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Financial Integration and risk premiums in emerging stock markets

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Abstract

This paper employs a conditional version of the International Capital Asset Pricing Model (ICAPM) to investigate the determinants of regional integration of stock markets in the Latin America and Asia over the period 1996-2008. This model integrates three sources of time-varying risks: common international market risk, exchange rate risk and regional market risk. At the empirical level, we make use of the asymmetric multivariate BEKK-GARCH of Baba, Engle, Kraft and Kroner (1990) process to simultaneously estimate the ICAPM for both Latin America and Asia. Our results from the estimation of capital asset pricing model show that the currency risk premium is the most important component of the total premium followed by the global market premium. As for the regional risk, our findings show that it is significantly priced for all studied emerging regions but its contribution to the total risk premium is weak.

Keywords: ICAPM, stock market integration, exchange rate risk
JEL Classification: G12, F31, C3

1. Introduction

Regional and cooperation has been strengthened in last decades and regional integration has now become an incontestable trend due to its theoretical expected advantages. Regional integration may offer to national emerging stock markets ways to overcome some of the obstacles constraining their development. Possible benefits associated with regional integration of exchanges are more possibilities of diversification of risks in more efficient and competitive markets, and lower costs. By combining the resources of fledgling and fragmented capital markets, regionalization could boost liquidity and the ability of these markets to mobilize local and international capital for infrastructural development. Investors would gain access to a broader range of shares. There may also be a role for a well-functioning regional exchange in preventing large capital outflows from the region. Moreover, progress toward integration of capital markets on a regional basis may actually help spur accelerated economic integration goals in other areas.

We estimate a multivariate version of BEKK-GARCH of Baba, Engle, Kraft and Kroner (1990) to specify the contribution of each risk factor to the total premium. The model is estimated for the period of March 1996-June 2008, simultaneously for 3 market regions: the world market and two emerging zones: Asia (Malaysia, Singapore, Sri Lanka, Indonesia and Thailand), and Latin America (Venzuela, Chile, Brazil, Argentina and Mexico).

Our findings show that international equity risk premium in emerging zones is determined by three risk factors: global factors, regional factors and currency risk. The relative contributions of these factors to the total risk premium vary across regions as well as over time according to stock and currency market stability or instability.

The paper is organized as follows. Section 2 presents the model and introduces the econometric methodology. Section 3 describes the data and section 4 reports the empirical results. Concluding remarks are in section 5.

2. Empirical methodology

We propose to estimate the following empirical international asset pricing model in which expected risk premium of region *i*, $E(R_{i,t})$, is determined by the world market excess return, $R_{m,t}$, the exchange rate return, $R_{k,t}$, and the residual regional return, $\mathrm{var}(\theta_{it} / \psi_{t-1})$:

$$E(R_{i,t} / \psi_{t-1}) = \lambda_{m,t-1} Cov(R_{i,t}, R_{m,t} / \psi_{t-1}) + \sum_{k \in \{L.America, Asia\}} \lambda_{k,t-1} Cov(R_{i,t}, R_{k,t} / \psi_{t-1}) + \lambda_{i,t-1} \text{var}(\theta_{it} / \psi_{t-1})$$

$$\lambda_{m,t-1} = \exp(\delta'_m M_{m,t-1})$$
$$\lambda_{k,t-1} = \exp(\gamma'_i R_{i,t-1})$$
$$\lambda_{i,t-1} = \exp(\delta'_k M_{k,t-1}) \quad (1)$$

All returns are expressed in the same reference currency, the American dollar.

$\lambda_{m,t-1}$ et $\lambda_{i,t-1}$ dente the world and regional prices of risk respectively. The evidence in Harvey (1991) and De Santis and Imrohoroglu (1997) suggests that the price of risk is time varying. Furthermore, Merton (1973) and Adler and Dumas (1983) show the price of market risk to be equal to the world aggregate risk aversion coefficient. Since most investors are risk averse, the price of risk must be positive. In this paper, we follow De Santis and Imrohoroglu (1997), De Santis *et al.* (2003) and Gerard *et al.* (2003) and model the dynamics of the risk prices as a positive function of global information variables ($M_{m,t-1}$ for $\lambda_{m,t-1}$) and regional information variables ($R_{i,t}$ for $\lambda_{i,t-1}$).

Concerning the price of currency risk, the theory does not impose any restrictions on its sign. This is because investors might in fact be willing to attach a negative price to a currency deposit if the expected excess return is negative and the currency return covaries positively with the market portfolio. We thus adopt a linear specification to model the currency price risk based on information contained in $M_{k,t-1}$, *k* = Latin America and Asia. $\text{var}(\theta_{it} / \psi_{t-1})$ captures the regional market undiversifiable risk uncorrelated to world risk. We measure this regional risk by:

$$\text{var}(\theta_{it} / \psi_{t-1}) = Var(R_{i,t}) - \frac{Cov(R_{m,t}, R_{i,t})^2}{Var(R_{m,t})} - \frac{Cov(R_{k,t}, R_{i,t})^2}{Var(R_{k,t})} + 2\frac{Cov(R_{kt}, R_{i,t}) * Cov(R_{mt}, R_{i,t}) * Cov(R_{mt}, R_{k,t})}{Var(R_{m,t}) * Var(R_{kt})} \quad (2)$$

Next, consider the econometric methodology. Under rational expectations, we assume errors follow a GARCH (1,1) specification and write the model as follows:

$$r_t = \delta_{m,t-1} h_{m,t} + \sum_{k \in \{L,A,E,M\}} \delta_{k,t-1} h_{k,t} + \delta_{d,t-1} Var_t + \varepsilon_t \quad (3)$$

where

$$\varepsilon_t | \psi_{t-1} \sim N(0, H_t)$$
$$H_t = H_0 * (\tau\tau' - aa' - bb') + aa' * \varepsilon_{t-1}\varepsilon_{t-1}' + bb' * H_{t-1} \quad (4)$$

H_t is the conditional covariance matrix of returns, $h_{m,t}$ and $h_{k,t}$ are the conditional covariance between the considered zone equity returns and the world market and the different exchange

rate returns respectively. H_0 is the unconditional variance. Var_t is the ($N \times 1$) vector of residual regional risks can be written as

$$Var_t = D(H_t) - h_{m,t}^2 / h_{mm,t} - h_{k,t}^2 / h_{kk,t} + 2(h_{m,t} * h_{k,t} * h_{mk,t}) / (h_{mm,t} * h_{kk,t})$$

$\delta_{d,t-1}$ the vector of domestic prices of risk. $D(H_t)$ is the diagonal of H_t. $h_{mm,t}$ and $h_{kk,t}$ the variances of the world market return and the exchange rate k return. In the system (3), there are 5 equations: 3 equations to model the expected risk premium for the world equity market and the two studied emerging zones, and two equations to model the expected excess returns of the aggregate exchange rates of the four studied emerging zones against American dollar.

3. Data and preliminary analysis

This study investigates the global integration process of emerging market regions: Asia (Malaysia, Singapore, Sri Lanka, Indonesia and Thailand) and Latin America: Venezuela, Chile, Brazil, Argentina and Mexico).

Monthly data are collected for regional stock market indices, world stock market index, and real effective exchange rate indices over the period from March 31, 1996 to March 31, 2008[1]. Our sample excludes the episodes of the last Global Financial Crisis that could generate biased estimates. Data are obtained from Thomson Datastream International, the IMF's International Financial Statistics (IFS) and the U.S. Federal Reserve databases.

3.1 Stock market returns

We use the Morgan Stanley Capital International (MSCI) World market index, which is the value-weighted global market index consisting of the 21-national indices, as a proxy for the global market. For each of the four regions, index returns corresponds to the geometric mean of stock returns weighted by market capitalization of each member country. The returns on world market and on each country index are computed from taking the difference in logarithm between two consecutive index prices. All returns are expressed in US dollars and are converted

[1] We choose monthly data to make easier comparisons with previous studies. Moreover, as shown by Harvey (1991), using monthly data reduces any potential biases that may arise such as the bid-ask effect and non-synchronous trading days. .

into excess returns by subtracting the one-month Eurodollar interest rate, taken as the risk-free rate in our study. The Eurodollar rate is obtained from Datastream International database.

3. 2 Real exchange rate indices

We use the real effective exchange rate (REER) indices to represent exchange rate risk since variations in inflation rates of emerging countries are more significant in comparison to those in exchange rates. For each emerging region, the REER index is measured by the geometric weighted average of all individual countries' exchange rates against the US dollar, where the weights are the share of each country in the foreign trade with the United States. These indices are calculated monthly by using exchange rate and trade data from Datastream International, the Federal Reserve Bank of St Louis, and the IMF's International Financial Statistics.

3.3 Global and regional information variables

Global instrumental variables are used to explain changes in the prices of world market and foreign exchange risks. Following Hardouvelis et *al.* (2006) and Carrieri et *al.* (2007), we employ the following variables: the dividend yield (dividend-to-price ratio) of the world market portfolio (MSCI World index) in excess of the 30-day Eurodollar interest rate which is denoted by (ERDIVM) , the variation in the US term premium (VPRM)) which is measured by the yield spread between 10-year US Treasury notes and 3-month US Treasury bills, the return on the S&P's 500 stock market index (VRSP)[2], and the variation in the 1-month US Treasury bill yield (VRTUS). Data concerning these information variables are obtained from MSCI and the IMF's International Financial Statistics databases. The regional instrumental variables for each region, which are used to infer the changes in the regional price of risk, include the dividend yield of a regional market portfolio (ERDIVL), the return on the regional stock market index in excess of the 30-day Eurodollar interest rate (RRI), and the variation in the trade-weighted average regional inflation rate (VTI). Data are extracted from MSCI and Datastream International.

3.4 Stochastic properties of the data

[2] Hardouvelis et *al.* (2006) consider the default premium, measured by the difference in yields between a bond rated Baa by Moody's and a bond rated Aaa, as a global information variable.

Table 1 indicates that the skewness coefficients are positive for Latin America and negative for Asia. They are significantly different from zero, indicating the presence of asymmetry in the return distribution. In addition, all the return series are characterized by a kurtosis coefficient statistically significant and greater than 3, and thus have fatter tails than those of a normal distribution. The findings from Jarque-Bera test, not presented here for concision purpose, confirm the rejection of normality.

4. Empirical results

Panel A of table 2 presents the estimated parameters for the price of foreign exchange risk associated with fluctuations of each of the four regional trade-weighted real exchange rate indices vis-à-vis the US dollar. We first observe that they are mainly driven by the S&P's 500 index returns, and the change in the yield of the 1-month US treasury bills because the associated coefficients are statistically significant at the conventional levels (except Southern Europe). However, the excess dividend yield of the world market is not significant. However, we employ the Wald test to investigate the null hypotheses that the price of exchange risk is zero and constant respectively.

The filtered series reported in Figure 1 shows a considerable reduction of the risk at the beginning of the years 2000 and 2005. The highest values are recorded in 2002 and 2003 after the terrorist attacks against the United States and a second drop from the year 2006. The price of world market risk is very volatile especially in the late 1990s and after 2001. The HP filtered series reveals two phases of expansion: in 1999 and from 2002 until the end of the study period. In this second phase, the change is much more significant compared to the years 1997-1998, reflecting the uncertainty across global financial markets in recent years. Next consider the prices of regional residual risks. The inclusion of these risks can be interpreted as a measure of mild segmentation or as an average measure of other factors that cannot be captured by the model like differential tax treatment. However as shown in Figure 2 the dynamics of regional prices of risk are different depending on regional specific factors.

Risk premiums are calculated based on the estimation results from Table 2. The results are summarized in Table 3. The evolution of these risk premiums over time is reproduced in Figure 2. The total premium is, as expected, higher for emerging regions than for the world market. The contribution of currency risk premium is also higher for emerging regions; the exchange risk premium is the main component of the total risk premium for the studied emerging regions

whereas the global risk premium is the most important component of the world total risk premium. However, the estimated total premiums vary considerably from one emerging region to another, from 4.76% for Southern Europe to 10.53% for the Latin America. They are time-varying and reach high values in times of crises and react significantly to international events: the Gulf wars during the years 1991 and 2003, the financial crises of the Asian markets and Latin America during the years 1997, 1998 and 2001 and the terrorist attacks against the United States in 2001.

As for regional residual risk premiums, they are significant for all studied emerging regions confirming that these regions are partially segmented from world markets. However results in Table 4 show that for all studied emerging regions the contribution of regional residual risk factors to the formation of the total risk premium is economically weak. For the Latin American region, the total premium risk is particularly volatile over the period, reaching its highest values between 1996 and 2008. This period was marked by the economic crisis in Mexico in 1994-1995, an event that has hit the Mexican economy, and began with a sudden devaluation of the Mexican peso. The crisis then spread to the real economy and this crisis has had an impact on other emerging markets, particularly those in South America. In addition, the exchange risk premium is the most significant component of the total premium. Our results confirm those of Arouri (2006) and Guesmi (2012) who shows that currency risk is the most important risk factor in Latin America over the period 1990-2000. For South Asia, the total risk premium initially knows very high values during the financial crisis of 1997-1999, and shows a subsequent increase in the years 2001, 2002 and 2007. The exchange risk premium is the main component of total risk premium during the sub-period 1996-2001, suggesting that during this period the dynamics of expected returns is better explained by exchange rate risk than the world global risk. For Southeast Europe, the total premium risk seems to be very volatile during the entire study period. This confirms the increasing degree of integration in this area since stock returns are more dependent on overall European and world risk factors than on purely regional risk factor. Similar results are obtained for the Middle-East region.

In sum, throughout the study period, the premium associated with the exchange risk is statistically and economically significant for the four studied emerging regions. However, the contribution of the exchange premium to the total premium is more pronounced for the South-East Asia and the Middle East. The contribution of the residual risk factor is also statistically significant but economically weak. For the world market, the total risk premium is mainly determined by the world market risk factor. The exchange risk premium is negative which

shows that average investors are willing to pay a portion of their total premium to protect against unanticipated fluctuations in exchange rates (Arouri, 2006; Guesmi, 2012).

5. Conclusion

The conditional version of the partially segmented CAPM we introduced in this paper has allowed us to investigate the formation of the international risk premium in two emerging market regions, Latin America and Asia and the world market. The empirical approach we employed presents numerous advantages in particular it takes into account the phenomenon of partial segmentation and allows the prices and quantities of risk to vary over time. Our findings show that (i) emerging regions are partially segmented from world stock markets, (ii) the risk premium in emerging zones depends significantly on both global, exchange rate and regional risk factors, but (iii) the exchange risk premium is the most important component of the total international equity premium in emerging zones.

REFERENCES

Adler, M and B. Dumas (1983) “International Portfolio Selection and Corporation Finance: A Synthesis”, *Journal of Finance*, n° 38, pp. 925-84.

Arouri, M. (2006), “Are Stock Markets Integrated? Evidence from a Partially Segmented ICAPM with Asymmetric Effects” *Frontiers of Finance and Economics*, 2, 70-94.

Baba, Y., Engle, R.F., Kraft, D.F. and K. Kroner (1990) "Multivariate Simultaneous Generalized ARCH", *mimeo*, Department of Economics, University of California, San Diego.

Carrieri, F. (2001) "The effects of liberalization on market and currency risk in the European Union" *European Financial Management*, 7, 259-290.

Carrieri, F., Errunza, V., K. Hogan (2007) "Characterizing world market integration through time" *Journal of Financial and Quantitative Analysis*, 42, 915-940.

De Santis, G and S. Imrohoroglu (1997) "Stock Returns and Volatility in Emerging Financial Markets" *Journal of International Money and Finance*, 16(4), 561-579.

De Santis, G., Gerard, B, P. Hillion (2003) "The relevance of currency risk in the EMU" *Journal of Economics and Business*, 55, 427-462.

Engle, R. (1982) "Autoregressive conditional heteroskedasticity with estimates of the variance of U.K Inflation" *Econometrica*, 50, 987-1008.

Gerard, B., Thanyalakpark, K., and J. Batten (2003) "Are the East Asian markets integrated? *Journal of Economics and Business*, 55, 585-607.

Guesmi K. (2012) "Characterizing South-East Asian Stock Market Integration through Time" *International Journal of Business*, 17(1), 100-112.

Hardouvelis, G., Malliaropoulos, and D. Priestley (2006) "EMU and stock market integration" *Journal of Business*, 79, 365-392.

Harvey, C.R (1995) "The risk exposure of emerging equity markets" *World Bank Economic Review*, 9, 19-50

Harvey, C.R (1991) "The world price of covariance risk" *Journal of Finance*, 46, 111-157.

Merton R.C. (1973) "An Intertemporel Capital Asset Pricing Model" *Econometrica*, 41(5), 867-887.

Table 1. Descriptive statistics of return series

	Mean	**Std. dev.**	**Skewness**	**Kurtosis**	**J.B.**	**ARCH (6)**
Panel A : *Returns on real exchange rate indices*						
Latin America	-0.043	2.343	-0.411	4.426	16.602^{++}_{+}	21.098^{++}_{+}

Asia	0.454	3.451	-0.607	4.385	20.782^{++} $^{+}$	20.281^{++} $^{+}$
Panel B: *Excess returns on regional stock market indices*						
Latin America	2.248	10.040	0.766	8.450	191.34^{++} $^{+}$	12.145^{++}
Asia	2.074	8.173	-0.714	8.020	169.96^{++} $^{+}$	25.044^{++} $^{+}$

Notes: ARCH (6) is the empirical statistics of the Engle (1982)'s test for the 6^{th} order of ARCH effects. $^{+}$, $^{++}$, and $^{+++}$ indicate that the null hypothesis of no ARCH effects is rejected at the 10%, 5% and 1% levels respectively.

Table 2. Prices of world market, real exchange rate and regional market risks

	Constant	**RDIVM**	**VPRM**	**VRSP**	**VRTUS**
Panel A : *Price of exchange rate risk*					
Latin A.	0.567***	3.174	- 0.027	29.092*	8.539*
	(0.007)	(1.937)	(0.050)	(2.346)	(0.903)
Asia	0.875***	0.702	0.195*	10.305*	3.868*
	(0.067)	(0.610)	(0.016)	(0.739)	(0.284)
Panel B : *Price of world market risk*					
Monde	0.785***	19.122*	-0.153*	9.600*	0.451
	(0.034)	(3.118)	(0.036)	(1.728)	(1.079)

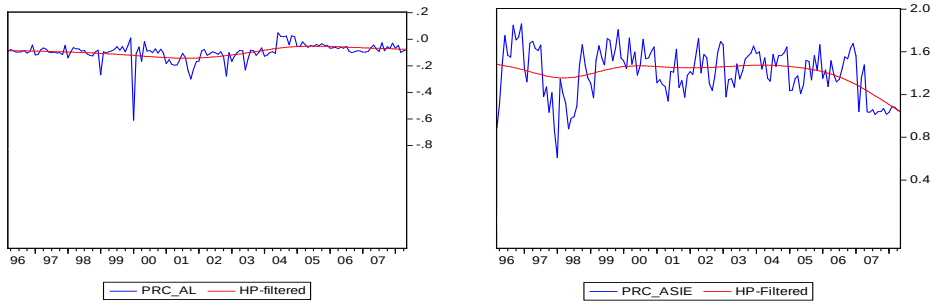
Table 3. Decomposition of the total risk premium

	PRR (%)	**PRW (%)**	**PRCT (%)**	**PRT (%)**
Latin America	0,347***	4.592*	5.593*	10.532*
	(0.200)	(0.000)	(0.155)	(0.000)
Asia	0.668**	5.245*	8.607*	14.520*
	(0.320)	(0.000)	(0.000)	(0.000)
World	-	6.751*	-2.400*	4.351*
		(0.000)	(0.000)	(0.000)

Notes: The total risk premium (PRT) is divided into world market risk premium (PRW), currency risk premium (PRCT) and residual regional risk premium (PRR).
$^{+++}$ indicates that the average risk premiums are significantly different from zero at the 1% level with respect to the two-sided Student-t test.

Figure 1. Exchange risk prices

1.1 *- Latin America* ***1.2*** **–** *Southeast Asia*



1.3 *- World Price of Market Risk*

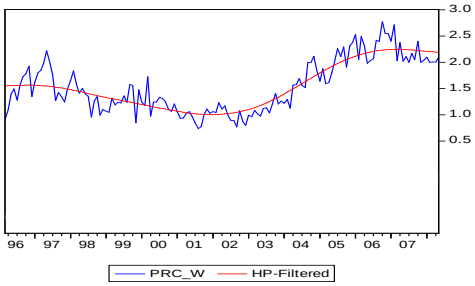


Figure 2. Prices of the regional risk

2.1*- Latin America* **2.2-** Southeast *Asia*

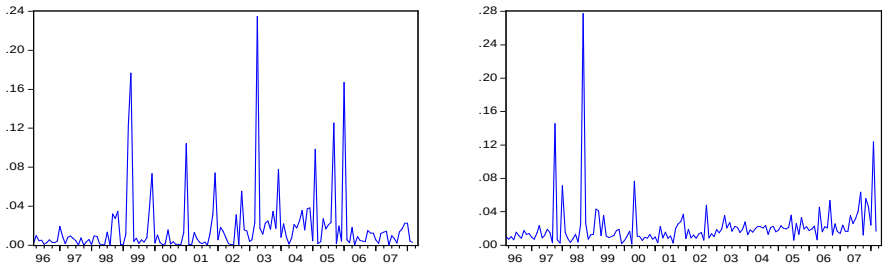


Figure 3. Evolution of risk premiums

3.1- Southeast *Asia* **3.2-***Latin America*