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ABSTRACT

Economic Integration and the Co-movement of Stock Returns*

In this paper we analyze the determinants of co-movements in stock returns among 40 developed and emerging markets, from the 1970s to the 1990s. We provide empirical estimates of the impact of bilateral indicators of economic integration such as bilateral trade intensity, the dissimilarity of export structures, the asymmetry of output growth and bilateral real exchange rate volatility. We find that each indicator has the expected effect on the correlation of stock returns: trade intensity increases the correlation of stock returns, while real exchange rate volatility, the asymmetry of output growth and the degree of export dissimilarity decrease it. We also find that countries with more developed and more analogous institutions - in terms of either rule of law or civil liberties - display a higher correlation of stock returns.

JEL Classification: E44, F15, F36 and G15

Keywords: bilateral trade intensity, co-movement of stock returns, economic integration and real exchange rate volatility

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1. Introduction

In the past few decades there has been a marked increase in international economic integration, as measured by both trade and financial flows. The economics literature has debated extensively the causes and consequences of this rise in international integration. This paper assesses the consequences of real and monetary integration on the correlation of real stock returns between countries. We believe that, in light of the depth of integration under the agreement for Economic and Monetary Union in Europe, and related regional integration movements, it has become key to evaluate how economic integration affects (or not) the correlation of stock returns.

Economic integration may lead to lower correlation of asset returns if, for instance, it is associated with higher sectoral specialization.¹ On the other hand, larger flows of capital movements across economies and international arbitrage² may lead to higher correlation of stock returns across economies.³ There have been several studies that find evidence of increasing integration between stock markets, including Lee (2005), Pascual (2002) and Rangvid (2000).⁴ Recently, Bekaert and Hodrick (2006), using a risk-based factor model, concluded that there is no evidence of an upward trend in the correlation of returns across countries, except in the case of European stock markets. Along the same lines, Wälti (2006) studied the impact of monetary integration on stock market synchronization and concluded that the adoption of a single currency indeed affects correlation. For the latter half of the 1990s, bilateral trade flows are important determinants of the co-movement in stocks, while bilateral foreign investment is not significant.

This paper adds to the literature in several ways. First, it uses a new dataset on indicators of bilateral economic integration between 40 economies, large and small, developed and developing. Second, the data cover the 1970s and 1990s, decades for which data on stock returns for such set of economies are available. Finally, it assesses the robustness of the impacts of monetary and real bilateral integration by controlling for a

¹ Roll (1992) uses a Ricardian model to relate specialization and international market correlations, but Heston and Rouwenhorst (1994) show that it is country effects - fiscal, monetary, legal, and cultural differences - and not differences in country specializations that explain the co-movement between stock markets.

² Dumas, Harvey and Ruiz (2002) investigate the underlying determinants of cross-section stock returns correlation. Under the hypothesis of financial market integration, stock market correlation is in line with the actual values.

³ Cross country correlations in stock returns may also change over time – as shown by Goetzmann et al. (2001) for a long time series - and are generally higher in periods of deeper integration - also Goetzmann et al. (2001) – and in periods of high variance of returns in the US market - Ramchand and Susmel (1998). The cross-market correlation of returns may change across regions, as well. There is evidence that it is higher for Europe - Books and del Negro (2002) - and increasing in Latin America - Heaney et al. (2002).

⁴ Lee (2005) finds that the conditional correlations between the U.S., Japan, and Hong Kong stock market returns are positive and increasing. Pascual (2002) finds evidence of increasing integration in the case of the French stock market, but not the British and German markets. Rangvid (2000) also shows that the degree of convergence among European stock markets has increased during the two last decades.

large set of bilateral information, including, for the first time, indicators of bilateral institutional development and similarity.

2. Empirical Results

We use a new dataset to assess the effect of economic integration on the correlation of returns. It covers 40 developed and emerging markets from the 1970s to the 1990s.⁵ For each decade, we have computed the correlation of stock returns for all country pairs, and collected indicators of bilateral integration from Larrain and Tavares (2003). The new panel dataset we are able to use allows us to assess, quantitatively, whether and how each of the indicators of economic integration - the bilateral trade intensity, the dissimilarity in the structure of exports, the correlation of output growth and the bilateral real exchange rate variability - affect the correlation of stock returns. We also employ, for each country pair, a widely used set of control variables related to the size of the two economies, bilateral distance, per capita GDP, population, whether the countries share a common language, a common border or a common colonizer and whether they are islands. Lastly, we use two new indicators of institutional development and similarity as independent control variables.⁶ Our specification is:

$$\begin{aligned} \text{Correlation of stock returns} = & \alpha + \theta_1 * \text{Bilateral Trade Intensity} + \theta_2 * \text{Asymmetry of Output Growth} + \\ & + \theta_3 * \text{Dissimilarity of Export Structure} + \theta_4 * \text{Real Exchange Rate Variability} + \\ & + \beta_1 * \text{Size of the Economies} + \beta_2 * \text{Distance Between Economies} + \beta_3 * \text{Average Per Capita GDP} + \\ & + \beta_4 * \text{Common Language Indicator} + \beta_5 * \text{Common Colonizer indicator} + \beta_6 * \text{Island Indicator} + \\ & + \beta_7 * \text{Development of Rule of Law} + \beta_8 * \text{Development of Civil Liberties} + \varepsilon \end{aligned}$$

We test for the sign and significance of θ_1 , θ_2 , θ_3 and for θ_4 by entering the integration indicators sequentially and then simultaneously. For each specification we obtain ordinary least square estimates, without and then with additional controls. Table 1 presents results for the impact of the four indicators of integration on the correlation of stock returns. The first four columns show that the all indicators of bilateral integration are statistically significant in explaining the correlation of stock returns. The signs of estimates are as expected: an increase in real exchange variability, a lower correlation of output shocks or a larger difference in export structure decreases the correlation of stock

⁵ The use of decade averages corrects for possible bias stemming from short-term effects such as stock market crashes, which have been shown to affect the correlation of returns across countries.

⁶ A detailed description of the data is presented in the Appendix.

returns, while trade intensity increases it. When we add control variables the significance levels decrease but all variables remain significant at the 10 percent level with the expected sign. Regarding the control variables, most are statistically significant with the exception of the Size of the economies, Average per capita GDP and the Common Colonizer Indicator. The indicators of institutional development are both significant throughout and more developed legal and political institutions in both economies do have a positive impact on the co-movement of stock returns.

[Table 1 about here]

3. Conclusions

In this paper we provide empirical estimates of the effect of indicators of bilateral economic integration on the correlation of real stock returns between economies. We concentrate on the role of bilateral real exchange rate volatility, bilateral trade intensity, correlation of output growth and export dissimilarity and find that each indicator has the expected effect on the co-movement of returns. In addition, we provide strong evidence that analogous institutional development in two given economies leads to an increase in the co-movement of their stock returns.

Table 1
Dependent Variable: Correlation of Stock Returns – Ordinary Least Squares Estimation

	rexch	Shoc	dis	bitr	Rexch and shoc and dis and bitr	rexch	Shoc	Dis	bitr	Rexch and shoc and dis and bitr
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bilateral Trade Intensity	0.3762** (5.05)	-	-	-	0.0280** (3.84)	0.01276* (1.78)	-	-	-	0.01323* (1.86)
Asymmetry of Output Growth	-	-7.749** (-6.69)	-	-	-6.569** (-4.03)	-	-2.3874* (-1.90)	-	-	-2.7299* (-1.67)
Dissimilarity of Export Structure	-	-	-0.3132** (-5.48)	-	-0.194** (-3.08)	-	-	-0.014** (-2.23)	-	-0.01202* (-1.84)
Real Exchange Rate Volatility	-	-	-	-1.042** (-3.53)	0.7634* (1.92)	-	-	-	0.06205 (0.20)	0.70997* (1.75)
Size of the Economies	-	-	-	-	-	3.74e-09 (0.17)	2.05e-09 (0.09)	3.89e-09 (0.18)	2.55e-09 (0.12)	1.09e-09 (0.05)
Distance Between Economies	-	-	-	-	-	-1.64e-08 * (-2.30)	-1.46e-08* (-2.07)	-1.37e-08* (-1.94)	-1.57e-08* (-2.23)	-1.39e-08* (-1.94)
Average Per Capita GDP	-	-	-	-	-	-2.90e-09 (-0.90)	-2.73e-09 (-0.86)	-3.46e-09 (-1.10)	-3.00e-09 (-0.93)	-3.53e-09 (-1.12)
Common language Indicator	-	-	-	-	-	0.1302* (2.53)	0.1316* (2.55)	0.1281* (2.51)	0.10221* (1.89)	0.1073* (2.01)
Common Colonizer Indicator	-	-	-	-	-	0.04543 (0.32)	0.0225 (0.15)	0.0760 (0.52)	0.0225 (0.16)	0.0555 (0.38)
Island Indicator	-	-	-	-	-	0.0652** (2.17)	0.0621** (2.08)	0.0629** (2.11)	0.0638** (2.14)	0.06031** (2.04)
Development of Rule of Law	-	-	-	-	-	0.7979** (8.88)	-0.7027** (7.46)	0.7122* (1.93)	0.7579** (8.96)	0.6460** (6.66)
Development of Civil Liberties	-	-	-	-	-	0.1481** (2.49)	0.1452** (2.45)	0.1279** (2.16)	0.14479** (2.45)	0.1095* (1.81)
R2	0.0413	0.0749	0.0630	0.0217	0.1146	0.1819	0.1833	0.1881	0.1786	0.1962
F stat	10.06	18.13	12.60	6.95	13.87	13.31	13.61	13.85	13.29	11.30
Degrees of Freedom	(3,573)	(3,573)	(3,573)	(3,573)	(6,570)	(11,565)	(11,565)	(11,565)	(11,565)	(14,562)
Decision	Reject	Reject	Reject	Reject	Reject	Reject	Reject	Reject	Reject	Reject

Number of Observations: 577. Time Dummies: Yes. T-statistics in parentheses, computed using heteroskedastic-consistent standard errors.

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Appendix - Data

The data-set uses information for 40 countries spanning the period 1970-1995. All variables are computed for each of three periods, 1970-79, 1980-89 and 1990-97. When a variable is not available for the whole period, it is computed where available.

Correlation of Stock Returns - Correlation between yearly real US Dollar return for each country pair and each decade. **Unit:** Correlation. **Source:** Citibase dataset.

Bilateral Trade Intensity - Calculated as the mean, over each period of time, of the average of the two bilateral-export-to-GDP ratios for each pair of countries i and j , that is, $\frac{\frac{X_{ij}}{GDP_i} + \frac{X_{ji}}{GDP_j}}{2}$. **Source:** Larraín and Tavares (2003).

Real Exchange Rate Volatility - Standard deviation, over each period of time, of the change in the log of the bilateral real exchange rate for countries i and j . The real exchange rate is constructed using consumer price indices and nominal exchange rate data. **Source:** Larraín and Tavares (2003).

Asymmetry of Output Growth - Standard deviation, over each period of time, of the difference in the shocks to countries i and j . Output shocks for each country are calculated as annual change in the log of real GDP. The source for real GDP data is the IFS series of GDP. **Source:** Larraín and Tavares (2003).

Dissimilarity of Export Structure - Calculated adding, for the first eight 1-digit SITC codes, the absolute value of the difference between countries i and j of the export shares for each category. The mean is then taken over the appropriate period of time. **Source:** Larraín and Tavares (2003).

Size of the Economies - Calculated as the mean, over each period of time, of the average of countries i and j 's GDPs (logs). The GDP data are in constant dollars. **Source:** Larraín and Tavares (2003).

Distance Between Economies - Computed as the log of the Great Circle distance between the capital cities of countries i and j . **Source:** Rose (2000).

Average Per Capita GDP - log of the product of the real per capita GDPs of countries i and j . **Unit:** constant dollars. **Source:** Rose (2000).

Common Language Indicator - dummy variable which takes value 1 if two countries share the same official language. **Source:** Rose (2000).

Common Colonizer Indicator - dummy variable if the two countries were colonies and shared the same colonizer after 1945. **Source:** Rose (2000).

Island Indicator - takes value 1 if one of the countries i or j is an island, 2 if both of them are islands and 0 otherwise. **Source:** Rose (2000).

Development of Rule of Law – product of the indicators of development of the rule of law in each country, taking the value 1 when both countries have reached the highest level. **Source:** Lopes and Tavares (2004).

Development of Civil Liberties – product of the indicators of development of civil liberties in each country, taking the value 1 when both countries have reached the highest level. **Source:** Lopes and Tavares (2004).