise stated. For Hong Kong the sample period covers 1981.01 to 1989.12. ∗denotes significance at the 10% level and ∗∗at the 5% level

Panel a: Covariances of future dividend news

	Hong Kong	Japan	Singapore	Thailand	US
Hong Kong	–				
Japan	0.546∗∗ (0.002)	–			
Singapore	1.770∗∗ (0.022)	0.475∗∗ (0.017)	–		
Thailand	0.939∗∗ (0.034)	0.163∗∗ (0.014)	1.200∗∗ (0.025)	–	
US	0.176∗ (0.105)	0.190∗∗ (0.087)	0.686 (0.561)	0.241∗∗ (0.099)	–

tively small contribution confirming the difficulty in forecasting real interest rates. Similarly, the contribution of the real exchange rate was found small for the same reason.

In Tables 5A and 5B we present the results of the covariances of future dividend news and future excess return news for the two sub-periods, respectively. For both sub-periods, the covariance of future dividend news is much higher than the covariance of future excess returns, indicating the strength of economic integration in the region. Furthermore, this economic integration seems to have strengthened during the 1990s for most PBCs. The same can be said about the covariance of future excess returns news and financial integration. Developments between the US and PBCs have been different. The covariance of future dividend news has increased only for the US versus Japan and Singapore, while the covariance of future excess news has increased only versus Japan. At the same time, the high and statistically significant covariance between future domestic excess returns and future foreign dividend news for both sub-periods (results not shown) indicates the interaction between economic integration and financial integration.

Table 5A
Covariance decomposition of the US and PBCs: 1980.01–1989.12—continued

Panel b: Covariances of future excess returns news

	Hong Kong	Japan	Singapore	Thailand	US
Hong Kong	–				
Japan	0.190∗∗ (0.012)	–			
Singapore	0.589∗∗ (0.013)	0.219∗∗ (0.010)	–		
Thailand	0.190∗∗ (0.019)	0.084∗∗ (0.008)	0.364∗∗ (0.013)	–	
US	0.007∗∗ (0.002)	0.020∗∗ (0.002)	0.042∗∗ (0.003)	0.053∗∗ (0.004)	–

Table 5B
Covariance decomposition of the US and PBCs: 1990.01–1998.12

Panel a: Covariances of future dividend news

	Hong Kong	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonsia	3.100**	–							
	(0.041)								
Japan	0.519**	0.699**	–						
	(0.018)	(0.034)							
Korea	1.800**	2.980**	1.550**	–					
	(0.042)	(0.108)	(0.039)						
Malaysia	3.000**	4.280**	1.160**	2.850**	–				
	(0.044)	(0.111)	(0.028)	(0.094)					
Philippines	2.610**	4.310**	1.030**	2.030**	4.760**	–			
	(0.035)	(0.072)	(0.039)	(0.007)	(0.093)				
Singapore	1.710**	2.230**	0.967**	1.270**	2.640**	2.740**	–		
	(0.017)	(0.034)	(0.016)	(0.026)	(0.040)	(0.027)			
Taiwan	1.960**	1.770**	1.350**	1.820**	2.540**	3.480**	1.720**	–	
	(0.016)	(0.059)	(0.020)	(0.038)	(0.041)	(0.037)	(0.021)		
Thailand	2.780**	2.810**	1.090**	2.740**	4.920**	4.670**	2.780**	2.520**	–
	(0.029)	(0.059)	(0.030)	(0.072)	(0.070)	(0.054)	(0.038)	0.050)	
US	0.098**	0.093	0.558**	0.019	0.017**	0.127	0.245**	0.069	0.079**
	(0.021)	(0.102)	(0.142)	(0.012)	(0.008)	(0.112)	(0.132)	(0.052)	(0.009)

Table 5B
Covariance decomposition of the US and PBCs: 1990.01–1998.12—continued

Panel b: Covariances of future excess returns news									
	Hong Kong	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonesia	0.865**	–							
	(0.021)								
Japan	0.136**	0.242**	–						
	(0.009)	(0.020)							
Korea	0.602**	1.150**	0.448**	–					
	(0.029)	(0.064)	(0.021)						
Malaysia	0.912**	1.520**	0.427**	1.230**	–				
	(0.026)	(0.067)	(0.016)	(0.056)					
Philippines	0.791**	1.660**	0.365**	0.795**	1.760**	–			
	(0.020)	(0.044)	(0.022)	(0.035)	(0.058)				
Singapore	0.445**	0.679**	0.276**	0.416**	0.808**	0.886**	–		
	(0.009)	(0.020)	(0.009)	(0.014)	(0.022)	(0.016)			
Taiwan	0.516**	0.528**	0.429**	0.593**	0.705**	1.200**	0.456**	–	
	(0.009)	(0.034)	(0.012)	(0.023)	(0.023)	(0.023)	(0.012)		
Thailand	0.792**	1.070**	0.330**	0.962**	1.640**	1.540**	0.870**	0.711**	–
	(0.015)	(0.036)	(0.005)	(0.041)	(0.040)	(0.031)	(0.021)	(0.027)	
US	−0.013**	0.031**	0.066**	−0.006**	−0.026**	0.043**	−0.060**	−0.025**	0.043**
	(0.002)	(0.004)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.008)

In order to test the robustness of our results to a different specification, we estimated the VAR without the instrumental variables.[15] This specification did not have a great impact on the decomposition results. Thus, our results remained robust to the different specification of our forecasting model.

5.2. Correlations of the return components

In the next set of Tables, 6A and 6B, we present the correlation matrices of the return components for the two sub-periods, 1980.01–1989.12 and 1990.01–1998.12, respectively. In interpreting these results we provide answers to the questions posed in the introduction relating to the effect of stock market openness on financial integration; the importance of regional versus global integration; and the link between economic and financial integration.

5.2.1. Financial integration in pre and post liberalisation periods

During the 1980s there were only five cases out of ten of financial integration (see Table 6A, Panel b). Those were Singapore versus Hong Kong, Thailand, Japan and the US, and the US versus Thailand. In the cases of the US versus Singapore and Thailand the correlations were very high indeed. It is interesting to note that Hong Kong, Japan and the US were found not to be financially integrated, even though all three markets were open at the time, implying that other factors might

[15] Results can be made available by the authors. Indeed, an expanded version of the paper with details of all results can be found in Phylaktis and Ravazzolo (2001).

Table 6A
Correlations of the US and PBCs: 1980.01–1989.12
This table reports the results of correlations of US and PBCs excess stock returns components. The VAR is in excess return on US stocks, excess return on PBC stocks, the US real interest rates, change in the US nominal interest rate, the real exchange rate, the US dividend yield and PBC dividend yield. Excess returns are measured in dollars relative to the one-month Treasury Bill rate. Dividend yields are computed as the sum of dividends over the last 12 months divided by the current price. The components of the variance are given in equation (9). All variables are measured in logs and are in real terms unless otherwise stated. For Hong Kong the sample period covers 1981.01 to 1989.12. ∗denotes significance at the 10% level and ∗∗at the 5% level

Panel a: Correlations of future dividend news

	Hong Kong	Japan	Singapore	Thailand	US
Hong Kong	–				
Japan	0.127∗ (0.082)	–			
Singapore	0.484∗∗ (0.046)	0.228∗∗ (0.073)	–		
Thailand	0.310∗∗ (0.103)	0.056 (0.080)	0.496∗∗ (0.054)	–	
US	0.311∗ (0.192)	0.484∗∗ (0.101)	0.532∗∗ (0.098)	0.552∗∗ (0.018)	–

Table 6A
Correlations of the US and PBCs: 1980.01–1989.12—continued

Panel b: Correlations of future excess returns news

	Hong Kong	Japan	Singapore	Thailand	US
Hong Kong	–				
Japan	0.120 (0.146)	–			
Singapore	0.576∗∗ (0.087)	0.345∗∗ (0.125)	–		
Thailand	0.255 (0.193)	0.077 (0.144)	0.501∗∗ (0.094)	–	
US	0.139 (0.485)	0.436 (0.328)	0.799∗∗ (0.275)	0.975∗∗ (0.329)	–

have discouraged international investors. The result for Thailand was considered rather strange in view of the substantial restrictions which existed during this period. The correlations were thus reestimated for the shorter pre-liberalisation period 1980.01 to 1987.08 so that the end of the period coincided exactly with the official liberalisation date for Thailand. The correlation of future excess returns news between the US and Thailand was found to be statistically insignificant, implying no financial integration between the two countries.

During the 1990s, all PBCs were found to be financially integrated (see Table 6B, Panel b). No difference could be observed in the degree of integration amongst the highly open markets, like those of Hong Kong and Singapore, and the less open markets, such as those of Thailand, Indonesia and the Philippines. Even in Taiwan and Korea, which were highly regulated, there was a high degree of integration corroborating the results of previous studies. The high financial integration at both the regional and global level found for Thailand in the post-liberalisation period compared to the pre-liberalisation period is also in line with the results of other

Table 6B
Correlations of the US and PBCs: 1990.01–1998.12

Panel a: Correlations of future dividend news

	Hong Kong	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonesia	0.666**	–							
	(0.043)								
Japan	0.223**	0.243**	–						
	(0.055)	(0.063)							
Korea	0.452**	0.516**	0.428**	–					
	(0.044)	(0.085)	(0.051)						
Malaysia	0.699**	0.718**	0.319**	0.533**	–				
	(0.032)	(0.061)	(0.065)	(0.086)					
Philippines	0.638**	0.644**	0.320**	0.321**	0.774**	–			
	(0.037)	(0.044)	(0.081)	(0.075)	(0.031)				
Singapore	0.735**	0.610**	0.485**	0.369**	0.775**	0.798**	–		
	(0.027)	(0.044)	(0.051)	(0.073)	(0.029)	(0.005)			
Taiwan	0.476**	0.589**	0.330**	0.286**	0.417**	0.541**	0.479**	–	
	(0.042)	(0.068)	(0.043)	(0.061)	(0.048)	(0.026)	(0.052)		
Thailand	0.659**	0.662**	0.321**	0.467**	0.806**	0.754**	0.767**	0.387**	–
	(0.039)	(0.052)	(0.068)	(0.078)	(0.030)	(0.032)	(0.036)	(0.072)	
US	0.322**	0.180	0.724**	0.039	0.038	0.249	0.344**	0.139	0.15
	(0.085)	(0.197)	(0.171)	(0.198)	(0.172)	(0.224)	(0.144)	(0.106)	(0.194)

Table 6B
Correlations of the US and PBCs: 1990.01–1998.12—continued

Panel b: Correlations of future excess returns news

	Hong Kong	Indonesia	Japan	Korea	Philippines	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonesia	0.686**	–							
	(0.076)								
Japan	0.212*	0.310**	–						
	(0.117)	(0.118)							
Korea	0.524**	0.622**	0.446**	–					
	(0.081)	(0.107)	(0.095)						
Malaysia	0.774**	0.810**	0.415**	0.731**	–				
	(0.054)	(0.082)	(0.119)	(0.088)					
Philippines	0.656**	0.677**	0.369**	0.429**	0.832**	–			
	(0.067)	(0.066)	(0.142)	(0.127)	(0.043)				
Singapore	0.732**	0.373**	0.523**	0.443**	0.832**	0.811**	–		
	(0.053)	(0.066)	(0.102)	(0.114)	(0.052)	(0.030)			
Taiwan	0.498**	0.281**	0.408**	0.422**	0.440**	0.577**	0.452**	–	
	(0.086)	(0.125)	(0.088)	(0.092)	(0.100)	(0.024)	(0.105)		
Thailand	0.669**	0.675**	0.335**	0.871**	0.497**	0.778**	0.804**	0.379**	–
	(0.066)	(0.088)	(0.125)	(0.038)	(0.245)	(0.048)	(0.054)	(0.136)	
US	−0.543	0.321	0.414	−0.525	−0.320	0.546**	−0.027	−0.524	0.812**
	(0.508)	(0.441)	(0.692)	(0.339)	(0.751)	(0.109)	(0.854)	(0.347)	(0.213)

studies. Bekaert and Harvey (1997), in their time series and cross sectional models of analysing the effect of capital market liberalisation on emerging equity market volatility and allowing for correlations between local market and world market to vary, found that for some countries (Thailand from the PBCs) capital market liberal-

isation increased the correlation in post liberalisation periods, i.e. increased financial integration.[16]

The picture for the US is very different. Only the Philippines and Thailand are financially integrated with the US. There is no integration with Singapore, unlike the 1980s. Japan, the most financially advanced country, was not found to be integrated with the US. This result is in agreement with Ammer and Mei (1996), who included Japan in their study for the period 1974.01 to 1990.12. They find a negative but statistically insignificant correlation of future excess return news.[17]

5.2.2. Regional versus global integration

Developments in economic integration can be seen by examining correlations of future dividend news. During the 1980s there is economic integration amongst all PBCs (see Table 6A, Panel a) and that remains strong during the 1990s (see Table 6B, Panel a).[18] For the US the situation is different. It is integrated with all PBCs for which data exist during the 1980s, but only with Hong Kong, Japan and Singapore subsequently.

Comparing the above results of the correlations of future dividend news with the correlations of industrial production growth presented in Table 1 one can observe that these are generally higher. This confirms one of the advantages of using our methodology, which picks small but persistent comovements of long-term dividend growth compared to the contemporaneous correlations of output growth, which might understate the degree of integration.

Thus, regional economic integration has been important throughout the period of examination and more so during the 1990s. On the other hand, there is less global integration. These results are in accord with those relating to financial integration outlined in the previous section.

These findings, however, might have been influenced by the Asian financial crisis of mid-1997. Studies on the 1987 stock market crash and the Mexican crisis have shown that correlations between stock markets increase during a crisis (see e.g. Roll, 1989, Calvo and Reinhart, 1996, and Malliaris and Urrutia, 1992). Thus, in Section 6, we test the robustness of the results for the period 1990.01 to 1997.06.

[16] In a more recent study Bekaert and Harvey (2000) developed a cross-sectional time-series model and assessed the impact of market liberalisation in emerging equity markets on the cost of capital, volatility, beta and correlation with World market returns and found that correlation increased by a small amount, 4.2 percent, in post-liberalisation periods.

[17] We run the exercise, as they have done, by correcting for the asymmetry in the sense that Japanese excess return was measured relative to the US interest rate. Thus, we undertook a symmetric covariance decomposition and obtained a positive, high and statistically significant correlation (0.936 for the period 1990.01–1998.12) confirming their result although for a different sample period. The different results when measuring the Japanese excess returns in Yen rather in US dollars might reflect the pattern of depreciation of the dollar against the yen during the sample period.

[18] There is only one exception, Japan versus Thailand.

5.2.3. The link between economic and financial integration

Combining now the developments in economic and financial integration one can arrive at the following conclusions. First, during the 1980s, there is no case where financial integration has been found without the existence of economic integration. Second, during the 1990s in only two cases out of 38 we find financial integration, which is not accompanied by economic integration, namely the Philippines and Thailand versus the US. Thirdly, this link between economic integration and financial integration is also highlighted by the correlation of future domestic excess returns and future foreign dividend news. Throughout the period this correlation was high and statistically significant for all the cases where financial integration has been observed.

6. Robustness test to the Asian financial crisis

In Table 6C we present the correlations for the sub-period prior to the crisis 1990.01 to 1997.06. The results for the US are very different for this period compared to 1990.01–1998.12. Looking first at the correlations of future dividend news (see Panel a) we find the US to be economically integrated with all countries apart from Korea. Furthermore, the degree of economic integration is higher with two of the three countries with which integration was found in the post-crisis period, namely Hong Kong and Singapore.

The results are not very different for financial integration in the pre-crisis period (see Panel b) compared to the post-crisis period. The US was integrated with a few countries in both sub-periods; in the pre-crisis period with Indonesia, Singapore and

Table 6C
Correlations of the US and PBCs: 1990.01–1997.06

Panel a: Correlations of future dividend news									
	Hong Kong	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonesia	0.049**	–							
	(0.061)								
Japan	0.077	0.047	–						
	(0.064)	(0.082)							
Korea	0.255**	0.164*	0.377**	–					
	(0.055)	(0.098)	(0.077)						
Malaysia	0.660**	0.701**	−0.192	0.192**	–				
	(0.032)	(0.047)	(0.337)	(0.054)					
Philippines	0.515**	0.613**	0.100	0.084	0.626**	–			
	(0.045)	(0.047)	(0.094)	(0.088)	(0.034)				
Singapore	0.647**	0.600**	0.387**	0.210**	0.731*	0.732**	–		
	(0.030)	(0.043)	(0.070)	(0.066)	(0.032)	(0.033)			
Taiwan	0.363**	0.397**	0.269**	0.263**	0.396**	0.566**	0.431**	–	
	(0.056)	(0.091)	(0.039)	(0.048)	(0.065)	(0.043)	(0.075)		
Thailand	0.417**	0.499**	0.133	0.167**	0.665**	0.622**	0.667**	0.243**	–
	(0.048)	(0.088)	(0.102)	(0.080)	(0.043)	(0.058)	(0.047)	(0.097)	
US	0.535**	0.550**	0.223**	−0.055	0.476**	0.280*	0.609**	0.275**	0.397**
	(0.094)	(0.162)	(0.102)	(0.104)	(0.148)	(0.162)	(0.122)	(0.080)	(0.166)

Table 6C
Correlations of the US and PBCs: 1990.01–1997.06—continued

Panel b: Correlations of future excess returns news

	Hong Kong	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Hong Kong	–								
Indonesia	0.685**	–							
	(0.112)								
Japan	0.020	0.019	–						
	(0.018)	(0.157)							
Korea	0.210*	-0.140	0.394**	–					
	(0.113)	(0.202)	(0.150)						
Malaysia	0.657**	0.785**	0.989**	0.192*	–				
	(0.060)	(0.068)	(0.014)	(0.289)					
Philippines	0.436**	0.664**	0.107	0.050	0.645**	–			
	(0.098)	(0.074)	(0.189)	(0.181)	(0.065)				
Singapore	0.650**	0.668**	0.400**	0.126	0.720**	0.753**	–		
	(0.061)	(0.071)	(0.145)	(0.141)	(0.070)	(0.060)			
Taiwan	0.333**	0.473**	0.323**	0.232**	0.401**	0.652**	0.411**	–	
	(0.112)	(0.156)	(0.085)	(0.101)	(0.132)	(0.077)	(0.154)		
Thailand	0.335**	0.512**	0.132	0.174	0.681**	0.583**	0.689**	0.186	–
	(0.096	(0.158)	(0.197)	(0.162)	(0.087)	(0.259)	(0.083)	(0.180)	
US	0.109	0.867**	0.496	−0.755**	−0.085	0.157	0.714**	−0.392	0.726**
	(0.553)	(0.239)	(1.414)	(0.176)	(0.486)	(0.549)	(0.549)	(0.560)	(0.324)

Thailand; and in the post-crisis with the Philippines and Thailand. PBCs, on the other hand, were economically and financially integrated even before the crisis, but less so. Thus, the Asian financial crisis reduced global economic integration but increased regional economic and financial integration.

The link between economic and financial integration is highlighted also in this sub-period. There is only one case out of 30 where financial integration is not accompanied by economic integration (Japan/Malaysia). As in the previous sub-periods, this link is strengthened by the statistically significant correlation between future excess return and future foreign dividend news.

7. Conclusion

In this paper, we have examined questions relating to real and financial links amongst PBCs and between these countries and the US by analysing the covariance of returns on national stock markets. This framework has allowed us to examine these links simultaneously and more accurately and explore whether economic integration plays a role in linking the financial markets. This research has been motivated by the overwhelming evidence that financial markets can be integrated even in the presence of substantial foreign exchange restrictions. Our main empirical findings are as follows.

First, variation in dividends is the main source of stock return variance in all the countries examined. Correlated news about future dividend growth in each pair of countries is also the major contribution to the covariance of domestic and foreign excess stock returns indicating the strength of economic integration in the region.

The substantial trade between each of the PBCs and the two large economies of Japan and the US provides an important transmission channel for country specific shocks. This channel has been examined and confirmed by Canova and Dellas (1993), and Canova and DeNicole (1995) for the European countries, and by Schmitt-Grohe (1996) for the transmission of shocks between the US and Canada. If for example, foreign capital goods are used in the production of domestic goods, then "allowing for production interdependencies introduces a previously neglected channel through which idiosyncratic shocks may be propagated across countries".[19] Furthermore, it should be noted that the economic integration observed in our paper is higher than that revealed by the contemporaneous correlation of industrial production confirming one of the advantages of using the methodology in this paper to measure economic integration.

Secondly, our results emphasised also the link between this economic integration with financial integration. We found overwhelming evidence that financial integration is accompanied by economic integration. This evidence seems to suggest that economic integration provides a channel for financial integration. If economic integration relates to countries' comovements of output growth, and economic activity is positively related to stock prices, as has been shown to be the case theoretically and empirically, then it is not surprising to find stock prices moving together as well. In fact the relationship between economic activity and stock prices is stronger if foreign influences are taken into account through consumption and production interdependencies (see Canova and DeNicole, 1995). Thus, our results explain, at least partly, the high financial market integration found in this study and in other studies even in the presence of foreign exchange restrictions. In the current study no differences could be observed in the degree of integration amongst countries with different degrees of stock market openness during the period of the 1990s. These findings do not lend support to the use of restrictions to isolate capital markets from world influences.

Thirdly, the results indicate regional economic and financial integration, which became stronger during the 1990s even prior to the Asian crisis. This provides support to the view that economic integration and trade interdependencies might have played a major role to the contagion effect of the Asian crisis.[20] At the same time, the less pronounced financial integration of the PBCs at the global level before the crisis explains the mild effect of the crisis on world financial markets.

Finally, the results have revealed that some countries have close links with the US, and other countries with Japan. For example, Thailand has been greatly financially integrated with the US, while only the financial crisis seems to have linked it with Japan and even then less so than in the US. On the other hand, Korea and Taiwan have had close links with Japan. They have been financially integrated with Japan before and after the crisis and have had no links with the US. Ng (2000) finds similar links when examining volatility spillover effects from Japan and the US to

[19] See Canova and DeNicole (1995, pp. 983–984).

[20] See e.g. Glick and Rose (1999).

the PBCs.[21] These close links between Korea and Taiwan with Japan might stem from the substantial Japanese Direct Foreign Investment (DFI) in those countries since the mid 1980s. For example, it accounted for 52% of the DFI stock in Korea and 27% in Taiwan.[22] This DFI became increasingly export oriented, while at the same time a lot of parts and equipment were imported from Japan, strengthening the economic and financial links of these countries.[23]

The study has produced some tentative results with regard to the financial and real links in the Pacific Basin region. As more data become available a more accurate picture will emerge. The main finding of the study regarding the importance of economic integration for financial integration needs to be tested for other emerging stock markets.

Acknowledgements

We would like to thank the participants of the Tor Vergata Conference in Rome and in particular Leonardo Becchetti. The paper benefited also from helpful suggestions and comments given at the *Financial Management Association* meetings in Paris and Toronto, the *European Financial Meeting* in London and the Universities of Oxford, Brunel, Birmingham, Cyprus, and City University Business School workshops. We are grateful to the Emerging Markets Group, City University Business School, London, for financial support.

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[21] It is interesting to note that Thailand is not economically integrated with Japan, and Korea with the US, if one concentrates at the pre-crisis period to avoid any possible effects of the crisis on integration. Taiwan, however, is equally economically integrated with both the US and Japan.

[22] See Krenin et al. (2000).

[23] In 1992, the ratio of export sales to total sales of Japanese affiliates in manufacturing was 45% in Asia compared with only 23% in Latin America.

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