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THE IMPACT OF THE FINANCIAL CRISIS ON THE CURRENCY RISK PREMIUM DYNAMICS WITHIN THE G20: EVIDENCE FROM THE ICAPM

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ABSTRACT:

This study tests an international extension of the Capital Asset Pricing Model (CAPM), integrating two sources of risk: the first is related to the international financial market and the second is related to the domestic market. Our model takes into account the financial integration dynamics of each domestic market with the international market. In this framework, the ICAPM is tested separately, depending on whether the markets are perfectly integrated or partially segmented. Through an application to the different G20 stock markets, we show that the currency risk premium in the ICAPM is statistically and economically significant and contributes to the total risk premium. Our findings also put forward the existence of a link between high volatility on financial markets and significant increases in risk premium, especially the one related to the exchange market since summer 2007.

JEL Codes: C32, F31, G12.

KEYWORDS: Currency risk, financial integration, G20, financial crisis, ICAPM, MVGARCH.

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INTRODUCTION

The global financial crisis that emerged in 2007 was first seen as a liquidity crisis. The high signing premium, the shortening of credit horizons and the narrowing, or even closure, of some market activities reinforce the idea that the severe perturbations on the interbank market in the second half of 2007 have also affected other segments of the financial markets during the year 2008 (Caballero and Simsek, 2009; Simsek, 2009).
According to a 2009 Bank of France's report (Bank of France, 2009), this crisis has also emerged as a crisis of securitization[2] techniques. Indeed, the collapse of the most dangerous forms of securitization has revealed that financial innovations in recent years have served, not only to improve diversification and risk management, but also to increase the volume of credit per fund unit holding.

Several measures have been taken to fix the international financial system in general and the interbank market in particular. The actions were mainly taken by the central banks that almost instantaneously decided on liquidity provisions and ensured their maximum diffusion in the entire financial system. In an attempt to manage the periods of tensions on the money and credit markets, these decisions have been reinforced by a closer monitoring of Banks and other financial institutions.
In addition to Central Bank Governors, leaders of different countries, and particularly those of the most important industrialized and emerging ones (The Group of Twenty, G20) have worked closely together to find a quick exit to this global crisis. The G20 was established in 1999, after the succession of financial crises in the 1990s, to favour international cooperation between industrialized countries and those with a fast growing economy. During their last meetings (November, 2008; April, 2009), the G20 countries have established a clear roadmap for the work to be undertaken mainly by the respective central banks to restore confidence in the financial system.

Among the objectives of our investigation, we aim at studying the impact of the global financial crisis on the G20 countries. More specifically, we seek to measure and analyze the evolution of various risk premia related to the stock and foreign exchange markets before and after the start of the crisis.
To do this, we use and test the international version of the Capital Asset Pricing Model (CAPM) of Adler and Dumas (1983) which incorporates the currency risk and the risk of the financial market portfolio. Originally, only the latter type of risk was taken into account in the CAPM of Sharpe (1964) and Lintner (1965), but its basic assumptions have been challenged because they are not empirically verified (Roll, 1977; Stulz, 1981; Brennan and Copeland, 1988; Giovannini and Jorion, 1989; Harvey 1991; Fama and French, 1992; Scheicher, 2000)[3]. This is particularly the case of the Purchasing Power Parity (PPP) assumption, which is often

[2] Securitization is an old effective technique which can easily refinance loans granted by financial institutions.

[3] For the Sharpe-Lintner model to hold internationally, Stulz (1981) demonstrates that some auxiliary assumptions must be made. Harvey (1991), note that the empirical implementation of the model takes the view of a global investor whose returns are calculated in U.S. dollars. In other words, the investor is unhedged in exchange rates. Fama and French, 1992, Scheicher, 2000, detect an unstable relationship between the risk premium and the systematic risk.

questioned, except possibly in the very long term (Rogoff, 1996). In fact, some international investors can gain access to goods at a price lower than the others because the law of single price is not met. This problem has been integrated into the new generation of CAPM[4] through the assumption of deviation from PPP. In this context, the model contains and currency risk premium measured by the covariance between variations in the real exchange rate and asset returns, in addition to the "classical" risk premium measured by the covariance between asset returns on the market portfolio.

Many previous studies have tested the significance of the currency risk premium, but the results are very heterogeneous. Most of these past papers focused on developed markets such as Adler and Dumas (1983), Dumas and Solnik (1995), De Santis and Gérard (1997, 1998), Carrieri (2001), De Santis et al. (2003). These authors tested the model under the assumption of perfect integration of financial markets and showed that the currency risk premium was significant and contributed greatly to the total risk premium. Papers arguing the significance of the currency risk premium in emerging markets are very rare (Adler and Qi, 2003). Overall, the conclusions are different from one study to the other and are subject to various criticisms in part because the choice of a given market is not always adapted to the retained assumptions. Tai (2003) tested the significance of the currency risk premium in some emerging Asian countries, assuming that the markets were perfectly integrated. But, this assumption can't be verified in these markets often characterized by a partial financial segmentation and with an inflation rate much more volatile than the exchange rate, unlike the case of developed countries. Taking into account the two international risks, the one from the world market portfolio and the other from the exchange rate, can lead to biased results. In such case, the significance of the currency risk premium can be due to the assumption regarding the perfect market integration: the local risk factors are excluded and appear in this case as a foreign exchange risk.
The methodologies used to test the ICAPM differ according to the studies and evolved over time to provide more robust results. Dumas and Solnik (1995) used the generalized method of moments (GMM) proposed by Harvey (1991). However, this method does not allow the matching of the expectations of investors regarding the temporal variation of the currency risk with their importance in relation to the global risk premium. The multivariate GARCH-M approach, used by De Santis and Gerard (1998), overcomes the problems raised previously by allowing international investors to study the dynamics of various risk factors and to quantify them in relation to the total risk on the stock market. We follow these authors and use the multivariate GARCH-M model to study the various risk premiums. We also assume that the PPP is not verified and that inflation rates are volatile.

Our study differs from the previous ones on two important points. First, the literature mentioned *supra*, which was interested to the ICAPM, is split in two

[4] Compared to the standard CAPM, the international CAPM contains an additional term related to the risk of exchange rate; the standard CAPM including only the market risk based on the covariance between the returns of the assets of portfolio market.

strands[5]; the first focusing on the developed markets and the second on the emerging markets. This partition of the literature appears inappropriate given the increasingly importance of emerging countries at odds of developed countries[6]. For this reason, the significance of currency risk should not be investigated without taking into account the emerging countries. Thus, we consider a sample of developed and emerging markets (G20 countries) with different economic and financial characteristics, what we expect should allow a greater homogeneity of results. Secondly, and this is the most important point, we take into account the different economic and financial crises; Mexican, Argentina, Asian, and especially, the global crisis that emerged in summer 2007, to test the significance of different risk premiums and to study their dynamics over time. This allows us to investigate the impact of the crisis on the G20 financial markets and the speed at which it spreads between different financial institutions.
The objective of this paper is thus to provide robust results regarding the significance tests of the currency risk premium and its possible contribution to the formation of the total risk premium, in different developed and emerging markets. Most previous studies have shown that the currency risk is remunerated internationally in case of developed markets, but the results are very different in the case of emerging markets. We investigate whether the framework of perfect market integration or partial market segmentation has an impact on the robustness of the results.

The rest of the article is organized as follows. Section 1 is devoted to the presentation of the CAPM and two variants tested; namely perfect integration and partial segmentation of financial markets. Section 2 presents the data and their main statistical properties. Section 3 reports the estimation results of the ICAPM and the last section summarizes the main findings of the study.

1. THE INTERNATIONAL VERSION OF THE CAPITAL ASSET PRICING MODEL

1.1. THE THEORETICAL MODEL

We present here the international CAPM under its two variants, perfect integration and partial segmentation, and the main reasons for introducing the currency risk premium in this model.
A risk premium represents the difference between expected return of a risky asset and a risk-free asset. In other words, there is a linear relationship between excess returns on each asset and market. However, the measure of this risk premium requires prior identification of the systematic and specific sources of risks. To account for currency risk and to predict its eventual shortfall, the investor must focus on future variations of the exchange rate in order to anticipate for example a possible depreciation of the local currency. Hedging this risk requires a premium associated

[5] Little articles studying both developed and emerging economies. Carrieri et al. (2006a) study the G7 Countries, six emerging markets in Latin America, six emerging markets in Asia plus Greece, Kong Kong and Singapore. But, they have measured the risk premium for each country separately. In our study the risk premium is measured jointly for the all emerging and developed countries.
[6] According Benassy-Quéré et al. (2009), the emerging countries play an important role in the financing of the US current-account deficit. Carrieri et al. (2006), it is widely believed that the emerging markets risks were spilling into the broader global capital market (through the economic and financial crises).

with the unanticipated exchange rates fluctuations. This currency premium is at the root of the difference between the two versions of the CAPM: classical and international.

The article of Adler and Dumas (1983) is frequently considered as the reference in respect of the international version of the asset pricing model with perfect financial integration. However, some financial markets, especially emerging countries, can be better characterized by partial segmentation. In such case, it is necessary to extend the relation presented by Adler and Dumas (1983) to the more general case of partial segmentation.

Originally, Sharpe (1964) and Lintner (1965) present an asset pricing model where only the risk of market portfolio is taken into account. The model considers that the expected excess return of a financial asset is proportional to the systematic risk of the asset, measured by its covariance with the return of the market portfolio[7]. According to Harvey (1991a), Bekaert and Harvey (1995) and De Santis and Gerard (1997, 1998) in the market integration case, the conditional version of CAPM is written as follows:

$$E(R_{i,t}^{l} / \Psi_{t-1}) - R_{f,t} = \lambda_{m,t-1} Cov(R_{i,t}^{l}, r_{m,t} / \Psi_{t-1}) \quad (1)$$

where $R_{i,t}^{l}, R_{f,t}, r_{m,t}, \lambda_{m,t-1}$ and Ψ_{t-1} respectively denote the return of any financial asset *l* (in country *i*), the risk-free rate, the return of the market portfolio, the price of the global market risk and the informational set available to the investors at the end of period *(t-1)*.

In the opposite case of strict market segmentation and under the same assumptions of equation (1), we have the following relation:

$$E(R_{i,t}^{l} / \Psi_{t-1}) - R_{f,t} = \lambda_{i,t-1} Cov(R_{i,t}^{l}, R_{i,t} / \Psi_{t-1}) \quad (2)$$

Where $R_{i,t}$ and $\lambda_{i,t-1}$ are respectively, the return of the local market portfolio and the local price of risk. Here, the risk premium is determined by the covariance between asset returns *l* ($R_{i,t}^{l}$) and the local market portfolio return in country *i* ($R_{i,t}$) multiplied by the local price of risk ($\lambda_{i,t-1}$). At the national level, the expected excess return is determined by the variance of returns in that market times the price of variance:

$$E(R_{i,t} / \Psi_{t-1}) - R_{f,t} = \lambda_{i,t-1} Var(R_{i,t} / \Psi_{t-1}) \quad (3)$$

Assuming now that PPP is not verified and that inflation rates are random and vary from one country to another, the premium related to foreign currency risk should be incorporated into the model (1).

Note that while variations in exchange rates are much higher than those related to inflation in the case of developed markets, for many emerging countries, the local

[7] The difference between the expected return of financial assets and return on a risk-free rate (government bond, for example) represents the risk premium.

inflation rate is very volatile. We therefore must find a way (i) to take into account the specificity of each country, emerging or developed, and (ii) to include both the inflation volatility and the exchange rates variations in our model.
It is then necessary to determine what exchange rate should be to obtain a single result for all types of markets (emerging and developed). In fact, the local inflation of country *i* expressed in the currency of reference can be approximated by the variations of the real exchange rate (for example, Bar and Priestley, 2004; Hardouvelis et al., 2006). Taking into account this approximation and assuming that the distributions of returns of assets vary over time, the following conditional version of ICAPM (Adler and Dumas, 1983) is obtained under the assumption of perfect financial integration:

$$E(R_{i,t} / \Psi_{t-1}) - R_{f,t} = \lambda_{m,t-1} Cov(R_{i,t}, r_{m,t} / \Psi_{t-1}) + \sum_{k=1}^{L} \lambda_{t-1}^{k} Cov(R_{i,t}, r_{k,t} / \Psi_{t-1}) \quad (4)$$

Where $r_{k,t}$ is the variation of the exchange rate against the currency of the reference country and λ_{t-1}^{k} is the price of foreign exchange risk of currency *k*. All returns series are expressed in terms of the currency of the reference country. This version of the ICAPM shows that the excess return of any asset is a linear function of the covariance of asset returns with the portfolio of international market and its covariance with the variations in exchange rates. According to Bekaert and Harvey (1995,1997), Griffin (2001), Gerard et al. (2003), Karolyi and Stulz (2002), Barr and Priestley (2004), Hardouvelis et al (2006), the extreme situation of perfect integration is a purely theoretical case that does not comply with the reality of financial markets. In such case, the model adopted is a mixed relationship, which combines the influence of international market and exchange rates and that of the domestic market in the asset valuation. Both equations (3) and (4) allow us to write equation (5) as follows:

$$\begin{aligned} E(R_{i,t} / \Psi_{t-1}) - R_{f,t} = {} & \lambda_{m,t-1} Cov(R_{i,t}, r_{m,t} / \Psi_{t-1}) + \sum_{k=1}^{L} \lambda_{t-1}^{k} Cov(R_{i,t}, r_{k,t} / \Psi_{t-1}) \\ & + \lambda_{i,t-1} Var(R_{it} / \Psi_{t-1}) \end{aligned} \quad (5)$$

1.2. ECONOMETRIC SPECIFICATION AND ESTIMATION STRATEGY

Here we present the econometric model used to estimate the conditional version of the ICAPM. Starting from the model described by equation (4), under the hypothesis of perfect integration and at each point of time, the following equation describes the excess return of local market:

$$r_{i,t} = \lambda_{m,t-1} h_{im,t} + \sum_{k=1}^{L} \lambda_{t-1}^{k} h_{k,t} + \varepsilon_t \qquad \varepsilon_t / \Psi_{t-1} \sim N(0, H_t) \quad (6)$$

Where $r_{i,t}$ denotes the vector of excess return of national equity portfolios, $h_{m,t}$ is the conditional covariance between each asset and the market portfolio, $h_{k,t}$ represents the conditional covariance between each asset and the variation of exchange rate, ε_t is the vector of conditional error terms and H_t is the conditional covariance matrix of asset returns. The conditional variance-covariance matrix of

excess returns H_t is given in (7). This approach, originally suggested by Baba et al. (1990), was synthesized by Engle and Kroner (1995) who suggested the following specification called *BEKK (p, q, K):*

$$H_t = C^{*'}C^* + \sum_{k=1}^{K} A_k^{*'} \varepsilon_{t-1} \varepsilon_{t-1}^{*} A^* + \sum_{k=1}^{K} B_k^{*'} H_{t-1} B_k \qquad (7)$$

Where p=1, q=1 and *K* is the number of assets. C^*, A^* and B^* are matrix of size ($N \times N$) and C^* is the symmetric matrix, it ensures the positivity of the variance-covariance matrix H_t. The multivariate GARCH model allows components of the variance-covariance matrix to vary over time depending on products of shocks ε_t observed in the past values of H_t.

In the case where markets are partially segmented, the relation (5) can be written as follows:

$$r_{i,t} = \lambda_{m,t-1} h_{m,t} + \sum_{k=1}^{L} \lambda_{t-1}^{k} h_{k,t} + \lambda_{i,t-1} h_{i,t} + \varepsilon_t \qquad \varepsilon_t / \Omega_{t-1} \sim N(0, H_t) \qquad (8)$$

Where h_{mt} , $h_{k,t}$, $h_{i,t}$ are the columns of the variance-covariance matrix H_t of size (N * N) measuring the risk exposures of the world market, the currency risk and local market risk.

The relation (8) incorporates the price of a risk related to the international market, to the exchange rate and to the local market. De Santis and Gerard (1997) and Gerard et al.(2003) show that these prices vary over time. The international market risk price reflects the aggregation of the risk aversion of all investors. The later being supposed adverse to risk, the price should be positive whatever the time t (see for example, Adler and Dumas, 1983; Harvey, 1991; Bekaert and Harvey, 1995; De Santis and Gérard, 1997, 1998; De Santis et al., 2003). Consequently, it is modelized as an exponential function of some information variables related to aggregate macroeconomic and financial global market:

$$\lambda_{m,t-1} = Exp\left(\delta_m^{'} X_{t-1}\right) \qquad (9)$$

Where $X_{t-1} \subset \Omega_{t-1}$, X_{t-1} denotes all the information on global variables available at *(t-1)* and $\delta_m^{'}$ represents the weights associated with these variables.

The price of local market risk is then written as follows (Dumas and Solnik, 1995; De Santis and Gérard, 1997, 1998; De Santis et al., 2003; Adler and Qi, 2003):

$$\lambda_{i,t-1} = Exp\left(\gamma_i^{'} Z_{t-1}^{i}\right) \qquad (10)$$

Where Z_{t-1}^{i} is the vector of local variables of information observable on the market *i* at *(t-1)* and $\gamma_i^{'}$ represents the weights associated with these variables.

The price of currency risk can theoretically take positive values or negative ones. It is supposed to vary as a linear function of instrumental variables:

$$\lambda_{t-1}^{k} = Exp\left(\delta_i^{'} X_{t-1}\right) \tag{11}$$

Where $\delta_i^{'}$ is the weight of each variable in the vector X_{t-1}.

Finally, the estimation of the ICAPM is done by the maximum likelihood method. Assuming that the residuals are Gaussian, the log-likelihood function is written as follows:

$$\ln L(\Phi) = -\frac{T}{2}\ln(2\prod) - \frac{1}{2}\sum_{t=1}^{T} \ln\left|H_t(\Phi)\right| - \frac{1}{2}\sum_{t=1}^{T} \varepsilon_t(\Phi)^{'} H_t(\Phi)^{-1}\varepsilon_t(\Phi) \tag{12}$$

Where Φ is the vector of unknown parameters and *T* is the number of observations. As the assumption of normality is often violated in the case of financial series, the model is estimated by the quasi-maximum likelihood (QML). Under standard conditions of regularity, the QML is asymptotically normal.

2. DATA AND PRELIMINARY ANALYSIS

Our study focuses on the G20 economies which includes the major industrialized and emerging countries: Argentina (ARG), Australia (AUS), Brazil (BRA), China (CHN) Canada (CND), the Euro Area (EUM), France (FR), Germany (GER), India (IND), Indonesia (IDN), Italy (ITA), Japan (JP), Korea (KOR), Mexico (MEX), Russia (RUS), South Africa (SA) Saudi Arabia (SB), Turkey (TUR), United Kingdom (UK) and the United States (U.S.).

Three groups of data are considered: series of stock market returns in each area and for the world market, series of exchange rates expressed vis-à-vis the U.S. dollar, as well as macroeconomic and financial variables used to condition the estimation of the price of risk and the degree of integration. Data are monthly, and the period extends from January 1993 to November 2009 (except for China: 1994 to 2009; Russia and Saudi Arabia: 1998 to 2009).

Stock indexes are calculated including dividends, and are extracted from the *Morgan Stanley Capital International* (MSCI) database. Stock market returns are defined as $R_{i,t} = ln\left(P_{i,t} / P_{i,t-1}\right)$ where $P_{i,t}$ is the stock market index at time *t* (including dividends). Returns are monthly percentage, denominated in USD. The excess return of each index is calculated from the one-month Eurodollar deposit rate.

Real exchange rates series of all countries are expressed against the U.S. dollar. These data are from the *Federal Reserve Bank of Saint Louis*.

Some descriptive statistics are presented in Table 1. The column 2 of this table includes the average and standard deviation of stock returns for the G20 countries and the world market. The table also includes descriptive statistics for information variables that will be used in order to condition the factors of the estimated prices of risk. The choice of these variables is a very important issue from both empirical and theoretical point of view. According to Dumas and Solnik (1995), the theory of equilibrium model of financial assets fails in the specification of these information variables. From an empirical point of view, the choice of information variables has a significant impact on the results. Like most previous studies (Harvey, 1991; Ferson and Harvey, 1993; Dumas and Solnik, 1995; De Santis and Gerard, 1997, 1998; De Santis et al., 2003; Gerard et al, 2003; Hardouvelis et al., 2006), to condition the estimated price of world market risk and price of risk associated with unexpected fluctuations of real exchange rates, plus the constant term the following factors have been retained:[8] the first lag of the world market dividend yield in excess of the 1–month Eurodollar deposit rate (*EXWDY*), the first lag of the change in the term spread (*TERMSPRD*), the first lag of the default spread (*DEFSPRD*) and the first lag of return on a U.S treasury certificate to 1 month (*VEURODO*).
The term spread is the difference between a long rate (10-years U.S. bond yield) and short interest rate (3 months U.S. bill)[9]. Concerning the default spread, it is measured by the difference in yields between bonds rated Baa by Moody's and Aaa bonds yield. Practitioners define the default spread as the difference between the yield to maturity and the expected bond yield (Bekaert and Harvey, 1995; Hardouvelis et al., 2006). All these information variables are taken from Datastream and the Federal Reserve Bank of Saint Louis. They are used with a lag to excess returns.

Concerning the risk of local market of each country, a set of information variables is determined on the basis of previous studies (see for example, Bekaert and Harvey, 1995; Gerard et al., 2003; Hardouvelis et al., 2006). In addition to the constant term we retain: the first lag of excess equity returns *(RRI)*, the change of real exchange rate *(VTCR)*, the local market dividend yield *(DY)*, the first lag of the change in interest rates in the short term *(VTIC)* and the first lag of the change in the local term spread (*TERM*). All these information variables are taken from Datastream. They are summarized in the following table:

[8] The Dickey Fuller test was applied on all variables to detect a possible problem of nonstationarity. The application showed that all series are stationary.
[9] The analysis described by Korajczyk (1985) highlights on the interest rate differential as an argument to explain the foreign exchange risk premium.

SUMMARY TABLE OF ALL VARIABLES AND THEIR NOTATIONS

Variables	Description
• $R_{i,t}$	Local equity market return
• EXWDY	The first lag of the world market dividend in excess of the 1-month Eurodollar deposit rate
• TERMSPRD	The first lag of the change in the term spread
• DEFSPRD	The first lag of the default spread
• VEURODO	The first lag of return on a U.S treasury certificate to 1 month
• RRI	The first lag of excess equity return
• VTCR	The change of real exchange rate
• DY	The local market dividend yield
• VTIC	The first lag of the change in interest rate in the short term
• TERM	The first lag of the change in the local term spread

3. EMPIRICAL RESULTS

In this section we present all estimation results of the ICAPM. Firstly, the price of currency risk and financial markets (international and local) are analyzed. Then, we present the estimation results of the model under the assumption of perfect financial integration: the local market risk is not taken into account for the G20 countries. Only the risks related to the world market and to the unanticipated fluctuations in real exchange rate are considered. Finally, the model is re-estimated under the assumption of partial segmentation of financial markets. In this case, the total risk premium is determined by the risk premium of the world market, all exchange rate risk premiums and the risk premium of the local market portfolio.

3.1. ANALYSIS OF RISK PRICES

Price of currency risk

The price of currency risk in each country is estimated by expressing the real exchange rate variations as a linear function of four international instrumental variables. This price of risk is subsequently used to calculate the currency risk premium for each country as defined in equation (4) of the ICAPM. The estimation results are reported in Table 2.a. It appears from these results that the risk prices of real exchange rates are poorly explained by the international instrumental variables. They are determined mainly, in addition to the constant and the lagged endogenous variable, by the first lag of the world market dividend yield in excess of the 1–month Eurodollar deposit rate (*EXWDY*) for Argentina, Canada and Mexico. The first lag of return on a U.S treasury certificate to 1 month (*VEURODO*) also plays an

important role especially for some developed countries of the G20 (Australia, Canada and Japan)[10].

Overall, for all G20 countries, the instrumental variables explain between 4% (South Africa) and 47% (Korea) of the variation in the exchange rate risk price. The quality of fit is better for the EUM (30%) compared to its member countries (France, Italy, Germany), which does not exceed 20%. This can be explained by the fact that the European market representing the average of the area, it is closer to the world market, compared to member countries. Likewise, the objective of European monetary policy is to create a currency well listed on the exchange market which takes into account all information from the international market and representing a good competitor to the U.S. dollar (Bank of France, 2008).

The four information variables explain better the variations of currency risk prices of some G20 countries that have experienced economic crises during the 1990s and early 2000s such as Mexico, Korea and Argentina.

For all the G20 countries, the Wald test of the null hypothesis of no significance of coefficients was applied. Column 6 of Table 2.b reports the results and shows that all coefficients are significantly different from 0.

The prices of currency risk of different countries are reported on Figure A.1. For all countries studied, the price of risk specific to unanticipated variation of real exchange rate reacts significantly to the economic and financial events, such as the different monetary and financial crises in Latin America and Asia in 1995, 1997 1998 and 2001. This is also the case for terrorist attacks against the United States in 2001, as well as the world crisis emerged in August 2007 in the real estate and exacerbated by the collapse of U.S. bank Lehman Brothers in September 2008.

To investigate the cyclical behaviour of currency risk prices, we apply the Hodrick-Prescott filter. This reveals several phases of expansions and recessions, especially during the world crisis of 2007-2009 and regional crises (Figure A.1). The price of currency risk is positive for 6 countries during the entire study period (Saudi Arabia, Argentina, Brazil, India, China and Korea) and in average negative for 5 other countries (Euro Area, France, Germany, Italy and Japan). The filtered series of currency risk prices show that they follow a downward trend for some G20 countries (Australia, Mexico, USA) and a tendency to stability for other countries (Turkey, South Africa, Russia). The first observation we can make is that emerging markets exhibit more important fluctuations in exchange rates and foreign exchange risk than the developed countries, especially the Euro Area and its 3 members listed among the G20. This can be explained by the stability and the competitivity of the euro against the dollar since the beginning of the 2000s which might encourage international investors to privilege the European market compared the U.S. market. The price of currency risk of U.S. takes positive and negative values during the study period. Indeed, the net external balance of this country continues to deteriorate since the 1990s. Japan's situation is exactly the opposite with a strong increase in net external balance as well as phases of increasing productivity.

About the emerging markets, Brazil and Argentina are the countries that experienced respectively in 1998 and 2002 several depreciations peaks of their currencies. The case of Brazil refers to this country national crisis in early 1998 under the impulsion

[10] Results of residual tests are presented in Table 2.b. Faced with the problem of autocorrelation for some G20 countries, we have re-estimated the model by adding the lagged endogenous variable among the explanatory variables (DPR in Table 2a). This method has improved the results of tests on the residuals for many countries of the G20.

of the Asian financial crisis of 1997. It is in July 2002 that the real reached its lowest historical level[11]. The Brazilian crises propagated to Argentina in 2002 which in turn experienced a very severe crisis[12]. India and Korea have the same profile namely that their currency dropped sharply during the outbreak of the Asian crisis of 1997, followed by several phases of important fluctuations.

Price of world market risk

We now analyse the price of world market portfolio risk. The results of the exponential regression in function to international instrumental variables are reported in Table 2.a. These variables explain 31.52% of the variance of the model. In addition to the constant and the lagged endogenous variable, the first lag of return on a U.S treasury certificate to 1 month (*VEURODO*) contributes to the explanation of the price of risk related to the international market. All tests have been applied to the residuals and show that they have the good properties, except a slight problem of autocorrelation of order greater than 1.
According to Figure A.2, the price of risk is very volatile especially in the late of 1990s and after 2001. The application of the Hodrick-Prescott filter reveals two phases of expansion in 1996-1998 and from 2003 until late 2009. Thus, we note a greater impact of the crisis linked to terrorist attacks against the U.S. (from late 2001) and the subprime crisis (2007) on the international market, compared to the two Asian and Latin America crises (1990s). This may be explained by the share of the developed markets in the international market.

Price of local risk

Finally, the last component related to the risk of unanticipated fluctuations in economic aggregate and monetary market in each local area is analyzed. The price of local risk is estimated as an exponential function of instrumental variables related to domestic market: a constant, the first lag of excess equity returns *(RRI)*, the first lag of the change in real exchange rate *(VTCR)*, the local market dividend yield *(DY)*, the first lag of the change in interest rates in the short term *(VTIC)* and the first lag of the change in the local term spread (*TERM*). The estimation results show that the coefficient of adjustment is different from one country to another, varying between 1% (Great Britain and Turkey) and 50% (Italy)[13].
The prices of risk are reported on Figure A.3. The analysis of the overall trend of the filtered series highlights that (i) for some G20 countries, especially the most developed countries (USA, Euro Area, France, Germany, Italy), the price of local risk exhibits a similar pattern to that of the world market, with two phases of expansion in 1996-1998 and 2003-2009, (ii) for some other G20 countries, the price of local risk is low throughout the study period, but relatively volatile with slight peaks (Australia, Great Britain, South Africa, Turkey , Indonesia), (iii) for Korea and Russia, the impact of the world crisis which started in 2007 is much larger compared to that of the economic and financial crisis appeared in both countries in 1998 (Figure A.3) and (iv) unlike these two last countries, the impact of the Mexican

[11] Brazil has experienced a sharp devaluation of their currency by about 30% following the 1998 crisis.
[12] The depreciation of the Argentine peso in 2002 has reached 44%.
[13] The estimation results are available upon request to the author. They are not reported here in order to save space.

crisis on the price of local market risk is much higher than the current world crisis (Figure A.3).

3.2. PERFECT INTEGRATION OR PARTIAL SEGMENTATION

The purpose of this paragraph is to answer the question asked at the beginning of this study regarding the significance and importance of the currency risk premium taking into account the level of international financial integration of each country. In this context, equations (4) and (5) are estimated separately, depending whether the financial markets are perfectly integrated in the world market or partially segmented. Recall that earlier works were each other distinguable by the type of assumptions about the degree of financial integration (for example, Dumas and Solnik, 1995; De Santis and Gerard, 1998; Carrieri, 2001; De Santis et al., 2003; Tai, 2004). Our investigation differs from the previous works on two points. First, we rely on a large panel of 20 countries, emerging and developed. Second we test the ICAPM depending on whether markets are perfectly integrated or partially segmented. Our estimation results allow us (i) to determine for each country the hypothesis that best suit its local market, (ii) to study the possible existence of a link between the different sources of risk in the G20 countries (developed or emerging) and the level of financial integration and (iii) subsequently to analyze the importance of different risk premiums in explaining the formation of the total risk premium.

3.2.1. Perfect integration

We place ourselves under the assumption of perfect integration of financial markets in the world market and assume that the prices of risk and their variances can vary over time. The perfect integration hypothesis means here that a single model is valid for all financial assets, including the world market portfolio. In this case, there is only one source of risk coming from the international financial market: the internal factors are neglected and only the international factors are taken into account. Table 3 reports the results of the estimation of equation (4) by the quasi-maximum likelihood method, linking the total risk premium, the risk premium of international market and the premium related to unanticipated variation of the real exchange rate[14].

Regarding Table 3, we find that for 15 countries of G20, the total risk premium is determined by a constant, the risk premium of the world market and the currency risk premium. Indeed, all coefficients are significantly different from 0 at the 1% significance level and the two risk premia retained here contribute to the formation of the total premium. We also note that for all G20 countries, the coefficient affected to the currency risk premium is significantly different from 0 and positive. This is an evidence of a positive relationship between the currency risk premium and the total risk premium, thus demonstrating the existence of a growing relationship between the two risk premia.

[14] The premium for currency risk is the product between the prices of currency risk, estimated and analyzed above, and the terms of covariances between equity returns of differents countries and their exchange rate vis-à-vis the U.S. dollar. The risk premium of international market is the product between the price of global market risk and the covariance term between the equity return of local market and that of the global market.

Regarding the coefficient assigned to the risk premium of the world market portfolio, it is negative for 6 countries, mostly emerging economies: Brazil, Indonesia, Saudi Arabia and Korea. The explanation can be linked to the significance of the currency risk premium, which represents here the largest component of total risk premium, but can especially be linked to the adequacy of the assumption of perfect financial integration to cases of these emerging markets, for which the process of financial integration is not yet completed[15]. Since the exchange rates are linked to macroeconomic aggregates that characterize the economical situation of each country, it is possible that under the assumption of perfect integration, the risk of local market appears indirectly in the form of an currency risk.
The Wald test is applied to the different coefficients to determine the possible existence of constraints on the coefficients of both the exchange and the international market risk premia. It allows us to check whether the different risk premia contribute significantly to the explanation of the total risk premium. The estimation results are reported in the second part of Table 3. We note that the currency risk premia of all countries are significantly different from 0 (column 6 of Table 3): The currency risk premia of the different countries significantly contribute to the formation of the total risk premium, reflecting the opening of G20 countries over the world and the important role played by the currency risk in making decisions regarding the investment projects abroad. We also applied a test of constancy of the risk premia. The null hypothesis is rejected for the premium market risk, indicating that it evolves over time for all the countries. The last column of Table 3 also indicates that the currency risk premia are all significantly and jointly non-constant at the 5% significance level.

To sum up, the risk premium associated with unanticipated fluctuations in real exchange rates of all countries of the G20 are significantly different from 0 and contribute to the formation of the total risk premium. We must also note a difference between developed and emerging countries. For the latter, the coefficient assigned for the risk premium of world market is either negative or not significant as in the case of Argentina. Some countries like Brazil, Indonesia, Saudi Arabia and Korea have a negative relationship between the total and the global market risk premia; But according to the financial theory and to previous empirical studies (for example, Harvey, 1991; Ferson and Harvey, 1993; De Santis and Gerard, 1997, 1998; De Santis et al., 2003; Carrieri et al., 2006a), in most countries, the risk premium of market portfolio contributes significantly to the determination and formation of the total risk premium. Thus, as we previously explained, the assumption of perfect integration used here may be too strong for some emerging markets. We propose now to re-estimate the ICAPM under the assumption of the partial segmentation of financial markets that offers the possibility to better specify the risk factors and explain their dynamics. This hypothesis will allow us to test whether the risk of local market is better remunerated by international investors than the risk of exchange rate.

[15] Guillaumin (2009) explains that some emerging Asian countries have a low integration with the global market.

3.2.2. Partial segmentation

We now suppose that stock markets are partially segmented. The total risk premium is then a combination of international and national factors of risks. In addition to the risk premium of the world market portfolio and the currency risk premium, we add the risk premium linked to the local market portfolio. This second hypothesis allows (i) to check if the currency risk premium is still significant for the G20 countries, and contributes to the formation of the total risk premium, (ii) to study the significance of the risk premium in the local market, and (iii) to check subsequently, if the hypothesis of partial segmentation might be best suited for most of the G20 countries against the assumption of perfect integration.

The estimation results for each market are reported in Table 4. All currency risk premia are significantly different from 0 at the significance level 1%. All coefficients are positive, except for Japan. As for the perfect integration case, there is evidence of a positive relationship between the currency risk premium and the total risk premium, illustrating the existence of a growing relationship between these two risk premia. The risk premium of local market is significant for all G20 countries but 3 (Australia, Euro Area and Mexico), and the corresponding coefficient is positive for 15 countries (Table 4). As for the currency risk premium, the hypothesis of partial segmentation also highlights a positive relationship between total and local risk premia.

The risk premium of the world market portfolio is significant for all G20 countries except for three developed economies (France, Germany and the United States). For these three countries, this version of ICAPM tested under the hypothesis of partial segmentation, with a level of integration stable over time, seems not suitable[16]. Specifically, these three markets are the most industrialized and more related to the international market. Consequently, they are facing much important risk from outside than other emerging countries for example. Thus, the total risk premium must be explained in large part by the risk premium linked to the world market.

In order to study the dynamics of the different risk premia, the Wald test is applied to the corresponding coefficients. Overall, we find that they are significantly different from 0, except for China. The null hypothesis of constancy of currency risk premium is rejected for all countries, indicating that this currency premium changes considerably over time. Figure A.4 allows us to confirm the results of the Wald test. Indeed, the currency risk premium varies over time and responds significantly to economic and financial crises. The most significant evolutions appear during the world crisis emerged from the summer of 2007. During the period 1993-2007, this risk premium is weakly volatile for 6 developed countries (Australia, Canada, the Euro Area, Germany, Great Britain, the United States) compared to the others, mostly emerging and which have already known regional economic crises (Argentina, Korea, Mexico, Russia, Turkey, Indonesia). Then, a high volatility

[16] The estimation results showed that the risk premium of the global market is not significant for three developed markets (France, Germany and the United States) under the assumption of partial segmentation. This does not mean that the assumption of perfect integration is the most suitable and the partial segmentation hypothesis is rejected. In order to deepen the analysis on these 3 markets, one may relay on the ICAPM adopted by Bekaert and Harvey (1995), tested under the hypothesis of partial segmentation and affect to the two sources of risk, national and international, one coefficient related to the degree of integration that may vary over time

spreads from the beginning of the global crisis resulting in sharp declines followed by sharp increases of the currency risk premium for all countries.

The Wald test is also applied to the coefficient assigned to the local risk premium for each country. It follows that all risk premia are significantly different from 0 except for Australia, and the constancy test shows that they evolve over time.

The estimation of the ICAPM under the assumption of partial segmentation of financial markets allows that the risk premium of the local market contributes significantly to the formation of the total risk premium in addition to the two other risk premia. This hypothesis may be the most appropriate for different types of markets, especially the emerging and least developed; the assumption of the perfect integration being a polar case untested empirically, since we have shown that there is a risk component linked to the local market, which can contribute significantly to the formation of the total risk premium[17]. In addition, this hypothesis of partial segmentation provides a better measure to quantify the currency risk premium. We have shown that this latter does not reflect indirectly the risk of local market, which has been incorporated into a separate component, and its corresponding coefficient is proved to be significantly different from zero.

In order to deepen the analysis under the partial segmentation hypothesis, we calculate the conditional correlations of returns of each portfolio with the world market. Some studies, (see Borgy and Mignon (2009) among other) are based on moving correlations to estimate the degree of financial integration. Even if this measure of correlation is not the most appropriate to study the level of integration of each country with the world market, we adopt it here only in order to consolidate the results of the estimation of ICAPM[18].

Overall, Figure A.5 shows that (i) the level of correlation of all emerging countries belonging to the G20 with the world market is 0.52 on average over the entire period, and 0.79 in average for all developed countries[19], (ii) the level of correlation beyond the world crisis, *i.e* before 2007, is 0.49 on average for emerging markets and 0.76 for developed countries, illustrating that the high level of correlation observed for some countries during the crisis, reflects the reaction of the stock market to different regional and global crises, and (iii) for the most developed markets like the United States, UK and the Euro Area, their level of correlation with the world market is around 0.8-0.9 over the whole period. This does not validate the assumption of perfect financial integration for these markets. This hypothesis of partial segmentation has shown, firstly that the currency risk premium is still significant and contributes to the formation of the total risk premium, and secondly, in addition to the risk premium related to the world market portfolio, the local risk premia is also significant for all G20 countries. The study of dynamic correlations has allowed us to reinforce the case of partial segmentation of national markets, and more importantly, it has highlighted the impact of the crises on the equity markets and particularly on the dynamics of risk premium. In the following paragraph we

[17] Chaieb and Errunza (2007), showed that the majority of local markets are partially segmented.

[18] Gerard et al (2003), indicate that it is inappropriate to conclude to the integration of financial markets from simple calculations of correlations between stock returns, thus justifying the use of information variables related to macroeconomic fundamentals to explain the level of financial integration. See also Bekaert and Harvey (1995) and Hardouvelis et al (2006).

[19] The group of emerging countries is composed of Argentina, Brazil, India, Indonesia, Korea, Mexico, South Africa, Saudi Arabia and Turkey. The group of developed countries consists of: Australia, Canada, the Euro Area, France, Germany, Italy, Japan, Russia, UK and the U.S.

will study the impact of the world crisis, which had a large impact on the dynamics of the different risk premia[20].

3.3. ECONOMIC CRISES AND RISK PREMIUM DYNAMICS

The global financial system has been crossing a deep crisis since mid-summer 2007[21]. The crisis initially circumscribed to U.S. real estate, has gradually affected the world financial system through solvency and liquidity shocks (Caballero and Simsek, 2009). The bankruptcy of the investment bank Lehman Brothers in September 15, 2008, symbolizes the speed at which the financial crisis spread worldwide and marked a turning point which translating by to a sharp worsening of the crisis confidence in the financial system. According to a report from the Bank of France (2009), the bankruptcy of Lehman Brothers, (i) caused an increasing paralysis of interbank markets, (ii) also destabilized other short term markets, especially the U.S. market of Treasury bill, and (iii) precipitated the worsening of the financial situation.

Since the beginning of the world crisis, numerous reports and studies have been published mainly by monetary and financial organizations in the world (for example, IMF, European Central Bank, Bank of France). In order to deepen the analysis of this crisis, our investigation suggests an empirical measure, based on the ICAPM, of the risk premia (foreign exchange, world and national market) to explain the various disturbances which occurred in different financial market segments. According to the Bank of France (2009), more than a year after the start of the crisis, severe disturbances were always present on the monetary market and have affected other segments of financial markets, as evidenced by the high risk premia. To better illustrate this finding, we measured the total risk premium in financial markets and its three components during the crisis, *i.e.* from August 2007 until November 2009 for all countries of the G20. The aim is to compare the values of risk premia and their volatility before and during the world crisis. Recall that in this section we assume that financial markets are partially segmented, *i.e.* the risk premium is composed of the three risk premia (exchange, world market and local market).

The estimation results are reported in Table 5. Here, we focus on the study of the dynamics of the currency risk premium and its contribution to the formation of the total risk premium before and during the crisis[22]. Our results may be summarized as follows:

- during the pre-crisis period (1993-2007), the currency risk premium is positive on average for all G20 countries except China, Indonesia and United Kingdom. However, its value went down during the crisis at the expense of the premium market risk for all G20 countries except Korea and the United States. This illustrates the brutality of the crisis that emerged in the U.S. before spreading to the rest of the world. In fact, this crisis which began in August 2007 appeared in the U.S. housing sector (subprime crisis)

[20] According to the two graphs of exchange risk premium (Figure A.4) and of dynamic correlations (Figure A.5), we find that the series are much more volatile during the global crisis (started in 2007) compared to the remaining period of the study, for all G20 countries without exception.

[21] The Governor of the Bank of France and senior Vice President Christian Noyer, in a report released in October 10, 2008, characterizes the current crisis as the worst financial crisis in the last eighty years.

[22] We seek to illustrate the impact of the global crisis emerged in 2007, through the study of the volatility of exchange risk premium and its contribution to the formation of the total risk premium.

and caused thereafter, brutally and broader than expected, the reversal of the financial and banking situation accompanied with a slowdown of economic growth and high volatility in financial markets. This increase in volatility is observed here through the increase of the currency risk premium and total risk premium (of about 1.5 times), particularly for the U.S. market from August 2007.

- some countries, mainly the most developed ones (Australia, Euro Area, Italy, Japan, United Kingdom) have shown more resistance to the crisis by displaying an currency risk premium negative in average for the period 2007-2009, while it was positive before the beginning of the crisis. However, this downward trend observed for the currency risk premium has been to the detriment of other sources of risk. Indeed, the total risk premium has increased since the crisis began in these developed countries. However, it should be recognized that these countries have managed to overcome the difficulties caused by the crisis and maintain stability in their respective currencies against the U.S. dollar which was very volatile since the onset of the crisis[23].
- if the value of the currency risk premium went down during the crisis, its volatility has been multiplied by 3 compared to the period 1993-2007, for the emerging countries. It is even more important in the case of developed countries (4.7 times). This reflects the important impact of the crisis on financial markets, mainly on the most developed among them, given the high level of correlation between these markets and the world market compared to other emerging markets (Figure A.5), thus registering a rapid propagation of the crisis between the developed markets, probably due to some disturbances in the interbank system.
- the contribution of the currency risk premium to the formation of the total risk premium also declined for all countries during the crisis compared to the period that preceded it. Indeed, the two market risk premia, global and domestic, are the most important component in the total premium, since the currency risk premium decreased for all countries except the United States. The devaluation of U.S. dollar against other foreign currencies that have weathered the crisis, especially the euro, makes their markets more attractive to foreign investors compared to the United States.

In order to refine the analysis, Figure A.6 shows the evolution of the two risk premia (exchange and total). For all countries, the two risk premia exhibit a strong volatility that has occurred from late 2007 until the end of the study period. The impact of the crisis on financial markets is very significant. Indeed, the fluctuations on risk premia that occurred at the end of the period are much higher than the volatilities caused for example by the Mexican crisis (1994), the Asian crisis (1998) or the Argentina crisis (2001), allowing us to conclude that a crisis triggered in a developed country is much more dangerous compared to crises occurred in emerging markets.

[23] The largest decrease in exchange risk premium has been recorded in the euro area. This result confirms the findings of the Governor of the Bank of France in a report published in October 2008, "it should recognize that the euro has succeeded the test (...). The euro area has shown that it was well equipped for appear in up to its responsibilities as a truly global player in the international monetary system of the XXI century ".

CONCLUSION

The aim of this paper was to study the significance of the currency risk premium and its possible contribution to the formation of the total risk premium. To this end, an international version of the Asset Pricing Model (ICAPM) was estimated over the period 1993-2009 for G20 countries. The model was estimated under the two assumptions of perfect integration and partial segmentation of the stock markets. Our findings put forward the significance of the three risk premia, even that related to the local market (for 17 countries of G20). The currency risk premium is significant for all countries, and contributes to the formation of the total risk premium. By cons it is very volatile, particularly during the world crisis.

The estimation of the ICAPM under the assumption of partial segmentation revealed that this hypothesis is the most suitable for G20 countries except for a few developed economies (like France, Germany, USA, UK). Indeed, this hypothesis highlighted the significance of the local risk premium in addition to the risk premium associated to the foreign exchange market and international market.

However, the standard ICAPM does not allow the degree of integration to vary over time. To overcome this limit, this paper can be extended to account for a degree of financial integration that may vary over time between 0 (strict segmentation) and 1 (perfect integration).

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APPENDIX

TABLE 1. SUMMARY STATISTICS

The table reports the mean of each variable and the standard deviation (given in parentheses).

			Local information variables		
Mean	**RRI**	**VTCR**	**DY**	**VTIC**	**TERM**
Argentina	0.006	-0.003	0.031	0.067	-
	(0.115)	(0.033)	(0.024)	(0.530)	-
Australia	0.009	0.002	0.036	-0.002	0.008
	(0.061)	(0.032)	(0.007)	(0.040)	(0.013)
Brazil	0.016	0.003	0.035	-0.007	-
	(0.117)	(0.043)	(0.017)	(0.113)	-
Canada	0.009	0.001	0.022	-0.012	0.019
	(0.065)	(0.018)	(0.005)	(0.102)	(0.012)
China	-0.001	0.001	0.031	-0.005	-
	(0.109)	(0.024)	(0.015)	(0.118)	-
Euro Area	0.007	0.001	0.028	-0.012	0.013
	(0.057)	(0.023)	(0.009)	(0.054)	(0.009)
France	0.007	0.001	0.030	-0.013	0.013
	(0.059)	(0.024)	(0.008)	(0.074)	(0.012)
Germany	0.007	0.001	0.021	-0.011	0.014
	(0.069)	(0.024)	(0.007)	(0.075)	(0.009)
India	0.008	0.006	0.017	-0.007	0.013
	(0.094)	(0.019)	(0.006)	(0.093)	(0.013)
Indonesia	0.005	0.002	0.023	0.093	-
	(0.139)	(0.068)	(0.009)	(0.685)	-
Italy	0.007	0.001	0.029	-0.012	0.013
	(0.071)	(0.253)	(0.015)	(0.068)	(0.008)
Japan	0.001	0.000	0.010	0.076	0.013
	(0.059)	(0.028)	(0.005)	(0.916)	(0.004)
Korea	0.006	-0.000	0.017	-	-
	(0.117)	(0.033)	(0.005)	-	-
Mexico	0.008	-0.000	0.017	0.002	-
	(0.097)	(0.034)	(0.005)	(0.147)	-
Russia	0.013	0.040	0.012	0.011	-
	(0.177)	(0.187)	(0.013)	(0.223)	-
South Africa	0.009	-0.000	0.029	-0.002	0.009
	(0.085)	(0.038)	(0.008)	(0.042)	(0.019)
Saudi Arabia	0.01	-0.001	0.001	-	-
	(0.078)	(0.006)	(0.006)	-	-
Turkey	0.011	0.003	0.029	0.045	-
	(0.163)	(0.044)	(0.018)	(0.629)	-
United Kingdom	0.006	0.001	0.034	-0.011	0.008
	(0.048)	(0.021)	(0.007)	(0.061)	(0.013)
United States	0.006	-	0.018	0.001	0.017
	(0.047)	-	(0.005)	(0.213)	(0.012)

			International information variables		
	RRI	**EXWDY**	**TERMSPRD**	**DEFSPRD**	**VEURODO**
World	0.006	-0.019	0.223	0.013	-0.005
	(0.047)	(0.021)	(2.254)	(0.049)	(0.096)

EXWDY, the first lag of the world market dividend in excess of the 1-month Eurodollar deposit rate. ***TERMSPRD***, the first lag of the change in the term spread. ***DEFSPRD***, the first lag of the default spread. ***VEURODO***, the first lag of return on a U.S treasury certificate to 1 month. ***RRI***, the first lag of excess equity return. ***VTCR***, the change of real exchange rate. ***DY***, the local market dividend yield. ***VTIC***, the first lag of the change in interest rate in the short term. ***TERM***, the first lag of the change in the local term spread.

TABLE 2.A. ESTIMATION OF THE PRICE OF CURRENCY RISK AND INTERNATIONAL MARKET RISK BASED ON INSTRUMENTAL VARIABLES

The table presents the estimation results of equations (9) and (11). The estimation results of the currency risk price of each country are given in lines 2 to 39 below. The last two lines showing the estimation results of the price of world market portfolio risk.

	Constant	DPR	EXWDY	DEFSPRD	TERMSPRD	VEURODO	$\overline{R}^2$
Argentina	0.470***	0.432***	-0.036***	-0.001	-0.002	0.001	0.316
	(0.000)	(0.000)	(0.000)	(0.771)	(0.001)	(0.556)	
Australia	-0.026	0.583***	-0.002	0.007*	0.011	0.003	0.325
	(0.355)	(0.000)	(0.877)	(0.094)	(0.222)	(0.127)	
Brazil	0.223***	0.503***	-0.011	0.001	0.002	0.002	0.274
	(0.000)	(0.000)	(0.214)	(0.734)	(0.779)	(0.237)	
Canada	0.153***	0.472***	-0.036***	-0.003	-0.013	-0.004*	0.328
	(0.000)	(0.000)	(0.002)	(0.527)	(0.167)	(0.079)	
China	-0.035	0.506***	0.007	-0.009	0.001	0.001	0.228
	(0.657)	(0.000)	(0.606)	(0.874)	(0.538)	(0.966)	
Euro Area	-0.356***	0.528***	0.009	0.006	0.005	-0.002	0.295
	(0.000)	(0.000)	(0.333)	(0.173)	(0.569)	(0.302)	
France	-0.208***	0.459***	0.004	0.004	0.000	-0.002	0.197
	(0.000)	(0.000)	(0.734)	(0.433)	(0.592)	(0.517)	
Germany	-0.164***	0.472***	-0.002	0.002	0.006	-0.002	0.205
	(0.000)	(0.000)	(0.845)	(0.667)	(0.556)	(0.494)	
India	0.063*	0.416***	-0.007	0.003	-0.002	-0.002	0.156
	(0.051)	(0.000)	(0.521)	(0.537)	(0.829)	(0.435)	
Indonesia	0.013	0.525***	0.003	-0.001	-0.004	0.000	0.255
	(0.535)	(0.000)	(0.673)	(0.731)	(0.493)	(0.995)	
Italy	-0.114***	0.422***	0.001	0.003	0.008	-0.001	0.157
	(0.000)	(0.000)	(0.893)	(0.476)	(0.367)	(0.577)	
Japan	-0.102***	0.418***	0.006	0.003	-0.007	0.004*	0.174
	(0.000)	(0.000)	(0.481)	(0.383)	(0.422)	(0.071)	
Korea	0.093***	0.674***	0.011	-0.003	-0.001	0.004	0.470
	(0.000)	(0.000)	(0.211)	(0.417)	(0.943)	(0.026)**	
Mexico	0.034	0.626***	-0.016	-0.002	0.008	0.001	0.386
	(0.224)	(0.000)	(0.106)	(0.685)	(0.391)	(0.798)	
Russia	0.000	0.717***	0.001	0.001	0.005	-0.001	0.058
	(0.984)	(0.000)	(0.900)	(0.843)	(0.355)	(0.623)	
South Africa	0.051**	0.231***	0.010	-0.001	-0.003	0.002	0.041
	(0.037)	(0.001)	(0.227)	(0.759)	(0.727)	(0.224)	
Saudi Arabia	0.241***	0.875***	0.008	-0.175***	0.004	0.001	0.246
	(0.000)	(0.000)	(0.181)	(0.000)	(0.300)	(0.608)	
Turkey	0.008	0.319***	0.001	0.001	0.009	0.002	0.083
	(0.781)	(0.000)	(0.862)	(0.762)	(0.298)	(0.208)	
United Kingdom	-0.034	0.435***	0.010	-0.003	0.006	0.001	0.186
	(0.226)	(0.000)	(0.293)	(0.948)	(0.461)	(0.780)	
World	-1.162***	0.854***	-0.432***	0.004	0.004	0.010***	0.388
	(0.000)	(0.000)	(0.000)	(0.204)	(0.532)	(0.000)	

The levels of significance are 1% (***), 5% (**) and 10% (*). The p-value are given in parentheses below coefficient estimates. Faced with the problem of autocorrelation for some G20 countries, we have re-estimated the model by adding the one lagged (currency or world) risk price (DPR) among the explanatory variables.

TABLE 2.B RESIDUAL TESTS
The table reports the diagnostics for the residuals.

	N(JB)	L.B	White	ARCH	W
Argentina	679.220***	36.762	9.704	0.113	392.07***
	(0.000)	(0.124)	(0.999)	(0.945)	(0.000)
Australia	9.129**	47.088**	23.165	0.236	17.451***
	(0.010)	(0.013)	(0.676)	(0.888)	(0.000)
Brazil	946.76***	43.011**	18.654	0.110	133.622***
	(0.000)	(0.035)	(0.882)	(0.946)	(0.000)
Canada	5.337*	88.766***	75.364***	4.282	78.178***
	(0.069)	(0.000)	(0.000)	(0.118)	(0.000)
China	289.58***	17.323	14.280	34.318***	10.022***
	(0.000)	(0.835)	(0.816)	(0.000)	(0.000)
Euro Area	6.063**	36.052	28.453	1.917*	246.582***
	(0.048)	(0.142)	(0.388)	(0.383)	(0.000)
France	3.102	37.759	33.355	9.129**	61.143***
	(0.212)	(0.103)	(0.185)	(0.010)	(0.000)
Germany	2.839	38.121*	44.705**	12.077***	38.187***
	(0.242)	(0.096)	(0.017)	(0.002)	(0.000)
India	0.811	123.63***	17.032	33.553***	12.734***
	(0.667)	(0.000)	(0.930)	(0.000)	(0.000)
Indonesia	56.546***	44.544**	47.305*	8.221**	10.686***
	(0.000)	(0.025)	(0.080)	(0.016)	(0.000)
Italy	1.309	33.106	36.758*	6.254**	19.584***
	(0.519)	(0.232)	(0.099)	(0.043)	(0.000)
Japan	15.270***	36.671	15.221	2.679	23.491***
	(0.000)	(0.288)	(0.966)	(0.262)	(0.000)
Korea	47.641***	52.135***	27.424	11.698***	49.638***
	(0.000)	(0.004)	(0.441)	(0.003)	(0.000)
Mexico	92.704***	42.727**	31.844	0.991	27.645***
	(0.000)	(0.037)	(0.621)	(0.609)	(0.000)
Russia	31.461***	36.265*	48.479***	9.892***	36.033***
	(0.000)	(0.052)	(0.000)	(0.007)	(0.000)
South Africa	6.170**	27.029	47.430***	0.036	3.010***
	(0.046)	(0.517)	(0.009)	(0.982)	(0.007)
Saudi Arabia	3.758	357.717***	29.599*	97.328***	257.861***
	(0.153)	(0.000)	(0.077)	(0.000)	(0.000)
Turkey	52.278***	35.011*	14.188	0.717	4.046***
	(0.000)	(0.068)	(0.436)	(0.698)	(0.002)
United Kingdom	1.801	40.936*	15.536	0.412	10.694***
	(0.406)	(0.054)	(0.961)	(0.814)	(0.000)
World	0.729	131.554***	22.628*	0.519	-
	(0.694)	(0.000)	(0.067)	(0.775)	-

The levels of significance are 1% (***), 5% (**) and 10% (*). N(JB), Jarque-Bera test of the Normality of residuals, L.B : Ljung-Box test of the absence of autocorrelation, White, test of the homoskedasticity of residuals, ARCH, Engle test of conditional homoskedasticity and W, Wald test of non-significance of coefficients. The p-value are given in parentheses.

TABLE 3. ESTIMATION OF THE ICAPM UNDER THE ASSUMPTION OF PERFECT INTEGRATION AND WALD TEST

The table reports the estimation of the equation (6) of ICAPM by the quasi-maximum likelihood method.

				Wald test		
	Constant	**PRM**	**PRC**	**Lm=1**	**Lk=0**	**Lk=1**
Argentina	-6.139***	-0.018	0.419***	198.190***	62.642***	119.500***
	(0.000)	(0.807)	(0.000)	(0.000)	(0.000)	(0.000)
Australia	0.501	-0.292***	0.214***	626.376***	68.708***	924.284***
	(0.229)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Brazil	13.472***	-1.899***	0.889***	27644.294***	8114.532***	126.319***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Canada	-5.225***	0.135*	0.286***	145.657***	72.975***	453.456***
	(0.000)	(0.060)	(0.000)	(0.000)	(0.000)	(0.000)
China	-8.002***	0.466***	0.737***	26.013***	46.306***	5.848**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)
Euro Area	-5.225***	0.253***	0.323***	149.078***	43.893***	192.583***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	-6.213***	0.247***	0.432***	114.516***	87.616***	151.691***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Germany	-6.433***	0.263***	0.305***	100.249***	67.023***	346.622***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
India	-7.079***	0.559***	0.213***	184.252***	59.172***	807.473***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Indonesia	0.382	-0.119***	0.375***	685.827***	169.258***	470.013***
	(0.569)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
Italy	-7.048***	0.418***	0.515***	214.999***	424.689***	377.856***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Japan	-4.862***	0.066	0.663***	473.968***	2984.074***	772.248***
	(0.000)	(0.122)	(0.000)	(0.000)	(0.000)	(0.000)
Korea	-4.355***	-0.025	0.581***	240.565***	664.138***	346.057***
	(0.000)	(0.707)	(0.000)	(0.000)	(0.000)	(0.000)
Mexico	-11.455***	0.346***	0.575***	80.514***	43.455***	23.737***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Russia	-10.624***	0.223***	0.030***	1169.012***	84.619***	88447.452***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
South Africa	-7.644***	0.314***	0.233***	1791.985***	86.836***	931.692***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Saudi Arabia	-1.466*	-0.620***	0.712***	38.684***	6.321***	70.576***
	(0.071)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Turkey	-13.351***	0.029**	1.680***	4735.288***	10198.044***	1671.790***
	(0.000)	(0.038)	(0.000)	(0.000)	(0.000)	(0.000)
United Kingdom	-5.386***	0.414***	0.636***	59.464***	83.199***	27.165***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
United States	-5.339***	0.151***	0.325***	229.513***	52.026***	225.125***
	(0.000)	(0.007)	(0.000)	(0.000)	(0.000)	(0.000)

Note: The levels of significance are 1% (***), 5% (**) and 10% (*). *PRM*, *PRC* are, respectively, the world market risk premium and the currency risk premium. The p-value are given in parentheses.

TABLE 4. ESTIMATION OF THE ICAPM UNDER THE ASSUMPTION OF PARTIAL SEGMENTATION AND WALD TEST

The table reports the estimation of the equation (8) of ICAPM by the quasi-maximum likelihood method.

					Wald test				
	Constant	**PRM**	**PRC**	**PRL**	**Lm=1**	**Lk=0**	**Lk=1**	**Ll=0**	**Ll=1**
Argentina	-13.353***	0.209***	0.871***	2.632***	19810***	4482.751***	98.232***	14538.679***	5589.173***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Australia	-8.539***	0.536***	0.219***	0.119	178.682***	48.593***	614.962***	1.581	85.216***
	(0.000)	(0.000)	(0.000)	(0.208)	(0.000)	(0.000)	(0.000)	(0.209)	(0.000)
Brazil	-5.942***	-0.168***	0.754***	0.040**	7193.516***	8323.281***	884.012***	3.965**	2263.767***
	(0.000)	(0.000)	(0.000)	(0.046)	(0.000)	(0.000)	(0.000)	(0.046)	(0.000)
Canada	-5.292***	0.125**	0.228***	0.296***	192.022***	57.033***	650.614***	12.019***	67.809***
	(0.000)	(0.047)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
China	1.694***	0.091***	0.045*	1.116***	1583.712***	3.167*	1403.311***	7346.172***	78.877***
	(0.000)	(0.000)	(0.075)	(0.000)	(0.000)	(0.0751)	(0.000)	(0.000)	(0.000)
EU	-6.192***	0.334***	0.323***	0.116	488.785***	43.611***	192.453***	2.098	122.911***
	(0.000)	(0.000)	(0.000)	(0.147)	(0.000)	(0.000)	(0.000)	(0.147)	(0.000)
France	-8.032***	0.083	0.453***	0.373***	216.284***	108.779***	158.410***	561.310***	1583.483***
	(0.000)	(0.181)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Germany	-6.003**	0.434	0.959***	-0.917***	153.204***	81.006***	319.183**	652.327***	835.346***
	(0.012)	(0.156)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
India	4.846	0.148**	0.603***	-0.524***	167.917***	324.654***	140.172**	340.373***	2878.474***
	(0.479)	(0.024)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Indonesia	-19.656***	1.095***	0.046**	-1.349***	4.187**	5.018**	2184.466***	417.457***	1265.256***
	(0.000)	(0.000)	(0.025)	(0.000)	(0.041)	(0.025)	(0.000)	(0.000)	(0.000)
Italy	-7.778***	0.158***	0.459***	0.201***	477.598**	53.624**	74.093***	20.208***	319.674***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Japan	-8.413***	-0.051***	-0.235***	1.145***	7603.237***	620.478***	17133.625***	5577.961***	89.104***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Korea	-16.678***	1.298***	0.069***	-0.313***	147.188***	16.565***	2939.383***	335.917**	5899.697***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mexico	-11.208***	0.353***	0.570***	-0.017	74.120***	40.304***	22.910***	0.547	1922.492***
	(0.000)	(0.000)	(0.000)	(0.459)	(0.000)	(0.000)	(0.000)	(0.459)	(0.000)
Russia	-3.435***	-0.102**	0.036***	0.102***	636.972***	61.209***	43722.052***	19.419***	1521.061***
	(0.000)	(0.019)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SA	-9.665***	0.373***	0.369***	0.169***	545.679***	475.276***	1388.307***	165.757***	3978.76***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SB	-4.736***	-0.604***	0.053***	1.549***	851.391***	9.635***	3037.061***	1646.979***	206.71***
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)
Turkey	-44.226***	2.598***	0.101***	0.616***	17906.184***	221.625***	17639.586***	227.189***	88.478***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
UK	-0.292***	-0.213***	1.086***	1.732***	5838.081***	3893.455***	24.499***	2188.667***	390.804***
	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
US	-5.043***	0.016	0.335***	0.149***	726.350***	50.176***	196.303***	22.012***	723.301***
	(0.000)	(0.641)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

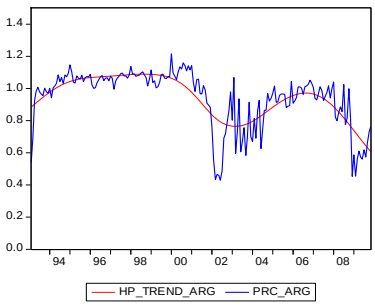
The levels of significance are 1% (***), 5% (**) and 10% (*). *PRM*, *PRC* and *PRML* are, respectively, the world market risk premium, the exchange risk premium, the local-market risk premium. The p-value are given in parentheses.

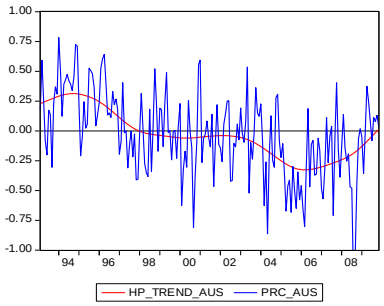
TABLE 5. IMPORTANCE OF CURRENCY RISK PREMIUM IN THE FORMATION OF THE TOTAL RISK PREMIUM
The table contains average of the currency risk premium as fraction of the total premium estimated for the International Asset Pricing Models of the previous tables. We report the average of the total risk premium (PRT) and the average of the currency risk premium (PRC). The table aims to show the importance of currency risk premium relative to the total risk premium for each country of the G20. It allows comparison between the two periods, before and during the world crisis.

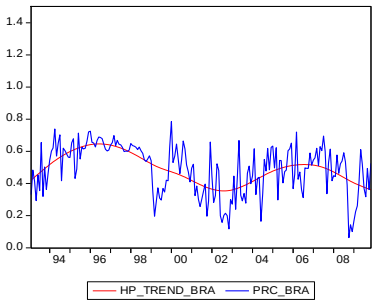
	1993-2007						2007-2009					
	PRC	PRT	PRC/PRT (%)	EPRC	EPRT	EPRC/EPRT (%)	PRC	PRT	PRC/PRT (%)	EPRC	EPRT	EPRC/EPRT (%)
Argentina	8.78	21.00	41.81	4.88	6.72	72.62	0.43	19.29	2.22	15.52	17.63	88.03
Australia	1.21	12.30	9.83	4.31	5.21	82.73	-1.08	19.19	-	24.61	30.32	81.16
Brazil	13.22	35.76	36.96	7.81	11.58	67.44	6.79	39.15	17.34	24.14	30.04	80.36
Canada	2.80	14.96	18.71	3.73	6.14	60.75	0.16	19.63	0.82	24.27	29.98	80.95
China	-1.02	2.75	-	2.69	12.05	22.32	-3.95	6.87	-	9.76	19.67	49.62
Euro Area	0.34	9.62	3.53	2.93	4.66	62.88	-2.51	15.56	-	12.95	17.42	74.34
France	1.15	19.67	5.85	2.66	4.29	62	0.25	26.50	0.94	12.19	19.64	62.07
Germany	0.41	20.02	2.04	3.14	5.96	52.68	0.97	26.73	3.62	22.35	27.97	79.91
India	2.99	28.92	1.34	4.25	6.04	70.36	3.74	42.79	8.74	15.51	21.58	71.87
Indonesia	-0.05	14.93	-	9.28	17.43	53.24	-5.07	16.85	-	20.20	33.66	60.01
Italy	2.14	21.18	10.10	3.32	5.31	62.52	-0.04	27.14	-	11.92	21.95	54.31
Japan	0.39	12.60	3.10	3.04	4.89	62.17	-0.17	11.24	-	8.70	11.27	77.19
Korea	2.11	14.97	14.09	7.88	16.04	49.13	4.06	27.76	14.63	21.17	50.99	41.52
Mexico	7.33	37.90	19.34	4.56	23.59	19.33	4.06	35.04	11.59	8.42	20.69	40.69
Russia	10.74	42.54	25.25	12.89	89.18	14.45	7.85	58.49	13.42	24.51	52.84	46.38
South Africa	1.46	15.51	9.41	4.19	8.99	46.60	1.41	21.52	6.55	20.67	29.21	70.76
Saudi Arabia	2.71	10.37	26.13	2.52	6.46	39.01	2.25	10.82	20.73	8.67	10.56	82.10
Turkey	5.07	18.83	26.93	6.04	7.40	81.62	-0.07	16.23	-	13.43	14.72	91.24
United Kingdom	-1.29	5.75	-	1.40	1.99	70.35	-3.25	8.77	-	6.50	10.42	62.38
United States	2.05	15.03	13.64	1.74	3.69	47.15	3.13	25.32	12.36	11.64	21.96	53.01

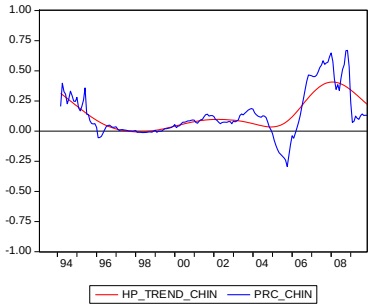
PRC : currency risk premium, ***PRT*** : total risk premium, ***PRC/PRT :*** fraction of total risk due to currency risk in (%), ***EPRC*** : Standard deviations of currency risk premium, ***EPRT*** : standard deviations of total risk premium, ***EPRC/ EPRT***: fraction of volatility of total risk due to currency risk in (%).

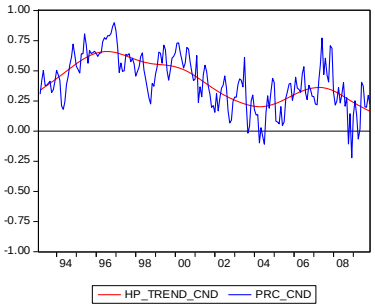
FIGURE A.1. PRICE OF CURRENCY RISK FOR EACH COUNTRY OF G20

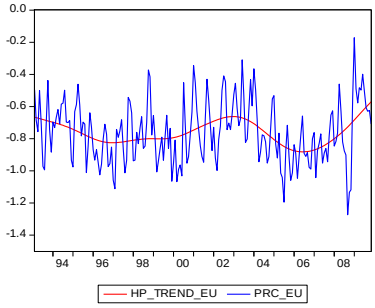


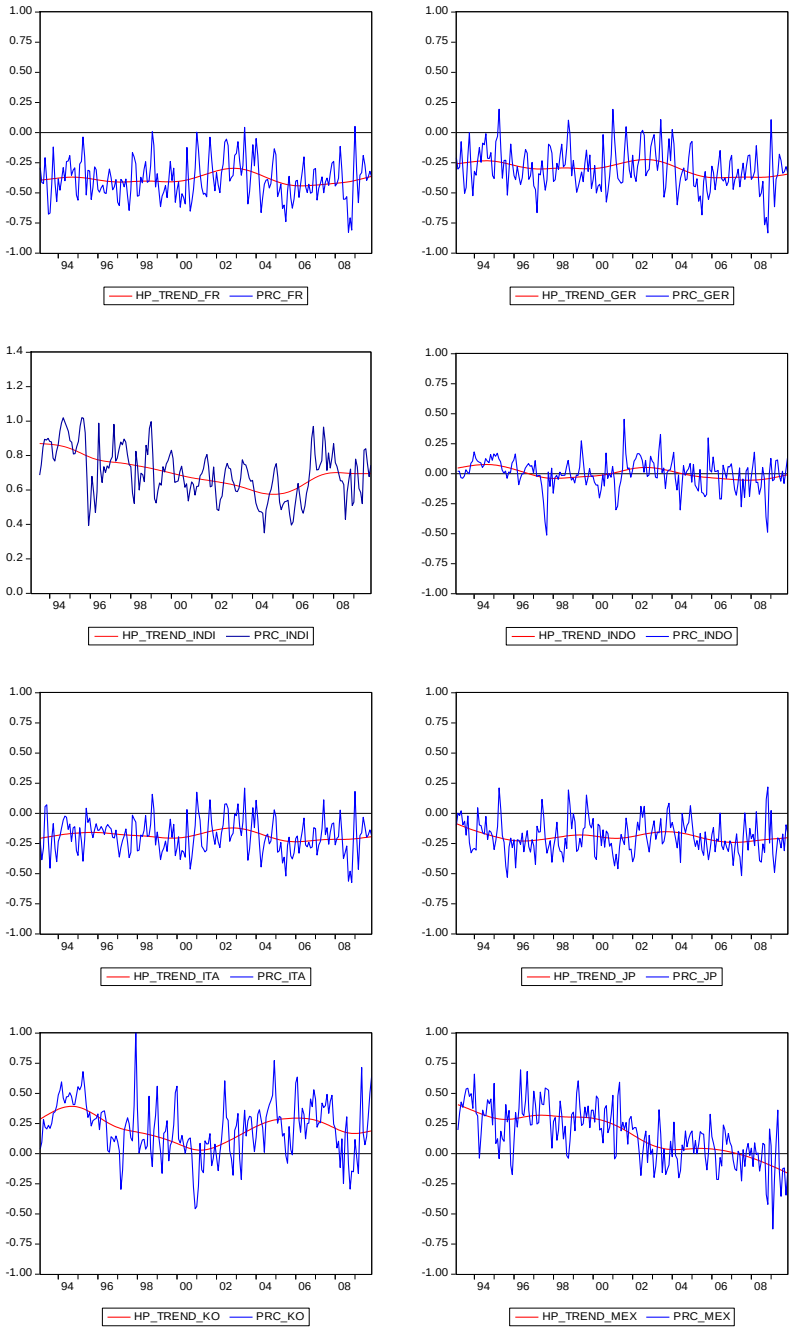


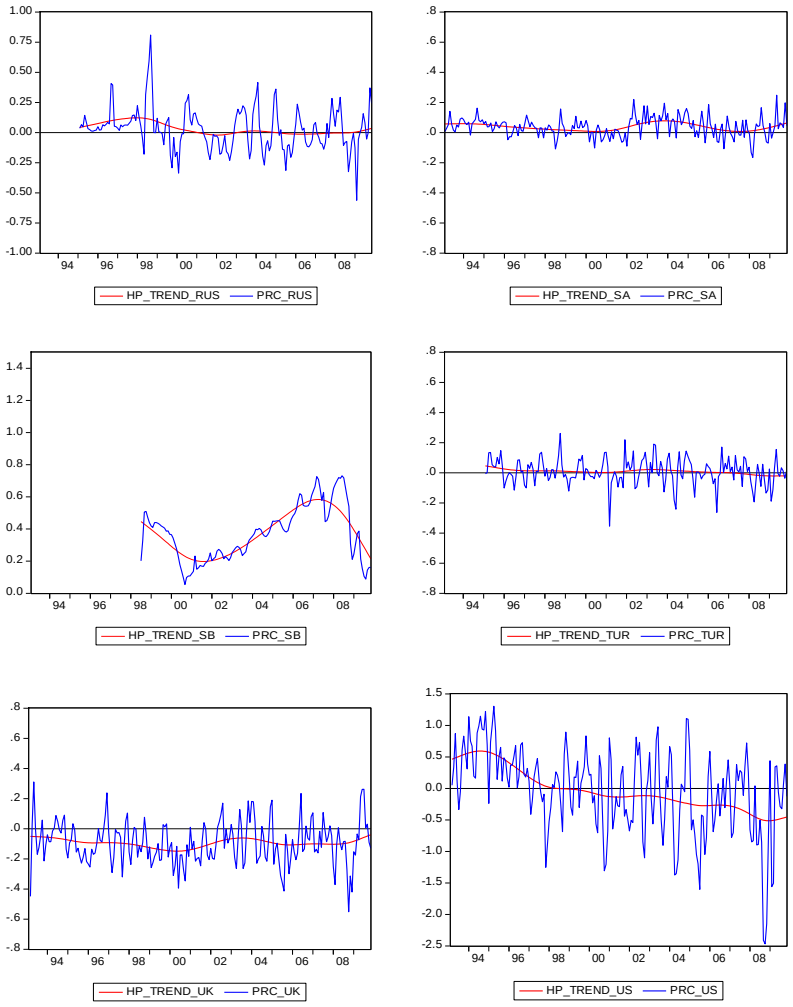






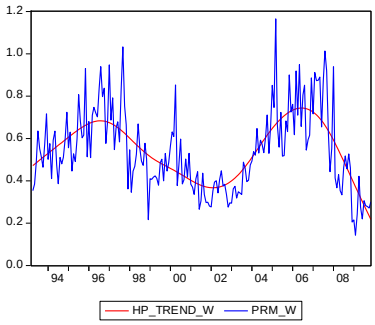



HP_TREND_FR
PRC_FR
HP_TREND_GER
PRC_GER
HP_TREND_INDI
PRC_INDI
HP_TREND_INDO
PRC_INDO
HP_TREND_ITA
PRC_ITA
HP_TREND_JP
PRC_JP
HP_TREND_KO
PRC_KO
HP_TREND_MEX
PRC_MEX



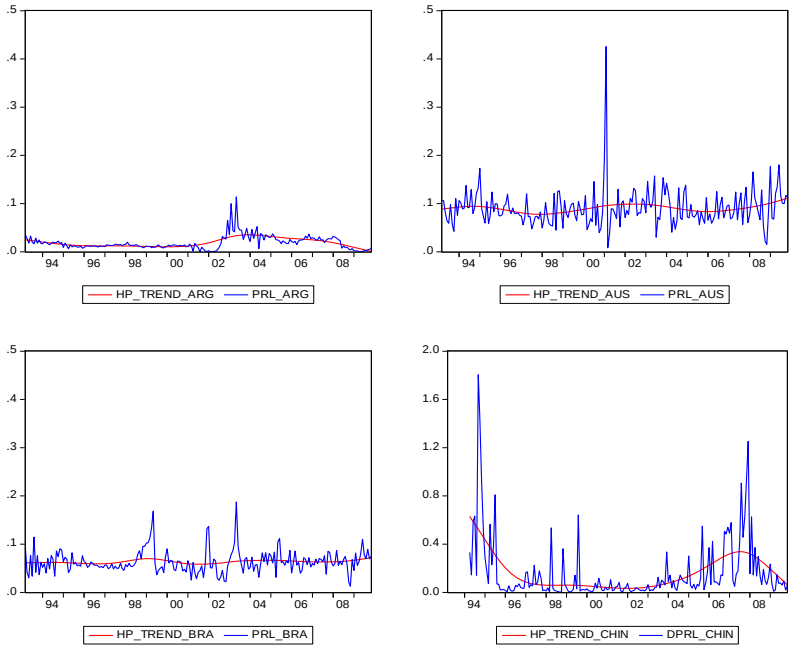
HP_TREND is the Hodrick Prescott Filtered series applied to price of currency risk, **PRC** is the Price of currency risk. The vertical axis corresponds to the price of currency risk in (%) and the horizontal axis represents the corresponding dates.

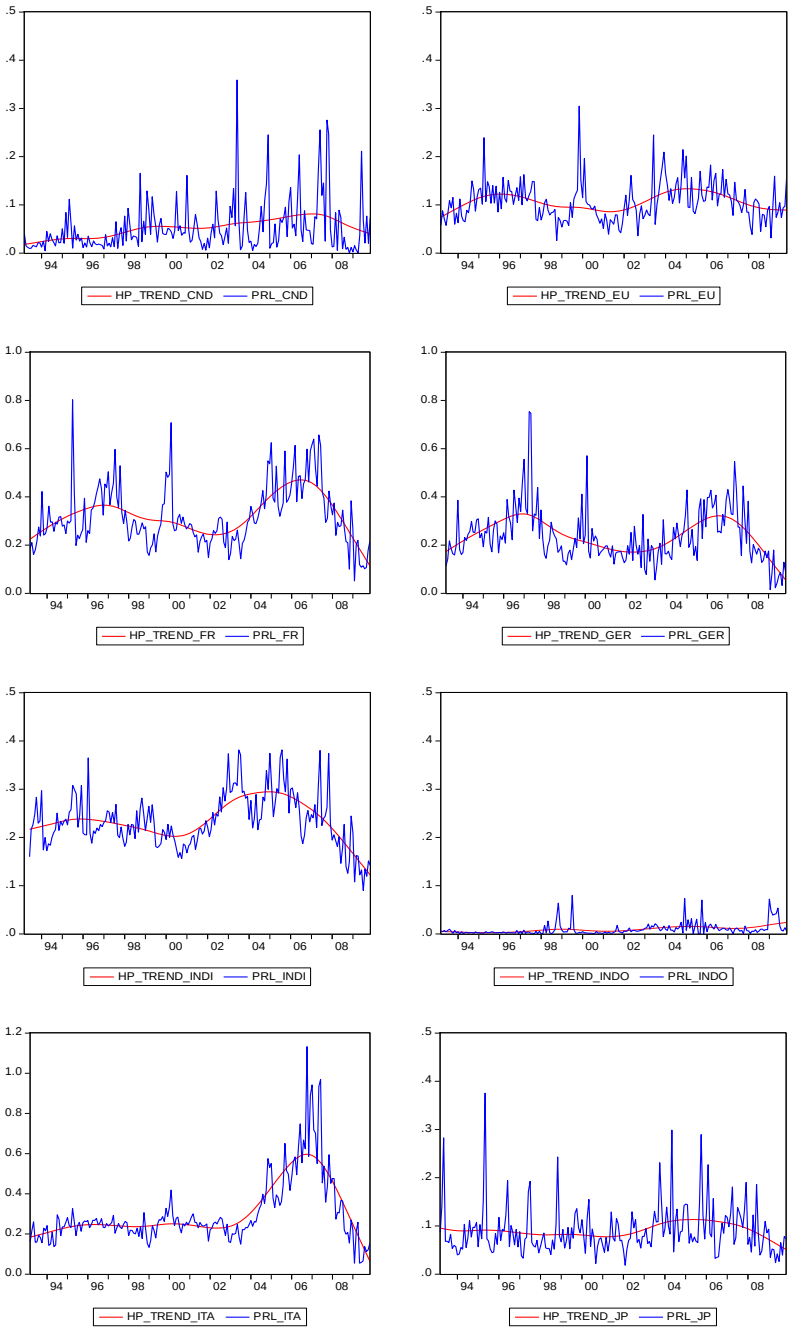
FIGURE A.2. PRICE OF WORLD MARKET RISK

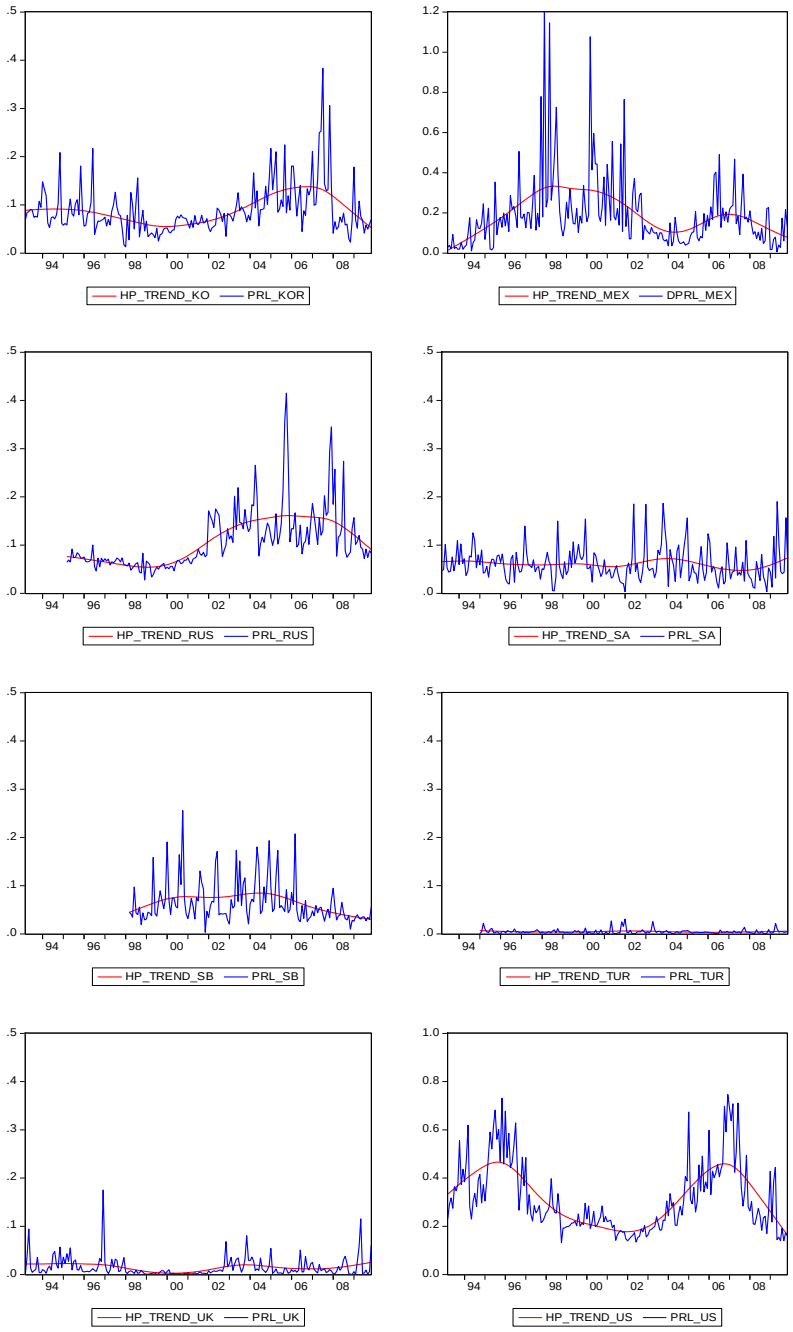


HP_TREND is the Hodrick Prescott Filtered applied to price of world market risk, **PRM_W** is the price of world market risk. The vertical axis corresponds to the price of world market risk in (%) and the horizontal axis represents the corresponding dates.

FIGURE A.3. PRICE OF FINANCIAL LOCAL MARKET RISK FOR EACH COUNTRY OF G20

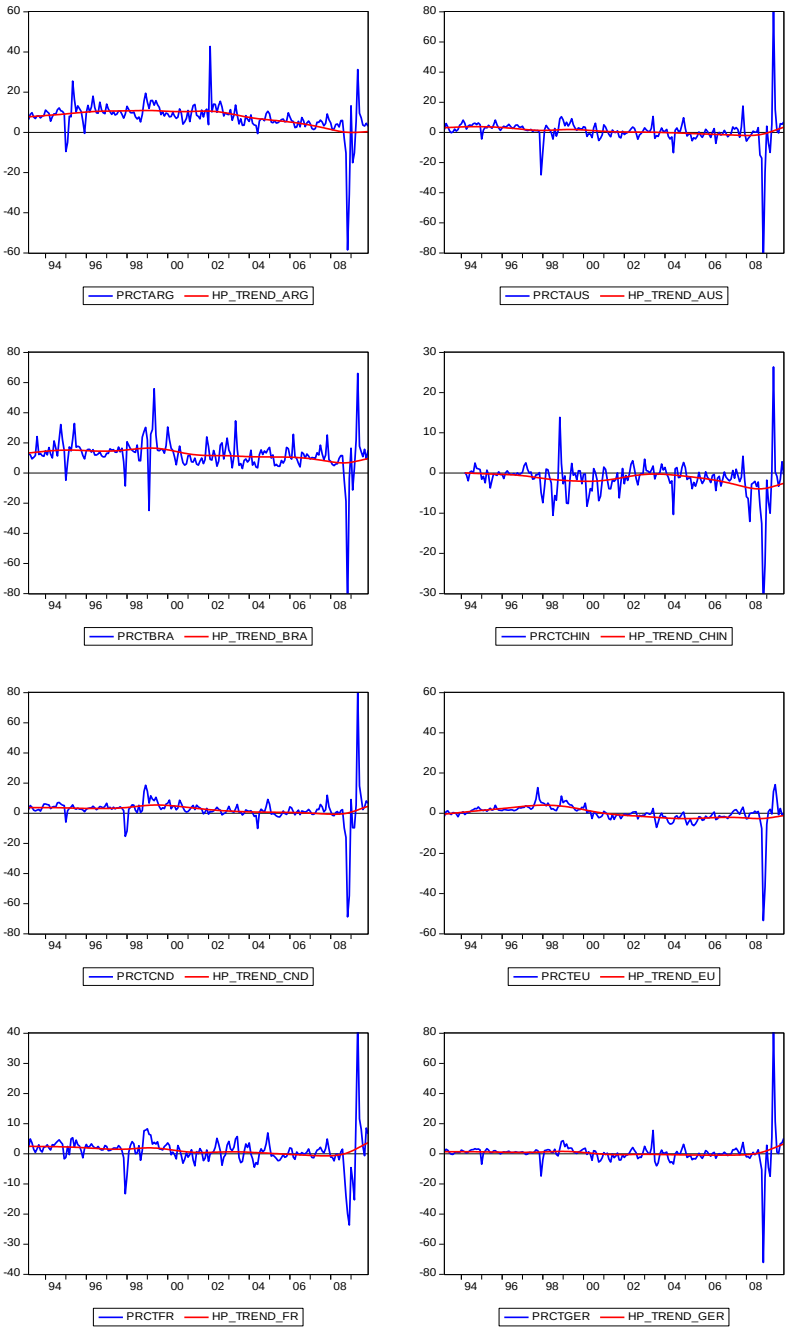


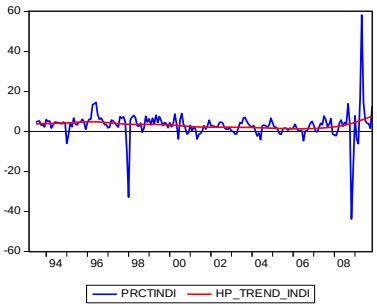

HP_TREND_CND PRL_CND
HP_TREND_EU PRL_EU
HP_TREND_FR PRL_FR
HP_TREND_GER PRL_GER
HP_TREND_INDI PRL_INDI
HP_TREND_INDO PRL_INDO
HP_TREND_ITA PRL_ITA
HP_TREND_JP PRL_JP

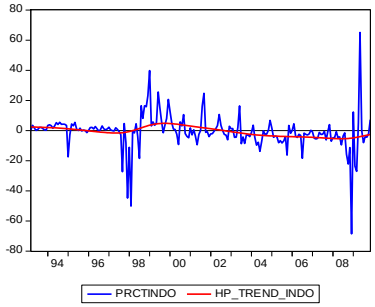


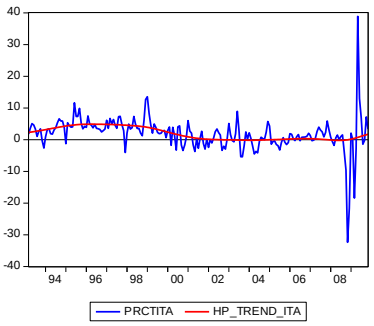
HP_TREND is the Hodrick Prescott Filtered series applied to price of local market risk, **PRL** is the price of local risk. The vertical axis corresponds to the price of local market risk in (%) and the horizontal axis represents the corresponding dates.

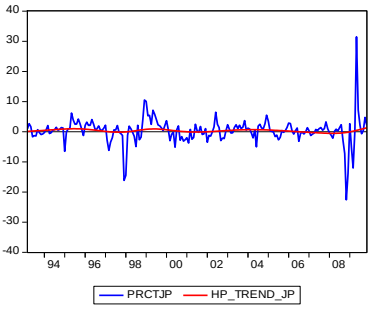
FIGURE A.4. CURRENCY RISK PREMIUM OF EACH COUNTRY OF G20

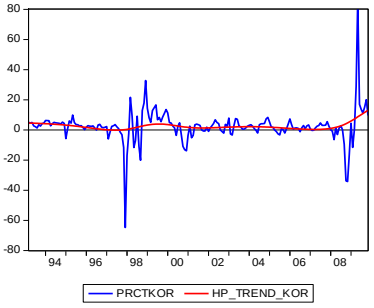


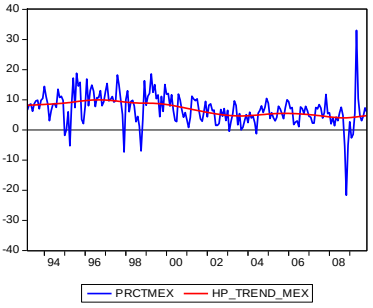

PRCTINDI
HP_TREND_INDI

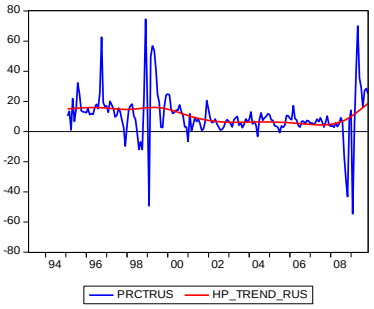

PRCTINDO
HP_TREND_INDO

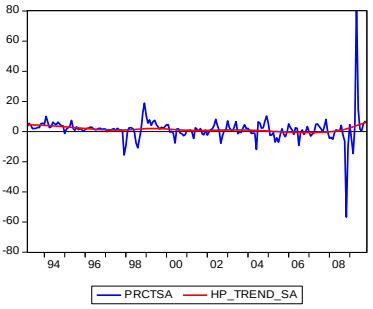

PRCTITA
HP_TREND_ITA

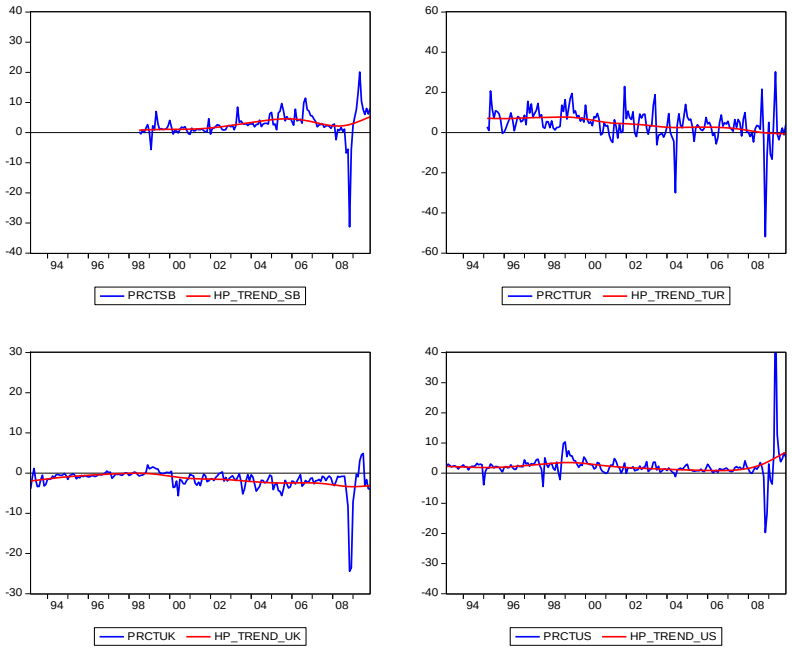

PRCTJP
HP_TREND_JP


PRCTKOR
HP_TREND_KOR


PRCTMEX
HP_TREND_MEX

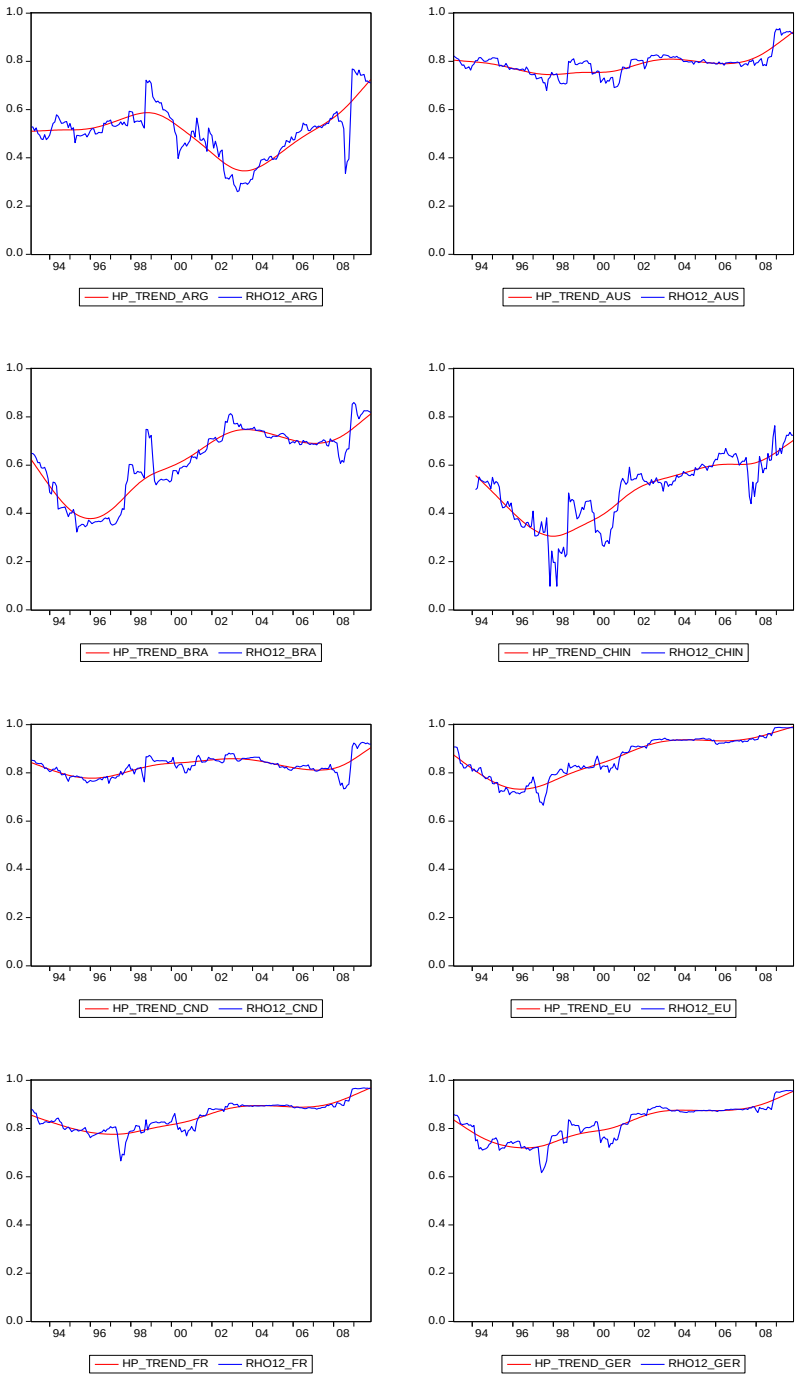

PRCTRUS
HP_TREND_RUS

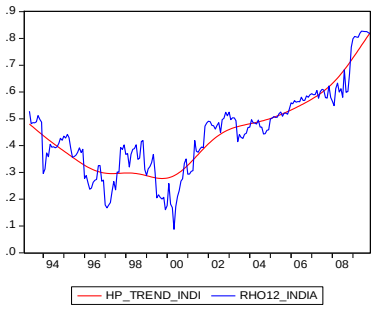

PRCTSA
HP_TREND_SA

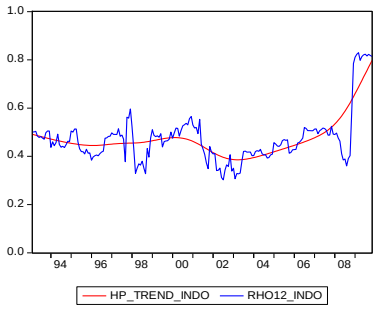


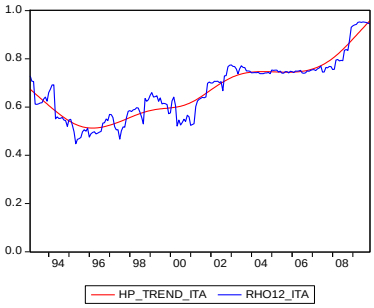
HP_TREND is the Hodrick Prescott Filtered series applied to premium of currency risk, **PRCT** is the currency risk premium. The vertical axis corresponds to the premium of currency risk in (%) and the horizontal axis represents the corresponding dates.

FIGURE A.5. CONDITIONAL CORRELATION BETWEEN EACH FINANCIAL MARKET OF G20 AND THE WORLD MARKET




.9
.8
.7
.6
.5
.4
.3
.2
.1
.0
94 96 98 00 02 04 06 08
HP_TREND_INDI
RHO12_INDIA


1.0
0.8
0.6
0.4
0.2
0.0
94 96 98 00 02 04 06 08
HP_TREND_INDO
RHO12_INDO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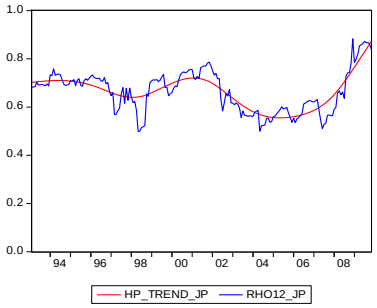
0.8
0.6
0.4
0.2
0.0
94 96 98 00 02 04 06 08
HP_TREND_ITA
RHO12_ITA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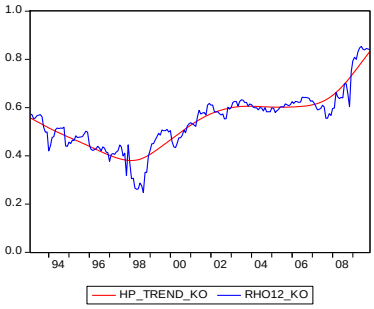
94 96 98 00 02 04 06 08
HP_TREND_JP
RHO12_JP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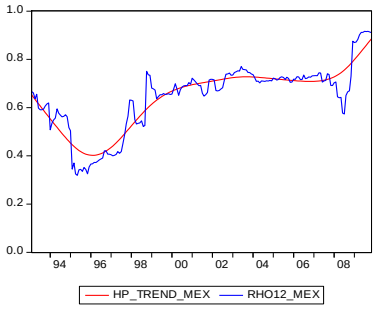
94 96 98 00 02 04 06 08
HP_TREND_KO
RHO12_KO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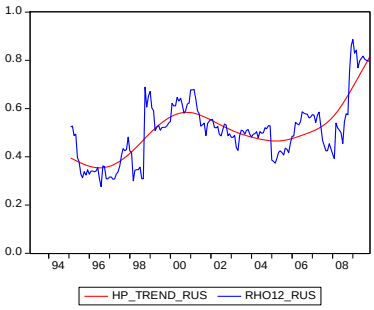
94 96 98 00 02 04 06 08
HP_TREND_MEX
RHO12_MEX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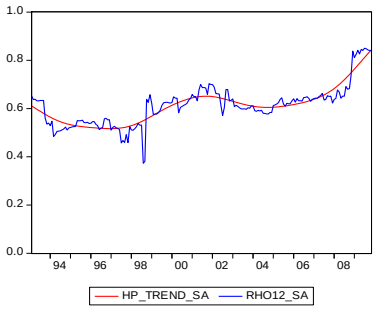
94 96 98 00 02 04 06 08
HP_TREND_RUS
RHO12_RUS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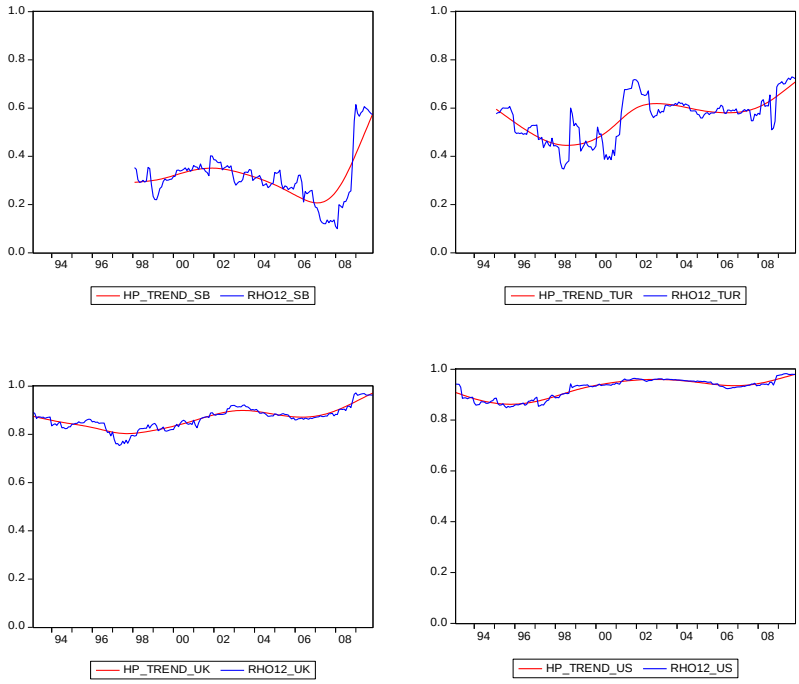
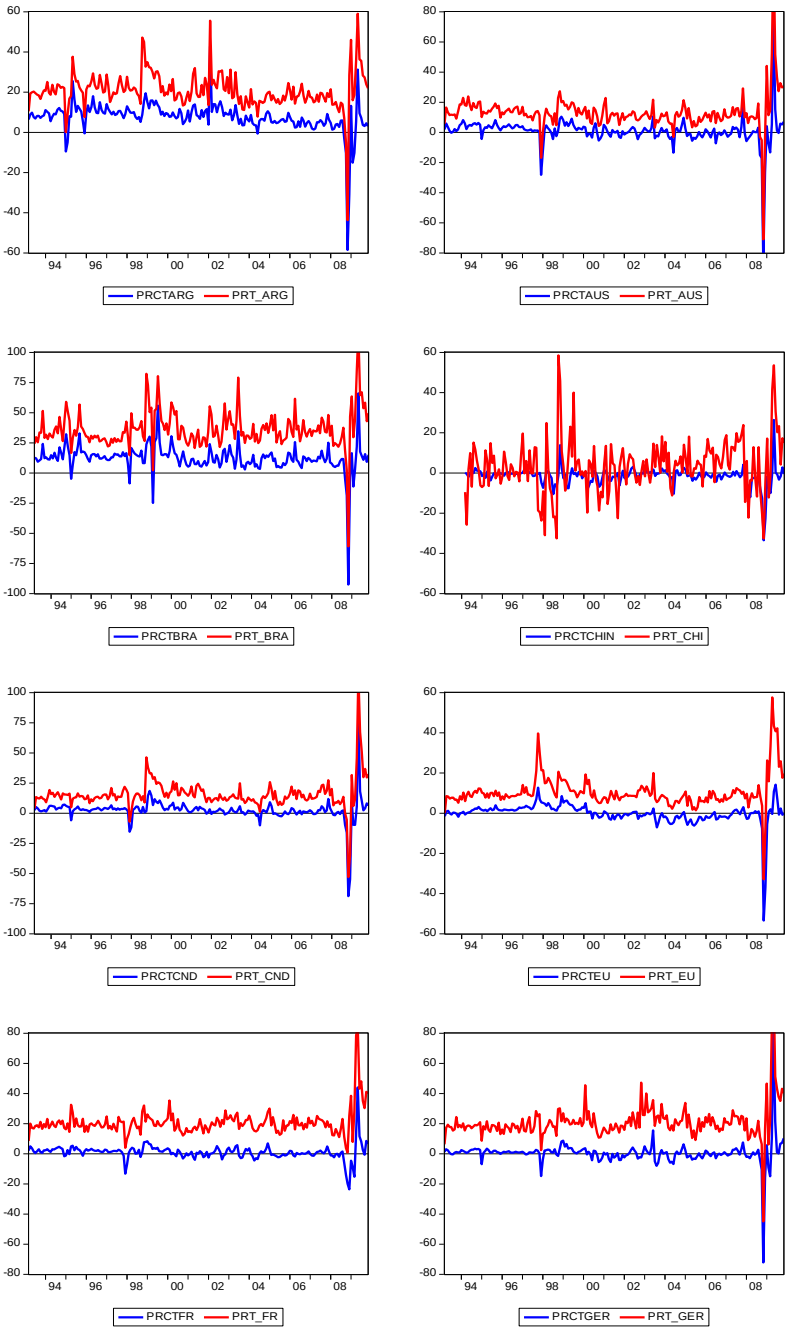
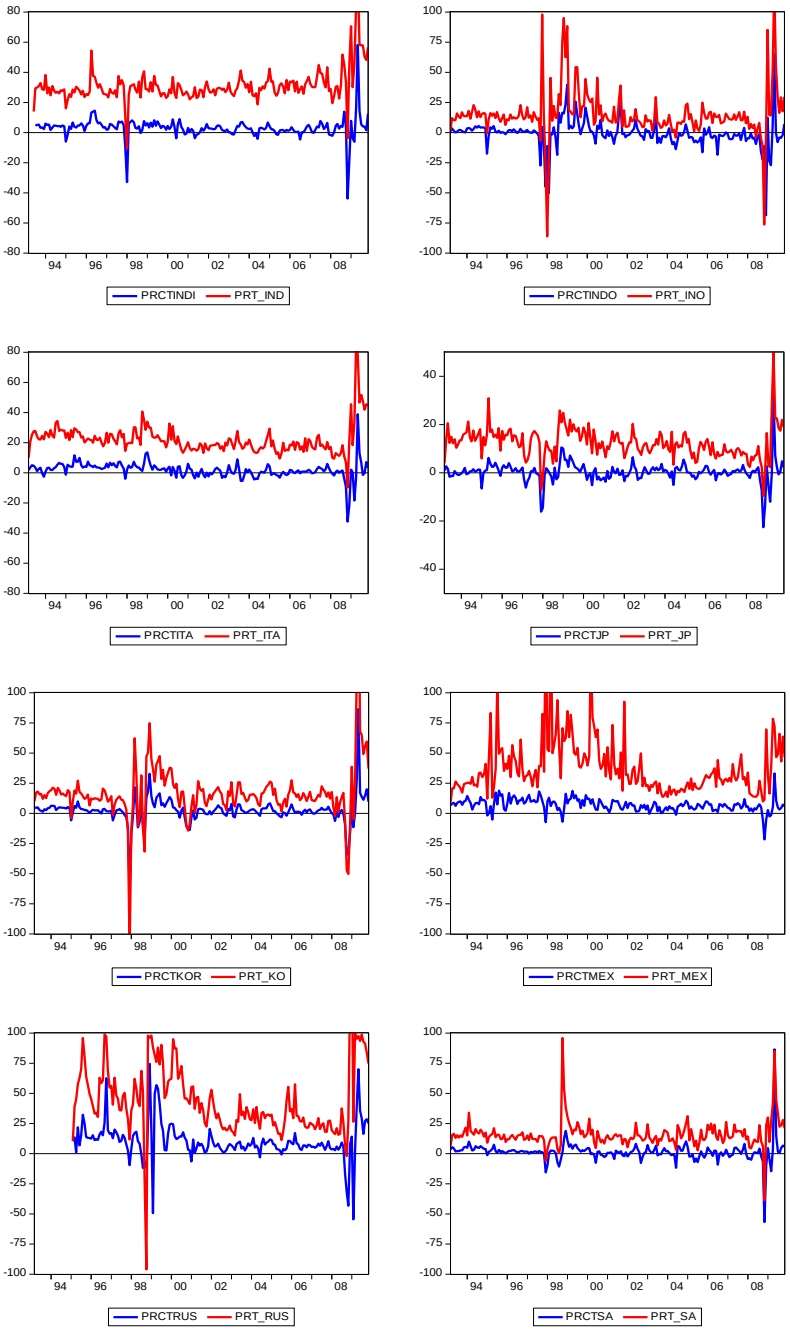
0.8
0.6
0.4
0.2
0.0
94 96 98 00 02 04 06 08
HP_TREND_SA
RHO12_SA

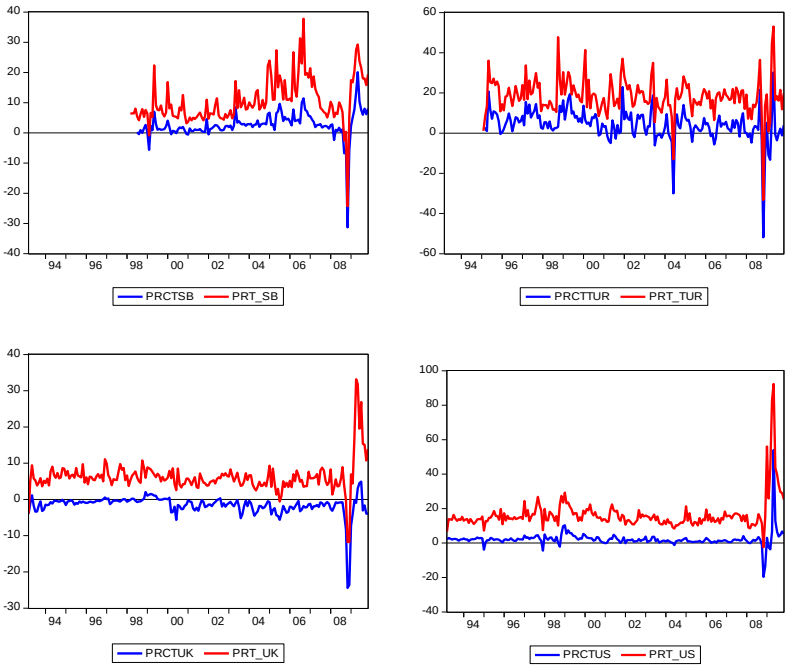


HP_TREND is the Hodrick Prescott Filtered series applied to conditional correlation. **RH012** is the dynamic conditional correlation between each local market and the world market.

FIGURE A.6. COMPARISON BETWEEN THE CURRENCY RISK PREMIUM AND TOTAL RISK PREMIUM FOR EACH COUNTRY OF G20




PRCTINDI PRT_IND
PRCTINDO PRT_INO
PRCTITA PRT_ITA
PRCTJP PRT_JP
PRCTKOR PRT_KO
PRCTMEX PRT_MEX
PRCTRUS PRT_RUS
PRCTSA PRT_SA



PRCT is the currency risk premium; **PRT** is the total risk premium. The vertical axis corresponds to the currency and total risk premia in (%) and the horizontal axis represents the corresponding dates.