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On the Determinants of Equity International Risk Premium: Are Emerging Zones Different?

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Abstract

This article contributes to the financial literature by investigating the formation of the international stock risk premium in emerging market zones. Our results from the estimation of a dynamic augmented 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.

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1. Introduction

In finance theory, there exists a positive correlation between risk and return: at the market equilibrium the expected returns on riskier investments are higher. The expected return on any risky investment is equal to the sum of the risk-free rate and an extra return to remunerate for the risk. This excess return is called risk premium and the latter is a key element of most financial models and its estimation is required for most questions addressed by finance theory such as asset pricing and corporate capital budgeting. The finance literature offers several models to estimate the risk premium by matching return and risk expected on different investment opportunities. These models can be classified based on the hypotheses made regarding two issues: (1) market structure and (2) deviations from purchasing power parity (PPP).

Within the complete segmentation framework where only domestic risk factors matter, the capital asset pricing model (CAPM) and the arbitrage pricing theory (APT) have been introduced by Sharpe (1964) and Ross (1976) respectively. These domestic models have been extended to the international context under the hypothesis of complete market integration where only global risk factors matter; see Adler and Dumas (1983) for a synthesis. However, recent studies have shown that both domestic and international models are not appropriate to estimate risk premiums in most emerging markets since these models consider only the two extreme cases of complete segmentation and perfect integration, whereas emerging markets are likely to be only partially integrated into world markets [Arouri *et al.* (2012) and references therein]. Indeed, it is true that in recent years, emerging capital markets have experienced numerous changes including removal of investment barriers, economic reforms, introduction of country funds and depository receipts as well as other financial innovations and that these changes have increased the exposure of emerging markets to global risk factors as well as their degree of integration into the world market, however, since today's emerging markets are neither perfectly integrated nor strictly segmented [Bekaert and Harvey (1995) and Carrieri *et al.* (2007), Guesmi and Nguyen (2011), Arouri and *al.* (2012)]. It is thus interesting to empirically investigate the effects of these integrating changes on the formation of equity risk premium in emerging markets.

The other important issue is the hypothesis made on PPP. If PPP does not hold continuously, investing in foreign markets entails exposure to foreign exchange rate risks. Any investment in a foreign asset is a combination of an investment in the performance of the asset and an investment in the performance of the domestic currency relative to the foreign currency. In such a setting, exchange rate risk may be one of the important determinants of international expected asset returns and, therefore, the estimation of international risk premium requires augmenting the previous asset pricing models by the risk of deviations from PPP. In the empirical literature, numerous papers show that currency risk is priced in developed stock markets, but its contribution to total risk premium is economically weak [De Santis and Gerard (2003), Carrieri (2001) and references therein]. The findings from emerging markets are however less conclusive [see Tai (2007) and Arouri (2006)].

Compared to previous works on the estimation of equity risk premium in emerging markets [Adler and Qi, 2003; Guesmi, 2011; Carrieri and al. 2007; Guesmi and Nguyen, 2011], we develop and test an international conditional capital asset pricing model with segmentation effects in order to identify the determinants of risk premium and measure their contribution to the formation of the total premium. Our model allows for different market structures and for deviations from PPP. We estimate our model at the regional level rather than the individual country level. Although previous studies have provided a general understanding of the global integration process of individual emerging markets over the recent decades (Errunza and

Losq, 1985; Bekaert and Harvey, 1995; Carrieri and al., 2007; Pukthuanthong and Roll, 2009 Arouri and al., 2012), little attention has been paid to the dynamics of the integration of emerging market regions into the world market. However, regional cooperation has been intensified in recent years and regional integration has now become an undeniable trend thanks 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 pooling 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 private-sector and infrastructural development. Investors would gain access to a broader range of shares; issuers would gain access to a larger number of investors. 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. For example, the harmonization of stock market regulations and trading practices that would accompany any regionalization of exchanges could deepen regional integration more broadly in policy areas such as taxation, accounting standards, corporate governance, and legal practices (Okeahalam, 2001).

We estimate a multivariate version of BEKK-GARCH of Baba, Engle, Kraft and Kroner (1990) to specify the dynamics of the conditional second moments and determinate the contribution of each risk factor to the total premium. The model is estimated for the period March 1996-June 2008, simultaneously for five market regions: the world market and four emerging zones: Asia (Malaysia, Singapore, Sri Lanka, Indonesia and Thailand), Southeastern Europe (Bulgaria, Poland, Romania, Greece and Czech Republic), Latin America: Venzuela, Chile, Brazil, Argentina and Mexico and Middle East (Lebanon, Egypt, Jordan, Israel and Turkey).

Our findings show that unlike developed zones where the international risk premium is essentially determined by global risk factors, the international equity risk premium in emerging zones is rather 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 rest of the paper is organized as follows. Section 2 presents the model and introduces the econometric methodology. Section 3 describes the data. Section 4 reports the empirical results. Concluding remarks are in section 5.

2. Empirical methodology

Understanding the formation of international equity risk premium in emerging zones requires to answer two questions: i- Are these emerging zones perfectly integrated into the world markets, partially integrated or completed segmented? And ii- Is currency risk priced in these markets? We thus 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, $\mathrm{var}(\theta_{it}/\psi_{t-1})$:

$$E(R_{i,t}/\psi_{t-1}) = \lambda_{m,t-1}Cov(R_{i,t}, R_{m,t}/\psi_{t-1}) + \sum_{k\in\{L,A,E,M\}}\lambda_{k,t-1}Cov(R_{i,t}, R_{k,t}/\psi_{t-1}) + \lambda_{i,t-1}\,\mathrm{var}(\theta_{it}/\psi_{t-1})$$
$$\lambda_{m,t-1} = \exp(\delta'_m M_{m,t-1}) \tag{1}$$
$$\lambda_{k,t-1} = \exp(\gamma'_i R_{i,t-1})$$
$$\lambda_{i,t-1} = \exp(\delta'_k M_{k,t-1})$$

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 Gerard (1997) suggests that the price of risk is time varying. Furthermore, Merton (1980) 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 Gerard (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 = L (for Latin America), A (East Asia), E (East Europe), M (Middle-East). $\mathrm{var}(\theta_{it}/\psi_{t-1})$ captures the regional market undiversifiable risk uncorrelated to world risk. We measure this regional risk by:

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

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

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

where

$$\varepsilon_t = \left[\varepsilon_{mt}, \varepsilon^c_{Lt}, \varepsilon^c_{At}, \varepsilon^c_{Et}, \varepsilon^c_{Mt}, \varepsilon_{Lt}, \varepsilon_{At}, \varepsilon_{Et}, \varepsilon_{Mt}\right]\psi_{t-1} \sim N(0, H_t)$$
$$H_t = H_0 * (\tau\tau' - aa' - bb') + aa' * \varepsilon_{t-1}\varepsilon_{t-1}' + bb' * H_{t-1} \tag{4}$$

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

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

$\delta_{d,t-1}$ 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 9 equations: five equations to model the expected risk premium for the world equity market and the four studied emerging zones, and 4 equations to model the expected excess returns of the aggregate exchange rates of the four studied emerging zones against American dollar. Under the assumption of conditional normality, the log-likelihood function can be written as follows:

$$\ln L(\Omega) = -\frac{1}{2}\left[TN \ln(2\pi) + \sum_{t=1}^{N} \ln\left|H_t(\Omega)\right| + \sum_{t=1}^{N} \varepsilon_t'(\Omega) \mathrm{H}_t^{-1}(\Omega)\, \varepsilon_t(\Omega) \right] \tag{5}$$

θ is the vector of unknown parameters, T the number of observations and N the number of parameters to be estimated. To avoid incorrect inference due to the misspecification of the conditional density of asset returns the quasi-maximum likelihood (QML) approach of Bollerslev and Wooldridge (1992) is used. Simplex algorithm is used to initialize the process. Then, the estimation is performed using (BHHH) algorithm developed by Berndt et al. (1974).

3. Data and preliminary analysis

This study investigates the global integration process of four emerging market regions: Asia (Malaysia, Singapore, Sri Lanka, Indonesia and Thailand), Southeastern Europe (Bulgaria, Poland, Romania, Greece and Czech Republic), Latin America: Venzuela, Chile, Brazil, Argentina and Mexico and Middle East (Lebanon, Egypt, Jordan, Israel and Turkey).

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[2]. 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[3] (IFS) and the U.S. Federal Reserve databases[4].

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 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

[2] 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. .
[3] http://elibrary-data.imf.org/
[4] http://research.stlouisfed.org/

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. Their returns are computed from taking the difference in logarithm between two consecutive index values. By construction, the REER index also allows for cross-country comparisons of changes in trade competitiveness.

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)[5], 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

Table 1 reports the main statistics of return series for stock market indices and real exchange rate indices for four emerging regions considered. Examination of these statistics shows that average exchange rate returns range from -0.043% (Asia) to 0.454% (Middle East). All the series display departures from normality conditions and conditional heteroscedasticity.

Regarding the regional stock market returns, the statistics presented in Panel B of Table 1 indicate that the Emerging Latin American region has the highest average excess return (2.248%), followed by the Emerging Asia (2.074%), Emerging Middle East (1.744%), and Emerging Southeastern Europe (0.789%). The Emerging Latin America was the most volatile during the studied period in terms of standard deviation (10.040%), while the Emerging Middle East was the least volatile (7.312%). The skewness coefficients are positive for all the regions, except for the Emerging Asia. They are significantly different from zero for almost all regions, 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. Table 2 shows the autocorrelations and partial autocorrelations of squared excess returns on stock market indices and returns on real exchange rate indices. We note in particular that only the first-order autocorrelations are significant at the 5% level for stock returns, and at the 1% level for currency returns. This finding suggests that GARCH (1,1) parameterization for the second moments is appropriate.

4. Empirical results

First, we analyse the implied prices of risk associated with the world and the exchange rate factors. We compute a number of specification tests based on QML Wald statistics of Bollerslev and Wooldridge (1992) which are robust to departure from normality. Then, we

[5] 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.

analyse the implied total risk premium and its decomposition to premiums associated with the different risk factors. In our model specification, variations in risk premiums over time arise from two distinct sources since both the second moments and the risk prices are allowed to vary.

4. 1 Prices of world market and foreign exchange risks

Panel A of table 3 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). Note however that the excess dividend yield of the world market is not significant in the case of Latin America, Asia and Emerging Southeastern Europe. However, we employ the Wald test to investigate the null hypotheses that the price of exchange risk is zero and constant respectively. The obtained results, reported in Panel D of Table 3, indicate the rejection of these null hypotheses at the 1% level for all emerging regions considered. These findings are effectively in agreement with those of previous studies, including Carrieri et al. (2007) and Tai (2007), in that the exchange rate risk is a relevant factor of risk for asset pricing in emerging markets, and that they change over time. We finally examine the hypotheses of joint nullity and constancy of all the four prices of exchange rate risk and find evidence against their validity. The average of foreign exchange risk in Asia is positive. 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. Concerning the area of Southeast Europe, the currency price of risk registers negative values over the entire period studied and knows booms in times of crisis. Finally, for the Middle East, the price of risk is positive throughout the study period as in the case of the Asian region. But it is less volatile and its dynamics resemble that of countries in the region of Southeast Europe. It has two small expansions in the late 1990s, 2001 and 2005. The latter period was also marked by the second Gulf war (ie from 2003), and the instability affecting Eastern countries related to security problems in the region. The Middle East recorded another phase of expansion at the beginning of the year 2006 explained by the beginning of a phase of economic recovery. Concerning the world market risk, the coefficients associated with the US term premium, returns on S&P's 500 index, and variation in the yield of 1-month US Treasury bills are significant at the 10% level. The excess dividend yield of the world market has, however, insignificant effect on the evolution of the price of world market risk. Results of the Wald tests of nullity and constancy restrictions on the price of world market risk, reported in Panel E, clearly rejects the null hypotheses that the latter is equal to zero and constant, which confirms the findings of previous studies including Bekaert and Harvey (1995), Carrieri et al. (2007) and Guesmi and Nguyen (2011).

Figure 1 shows that 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. Results in Table 3 show that some of the estimated coefficients of regional information variables used to condition the regional prices of risk are significant. The robust Wald test indicates that the regional risk is significantly priced is all studied emerging regions, thus all these regions are partially segmented. However as shown in Figure 2 the dynamics of regional prices of risk are different from one region to another depending on regional specific factors.

Diagnostics of standardized residuals are provided in panel G. One can remark that the indexes of kurtosis are often lower than those for the returns reported in Table 1. However, the Jarque-Bera test statistics for normality indicates that the unconditional distribution of the conditionally normal GARCH process is not sufficiently fat-tailed to accommodate the excess kurtosis in the data. This result justifies the use of the QML procedures. As expected, there are not ARCH effects in the residual series. Taken together, our results show that the specification GARCH (1,1) we use is flexible enough to capture the dynamics of the conditional covariance matrix. In summary, the results in Table 3 show that both the world market risk and the currency risk are internationally priced and that their prices are variable over time for the four study areas. We also show that the prices of regional residual risks are significant indicating that these regions are only partially segmented into the world stock market.

4. 2 Risk Premium Analysis

Having estimated the prices of different risks and conditional second moments, we proceed to analyze the dynamics of premiums associated with different risk factors. As we retain as shown in Table 3 the assumption of partial segmentation for all regions, the total premium risk is formed by international factors (the risk premium on the world market and the exchange rate risk) as well as regional factors (regional market risk).The purpose of this section is to analyze the formation of the total premium risk. The total risk premium (PRT) is divided into world market risk premium (PRW), currency risk premium (PRCT) and residual regional risk premium (PRR):

Formally, the total risk premium for region i (i = L, A, E, and M) is given by

$$PRT_{i,t} = PRW_{i,t} + PRCT_{i,t} + PRCT_{i,t} \tag{6}$$

with

$$PRW_{i,t} = \Omega^{i}_{t-1}\lambda_{m,t-1}Cov_{t-1}(R^{c}_{it}, R^{c}_{mt})$$

$$PRCT_{i,t} = \Omega^{i}_{t-1}\begin{bmatrix} \lambda_{L,t-1}Cov_{t-1}(R^{c}_{it}, R^{c}_{Lt}) + \lambda_{A,t-1}Cov_{t-1}(R^{c}_{it}, R^{c}_{At}) + \lambda_{E,t-1}Cov_{t-1}(R^{c}_{it}, R^{c}_{Et}) \\ + \lambda_{M,t-1}Cov_{t-1}(R^{c}_{it}, R^{c}_{Mt}) \end{bmatrix}$$

$$PRR_{i,t} = (1-\Omega^{i}_{t-1})\lambda_{i,t-1}Var_{t-1}(\theta^{c}_{it},)$$

These risk premiums are calculated based on the estimation results from Table 3. The results are summarized in Table 4. 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 four emerging market regions (Latin America, Asia, Southeastern Europe, and the Middle East) and the world market over a “relative stable” period (1996-2008). The empirical approach we employ 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.

Our article suggests many potential avenues for further research. First, our sample can be extended to include more emerging countries in the regions we study. Second, it would be informative to extend our sample period to include the recent years characterized by high economic and financial instabilities. In terms of policy decisions, our empirical approach can be used to assess the consequence of reforms and liberalization on regional market integration and the cost of capital and to better understand regional versus global integration dynamics. Finally, the empirical approach we propose in this article can be extended to take into account asymmetries and nonlinearities which may characterize stock returns in emerging regions.

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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^{+++}
Southeastern Europe	0.019	0.056	-0.719	7.012	111.301^{+++}	13.692^{++}
Middle East	-0.11	5.159	0.491	4.210	14.944^{+++}	2.550
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^{+++}
Southeastern Europe	0.789	8.128	0.634	8.030	180.82^{+++}	22.696^{+++}
Middle East	1.744	7.312	0.155	9.020	224.82^{+++}	19.894^{+++}

Panel C: *local instrumental variables*	Latin America	Asia	Southeastern Europe	Middle East
Regional stock market returns				
Mean	1.042	0.992	1.025	1.072
Skewness	-0.809	-0.932	-1.143	-0.667
Kurtosis	8.451	8.024	8.0032	9.017
Inflation				
Mean	6.233	-75.262	-403.985	-279.820
Skewness	-3.147	-3.772	-11.873	-6.828
Kurtosis	40.944	33.845	142.932	90.666
Dividend Yields				
Mean	1.313	2.793	1.599	1.702
Skewness	-0.064	0.043	1.587	0.630
Kurtosis	2.035	2.943	4.881	3.733
Panel D: *global instrumental variables*	***VPRM***	***VRSP***	***VRTUS***	***RDIVM***
Mean	-0.081	0.556	0.305	-3.570
Skewness	-3.187	-0.106	-0.958	4.834
Kurtosis	17.960	2.934	5.415	30.400

Notes : Notes: L, A, E, and M identify the emerging market regions of Latin America, Asia, Southeastern Europe, and the Middle East. ARCH(6) is the empirical statistics of the Engle (1982)'s test for the 6th 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. Autocorrelation of squared market and exchange rate excess returns

Panel A*: Autocorrelation of stock market squared returns*

	World		Latin America		Middle East		Asia		Southeastern Europe	
Lag	**AC**	**PAC**	**AC**	**PAC**	**AC**	**PAC**	**AC**	**PAC**	**AC**	**PAC**
1	-0.450^{+++}	-0.450^{+++}	-0.492^{+++}	-0.492^{+++}	-0.483	-0.483	-0.524^{+++}	-0.524^{+++}	-0.531^{+++}	-0.531^{+++}
2	-0.075	-0.347	0.020	-0.292	-0.031	-0.345	0.194	-0.111	0.060	-0.310
3	0.070	-0.186	-0.057	-0.271	0.029	-0.234	-0.126	-0.099	-0.029	-0.234
4	-0.110	-0.266	0.029	-0.212	0.034	-0.114	-0.172	-0.374	0.053	-0.106
5	0.025	-0.255	0.010	-0.155	-0.089	-0.177	0.161	-0.180	-0.158	-0.276
6	0.080	-0.147	-0.056	-0.214	0.015	-0.186	-0.228	-0.356	0.103	-0.241

Panel B*: Autocorrelations of exchange rate squared returns*

	Latin America		Middle East		Asia		Southeastern Europe	
Lag	**AC**	**PAC**	**AC**	**PAC**	**AC**	**PAC**	**AC**	**PAC**
1	-0.008	0.008	0.051	0.051	0.474^{++}	0.474^{++}	-0.432^{+++}	-0. 432^{+++}
2	0.006	0.006	0.064	0.061	0.006	-0.028	0.038	0.0296
3	0.013	0.013	0.023	0.016	0.017	0.20	0.029	-0.234
4	0.011	0.011	0.019	0.013	0.010	-0.140	0.028	-0.106
5	-0.003	-0.004	0.016	0.012	0.0006	0.099	0.027	-0.276
6	0.005	0.005	0.016	0.012	0.003	-0.056	0.024	-0.241

Notes: this table reports the serial correlation and partial autocorrelation functions for excess stock market returns, and real exchange rate returns. ** and *** indicate the significance at the 5% and 1% levels respectively.

Table 3. 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)
S. Europe	0.896***	1.716	-0.117***	22.275*	-0.528
	(0.078)	(1.047)	(0.059)	(1.268)	(0.488)
M. East	0.965***	2.67***	-0.60*	17.453*	3.105**
	(0.011)	(1.566)	(0.040)	(1.788)	(1.150)
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)

Panel C: *Price of local market risk*

	Constant	RDIV	RML	VTI
Latin A.	0.127***	0.479	0.384	0.971
	(0.03)	(0.503)	(0.261)	(8.915)
Asia	0.337***	-0.915	0.656 **	-5.915
	(0.201)	(1.685)	(0.234)	(3.685)
S. Europe	0.221*	6.160	-0.773	0.399*
	(0.112)	(4.205)	(1.030)	(0.039)
M. East	0.977***	2.671*	0.535	1.990***
	(1.078)	(0.503)	(1.672)	(0.390)

Panel D: *Specification test of exchange rate prices of risk*

Null Hyothesis	χ^2	df	p-value
Is the price of exchange rate risk in the Emerging Latin America equal to zero? H_0: $\lambda_L = 0$	226.138***	5	0.000
Is the price of exchange rate risk in the Emerging Latin America constant? H_0 : $\lambda_L = 1$	459.321***	4	0.000
Is the price of exchange rate risk in the Emerging Asia equal to zero? H_0: $\lambda_A = 0$	405.32***	5	0.000
Is the price of exchange rate risk in the Emerging Asia constant? H_0: $\lambda_A = 1$	1068.065***	4	0.000
Is the price of exchange rate risk in the Emerging Southeastern Europe equal to zero? H_0: $\lambda_E = 0$	425.539***	5	0.000
Is the price of exchange rate risk in the Emerging Southeastern Europe constant? H_0: $\lambda_E = 1$	226.138***	4	0.000
Is the price of exchange rate risk in the Emerging Middle East equal to zero? H_0: $\lambda_M = 0$	449.53***	5	0.000
Is the price of exchange rate risk in the Emerging Middle East constant? H_0: $\lambda_M = 1$	141.610***	4	0.000
Are the prices of the exchange rate risks jointly null? H_0: $\lambda_i = 0$	116.692***	20	0.000
Are the prices of the exchange rate risks jointly constant? H_0: $\lambda_i = 1$	86.683***	18	0.000

Panel E: *Specification tests on world risk price*

Is the price of world risk equal to zero? H_0: $\lambda_E = 0$	220.839***	5	0.000
Is the price of world risk constant? H_0: $\lambda_E = 1$	337.270***	4	0.000

Panel F: *Specification tests on regional risk price*

Is the price of regional risk in the Emerging Latin America equal to zero? H_0: $\lambda_L = 0$	16.875**	4	0.000
Is the price of regional risk in the Emerging Asia equal to zero? H_0: $\lambda_A = 0$	11.468**	4	0.000

Is the price of regional risk in the Emerging Southeastern Europe equal to zero? $H_{0:}\ \lambda_E = 0$	8.381**	4	0.000
Is the price of regional risk in the Emerging Middle East equal to zero? $H_{0:}\ \lambda_M = 0$	10.639**	4	0.000

Panel G : *Analysis of residuals*

	Latin America	Asia	Southeastern Europe	Middle East	World
Skewness	0.399	0.006^{+++}	-0.026^{+++}	-1.498^{+++}	0.337^{+++}
Kurtosis	3.376^{+++}	3.356^{+++}	7.045^{+++}	1.677^{+++}	2.053^{+++}
J .B	154.94^{+++}	102.820^{+++}	95.748^{+++}	238.335^{+++}	7.107^{+++}
ARCH(6)	0.035	0.014	0.039	0.149	1.799

Notes: This table presents the estimation results of the system (3) for world market and four real exchange index returns. L, A, E, and M identify the emerging market regions of Latin America, Asia, Southeastern Europe, and the Middle East. Numbers in parenthesis are the associated standard deviations. JB and ARCH(6) are the empirical statistics of the Jarque-Bera test for normality and Engle (1982)'s test for conditional heteroscedasticity.$^{+++}$ indicate that the null hypotheses of normality and autocorrelation is rejected at the 1% level.

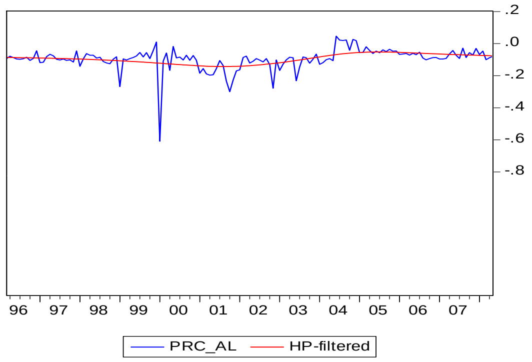
Table 4. Decomposition of the total risk premium

	PRR (%)	**PRW (%)**	**PRCT (%)**	**PRT (%)**
Latin America	0,347*** (0.200)	4.592* (0.000)	5.593* (0.155)	10.532* (0.000)
Asia	0.668** (0.320)	5.245* (0.000)	8.607* (0.000)	14.520* (0.000)
Southeastern Europe	0.001* (0.000)	1.203* (0.028)	3.544* (0.000)	4.768* (0.000)
Middle East	0.278* (0.000)	1.645* (0.000)	5.740* (0.000)	7.662* (0.002)
World	-	6.751* (0.000)	-2.400* (0.000)	4.351* (0.000)

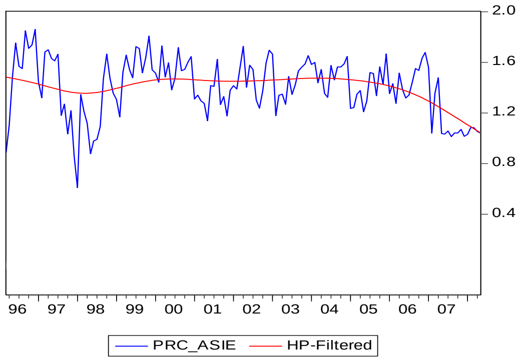
Notes: $^{+++}$ indicates that the average risk premiums are significantly different from zero at the 1% level with respect to the two-sided Student-t test.

Figure 1. Exchange risk prices

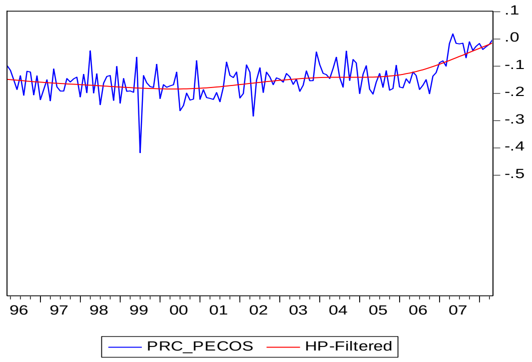
***1.1** - Latin America*



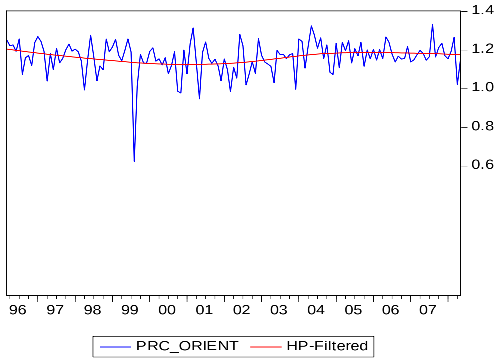
***1.2** – Southeast Asia*



***1.3** - Southeast Europe*



***1.4** – Middle-East*



***1.5** - World Price of Market Risk*

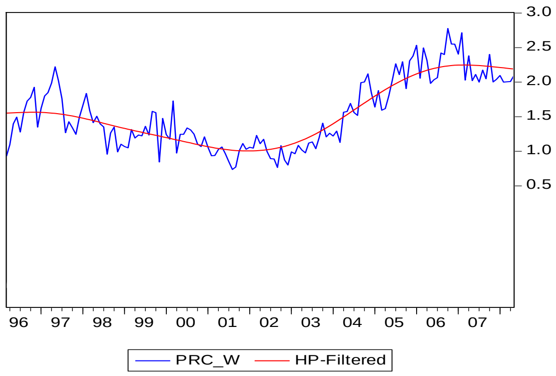
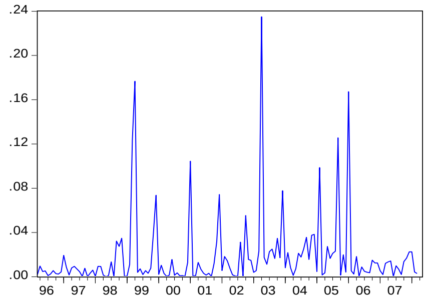
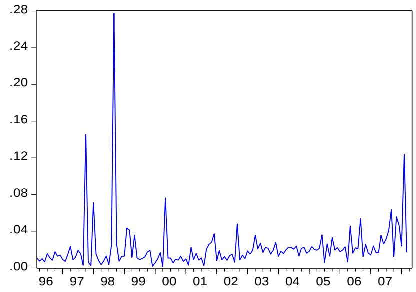


Figure 2. Prices of the regional risk

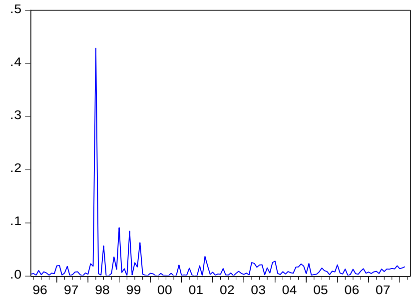
2.1*- *Latin America



2.2- Southeast *Asia*



2.3 - Southeast *Europe*



2.4- *Middle-East*

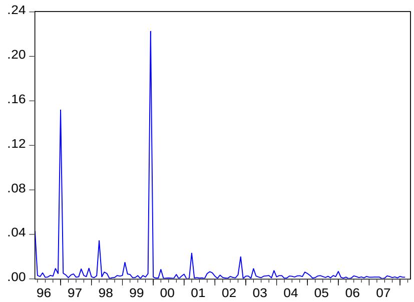
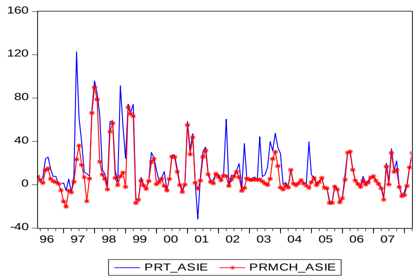
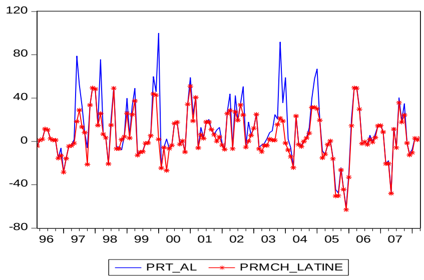


Figure 3. Evolution of risk premiums

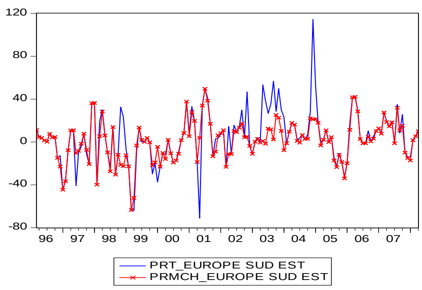
3.1- Southeast *Asia*



3.2-*Latin America*



3.3- Southeast *Europe*



3.4-*Middle-East*