International Network for Economic Research

Working Paper 2012.8

Testing the UIP Theory in the CEE Countries

by

Cristina Maria Triandafil & Christian Richter
(University of East London)

www.infer-research.net

TESTING THE UIP THEORY IN THE CEE COUNTRIES. EVIDENCE FROM THE GARCH MODELS[1]

Dr. Cristina Maria Triandafil[2]

Dr. Christian Richter[3]

Abstract: This paper tests the Uncovered Interest Parity theorem at the level of the CEE countries using three types of GARCH models (EGARCH, TGARCH and CGARCH models). In general the empirical results highlight that UIP is not confirmed. We find that a possible explanation for this might consist of an indiscriminate risk premium that results in a violation of the underlying assumptions of UIP. The analysis brings in a series of risk premiums which reflect the build up of various risk layers encompassed in the dynamics of macro-economic fundamentals and macro-financial variables. Apart from revealing those risk layers which trigger macroeconomic volatility, the research sheds light on the countries' limited capacity to achieve nominal and real convergence in the not too distant future.

Keywords: *term structure, interest rate, uncovered interest rate parity, structural factors*

JEL classification: E20, E52, E60, E61, E52

November 2012

[1] This study is a part of post-doctoral research project ''The sustainability of nominal and real convergence within the EU in the context of the financial crisis: implications on the prudential regulatory framework'' within the POSDRU project "Scientific research economic, support to welfare and human development in a European context "developed within the National Institute of Economic Research" Costin C. Kiriţescu ".

[2] The University Of Finance and Banking and National Institute of Economic Research of the Romanian Academy, Negru Vodă Street, Nr.3, Sector 3, code 030774, cristina_triandafil@yahoo.com

[3] Royal Docks Business School, University of East London, London, E16 2RD, UK, Email: c.richter@uel.ac.uk

Introduction

In general, financial markets' convergence criteria focus on the interest rate dynamics, in particular, the term structure, uncovered interest rate parity (UIP) and the purchasing power parity (PPP). All of these theorems have acquired a new importance in the light of the financial integration process. The Central and Eastern European countries (CEE) experienced floating rate regimes and current account liberalization prior to the integration in the European Union. This impacted to a significant extent on the evolution of macro-financial environment as well as the correlation with the business cycles of the developed countries[4]. After all, the interest rate connects the (macro-) economic system with the worldwide financial system. Apart from its important position in the architecture of the convergence process, the (short term) interest rate is also an important monetary policy instrument and a significant transmission mechanism.

The UIP brings forth the arbitrage opportunities that conducts to the similarities in terms of return corresponding to comparable assets or liabilities denominated in domestic and foreign currencies. Usually, UIP is closely related to market efficiency; though recent research has shown that financial markets may not be efficient at all (Hughes Hallett and Richter, 2002). Although, UIP has been investigated a lot for developed markets, research lacks for the CEE countries. The interest rate convergence criterion is analyzed within the term structure theory, having in mind a 'blended' risk premium. These risk factors generate additional risk layers which lead to a higher interest rate than in the developed financial markets. The research sheds light on the sources of additional risks at country level, as well as on their joint evolution that could result in clustering of the CEE countries, based on similar interest rate dynamics. In this sense, we take into account the CEE country specific economic development during and after the transition from a centrally planned economy to a market based economy.

[4] See for example Hughes Hallett and Richter (2011).

In this paper we base our conclusions on several GARCH regressions[5]. So we use different econometric models to check the robustness of previous results. Having rejected UIP for most countries we look at specific factors in the CEE countries which may have contributed to these market imperfections.

As a result, the paper sheds light on the CEE countries' limited capacity to achieve nominal and real convergence within the near future.

The analysis reveals a series of structural deficiencies related to financial system integration, soundness of public finance policies and institutional framework which all affect the potential for further integration in the euro-zone.

This study is structured as follows: section two is the literature review, section three presents the methodology and results. Section four concludes.

2. Literature review

Literature on UIP is abundant that either tests the efficiency degree of financial markets or reveals the various mutual relationships between interest rates and exchange rates. Different studies illustrate the UIP on various time periods, seeking to reveal the importance of time in explaining the accumulation of risks. Chinn & Meredith (2004), Mehl & Cappiello (2007) unveiled that UIP holds only for long periods of time (from five to ten years) in the virtue of the impact exerted by macroeconomic fundamental factors; the short term time horizon favors monetary policy actions that determine a negative correlation between exchange rate and interest rate.

In line with this, Fujii and Chinn (2001) revealed the importance of long term variables on the UIP confirmation; emerging economies, with flexible exchange rate regimes, create incentive for the validation of the UIP theory, especially in the context of long term horizons.

Lothiana & Wu (2011) made a research on a long period of time – 200 years- revealing that the UIP is validated only during some sub-periods of time. Other researches (Baillie & Bollerslev (2000), Flood & Rose (2002)) presented evidence

[5] For a co-integration analysis we refer to Sarrmidi and Salleh (2011) who also found that UIP does not hold for the CEE countries.

that it is only after 1990 that UIP becomes relevant. Nevertheless, Chaboud and Wright (2005) uncovered that UIP holds on shorter time horizon in the context of speculation transactions. Bekaert et al. (2007) brought forth that UIP depends rather on foreign currency than on time horizon.

Most of the researches have tested the UIP theorem based on countries specificities. There is an abundant literature dedicated to the analysis of a certain differentiation of the UIP according to the peculiarities of the macroeconomic environment, especially in the light of the differentiation between emerging and developed countries. The results usually rally upon two different lines: one encompassing a confirmation of the UIP at the level of the developed countries (Froot and Rogoff (1994), Taylor (2002), Sarno (2005), Bath (2011)), motivated by the absence of a potential lack of risk premiums because of an important stabilized macroeconomic environment, and the other reflecting the UIP failure in case of the emerging countries, which is explained by more deteriorated macroeconomic conditions.

Bansal and Dahlquist (2000) conducted a research on 28 developed and emerging economies based on data for the period 1976-1998; they show that it is more likely to give incentive to deviations from the UIP in case of countries with a more fragile macroeconomic environment, reflected particularly in lower GNP per capita, lower credit ratings and higher average inflation.

Alper at. al (2009) emphasized that emerging markets have been characterized by weaker macroeconomic fundamentals, more volatile economic conditions, shallower financial markets and incomplete institutional reforms. These differences of structural nature in comparison with developed countries affect the assumptions underlying the UIP theory, which triggers the rejection of this theory.

Most of the studies conducted during the last ten years unveiled a predominant violation of the UIP with no differentiation at the country level (Marey, 2004a-b, Peasaran and Wale, (2006), Verdelhan, 2006). This was explained in the light of risk premiums determined by transaction costs or central banks interventions. Zhang (2011) unveil that market dimension is a fundamental factor for the UIP confirmation; nevertheless, the current economic environment, characterized by a recessionary environment and government interventions, conducted to important deviations from the UIP theory.

Other studies analyze the UIP in the context of different exchange rate regimes. Flood and Rose (2002) unveiled that UIP is confirmed especially in case of the fixed exchange rate regimes.

However, there are only a few papers that concentrate mainly on CEE economies, most of the studies being focused on the developed countries. Bansal & Dahlquist (2000) and more recently Alper et al. (2009) highlighted that UIP is confirmed especially in case of emerging countries, emphasizing the role played by the high inflation rate. Mansori (2003) and Horobet et. al (2009, 2010) pointed out that for the Central and Eastern countries, testing the UIP leads to results that vary from one country to the other. Although the hypothesis is confirmed by positive slope coefficients, the corresponding statistic tests do not validate it.

Other studies unveiled in an indirect manner the UIP failure among the CEE countries through the prism of additional risk premiums triggered by persistent inflation. Orlowski (2005) pointed out that the important risk premiums associated with the inflationary process conduct to negative phenomena such as recession periods, unemployment and large imbalances.

Cihak and Mitra (2009) showed that CEE countries withstood in a robust manner the financial crisis experience in the context of the inflationary pressures reduction.

Recently, Filipozzi and Harkmann (2010) analyzed the UIP in the light of the recent financial turbulences in the CEE area. The conclusions lead to the idea that the theory does not hold at the global level, but there are still many differences at the country level. As such, for countries with a higher degree of financial integration (Czech Republic, Hungary, Poland) the theory is confirmed, in opposition with countries with a lower degree of financial integration (Bulgaria and Romania).

Boubakri and Guillaumin (2010) uncovered the failure of the UIP in the CEEC countries through the prism of additional risk premiums. In parallel, Kocenda and Poghosyan (2010) valorized a similar methodology to the present study and brought forth an important variable, encompassing the foreign exchange risk premium of an amount of 4% on the grounds of the GARCH in mean model.

Posta (2012) revealed the UIP failure at the level of the Czech Republic; the additional risk premium is impacted to an important extent by macroeconomic fundamentals, pointing to the volatility of long term nature.

However, the current literature does not bring in a global view on the relevance of the UIP for the CEE countries that still did not adopt the single currency; the previous researches lack of an integrated approach on the interest rate behavior in the light of the UIP theory, that should take into account the similarities imposed by the common features of macroeconomic structures from these countries. Apart from that, the current referential literature has concentrated on the status of the UIP for these countries, provided mainly under the form of a final statistic result that revealed the rejection of this theory for the countries under review. Besides that, the question is to what extent this failure can be attributed to fundamental factors pertaining to the macro -financial economic environment of these countries, with a special emphasis on the multiple dimension of the nominal and real convergence process.

The present paper envisages to fill the gap in the literature and to provide an integrated perspective on the structural factors that could drive a certain behavior of the interest rate under the aegis of the UIP theory in these countries.

For this purpose, in an initial stage, the paper tests the UIP theory at the level of the Central and Eastern countries (Bulgaria, Czech Republic, Hungary, Poland and Romania) by the intermediary of three types of GARCH models (TGARCH, CGARCH and EGARCH models).

The study valorizes the GARCH methodology having in mind their technical specificities that allow to address the volatility from a complex perspective: as such, TGARCH model permits the integration of non-linear behavior in the volatility while the EGARCH model gives the possibility to integrate asymmetries in the architecture in the light of a direct relationship between volatility and returns. Moreover, the CGARCH has in place the decomposition of the volatility on a two dimensional basis, allowing the separation of the long term component from the temporary one; in virtue of these technical peculiarities, the GARCH models create favorable conditions for a more robust analytical framework.

Once applied the models in question, the paper analyzes the statistic output through the prism of specific aspects from the macro-financial environment of these countries that could explain the additional risk premiums that determined the UIP failure.

The study contributes to the creation of a complex perspective on the ability of these countries to comply with the interest rate and inflation convergence criteria. Once revealed the risk layers that trigger important macroeconomic volatility, the research shed light on the countries limited capacity to achieve nominal and real convergence desideratum in the next period.

The analysis reveals a series of structural deficiencies related to financial system depth, soundness of public finance policies or institutional framework that affect the further integration of these countries in the euro-zone.

3. Methodology

This study approaches the UIP theory within the generalized autoregressive conditional heteroskedasticity models (GARCH) framework elaborated by Engle and Bollerslev (1986). This model is depicted by the following equations

(3.1) $X_t = a_0 + a_1 * y_t + \varepsilon_t + b_1 * \varepsilon_{t-1}$

(3.2) $h_{t2} = q_t + \alpha_1 * \left(\varepsilon_{t-1}^2 - q_{t-1}\right) + \gamma * \left(\varepsilon_{t-1}^2 - q_{t-1}\right) * D_{t-1} + \beta_1 * \left(h_{t-1}^2 - q_{t-1}\right)$

(3.4) $q_t = \varpi + \rho * q_{t-1} + \varphi * \left(\varepsilon_{t-1}^2 - h_{t-1}^2\right)$

where

$D_t = 1$ for ε_t inferior to 0, $D_t = 0$ otherwise

and

ε_t represents the error term.

The first equation represents the mean equation, where x_t is the log-difference.

The term ε_t is supposed to be conditionally normally distributed, being dependent on past information and capturing any unexpected appreciation or depreciation.

The second and third equation reflect conditional variance (h_t^2) which is conceived as a linear function of a time-dependent intercept, the lag in the squared realized residuals (ARCH term), an asymmetric term (γ) and the lagged conditional variance (GARCH term).

The present study focuses on running up three types of GARCH models: EGARCH model, TGARCH model and CGARCH model.

3.1 The EGARCH model

The exponential GARCH (EGARCH) model was proposed by Nelson (1991) who expressed the conditional variance equation as:

$$(3.5)\ \ln\left(\sigma^2\right) = \varpi + \beta \ln\left(\sigma_{t-1}{}^2\right) + \gamma \frac{\mu_{t-1}}{\sqrt{\sigma_{t-1}{}^2}} + \alpha\left[\frac{\left|\mu_{t-1}\right|}{\sqrt{\sigma_{t-1}{}^2}} - \sqrt{\frac{2}{\pi}}\right]$$

The model has several advantages over the simple GARCH in the light of the $\log\left(\sigma_t{}^2\right)$ term that is subject to modeling and even if the parameters are negative, $\sigma_t{}^2$ is positive. In this context, the elimination of potential non-negative constraints imposed on the model parameters is beneficial. In addition, the asymmetries are permissive in the EGARCH architecture in the light of a direct relationship between volatility and returns; consequently, if volatility and returns are negatively related, then λ is negative as well.

In the initial set up, Nelson assumed a Generalised Distribution Error (GED) structure for the errors. In essence GED represents a group of distributions that can be used for several types of series. For computational ease purposes, the application of the EGARCH model employs conditional normal errors rather than GED usage.

3.2 The TGARCH model

The Threshold GARCH model introduced by Rabemananjara and Zakoian (1993). brings forth various volatility reactions under the impact of previous shocks, integrating the non-linear behavior in the volatility as well.

This model puts a special emphasis on the conditional standard deviation instead of conditional variance:

$$(3.6)\ \sigma_t = K + \delta\sigma_{t-1} + \sigma_1^{+}\varepsilon_{t-1}^{+} + \alpha_1^{-}\varepsilon^{-}{}_{t-1}$$

$$\varepsilon_{t-1}^{+} = \varepsilon_{t-1} \ if \ \varepsilon_{t-1} > 0 \ \ and \varepsilon^{+}{}_{t-1} = 0 \ \ if \varepsilon_{t-1} \leq 0.$$

Where $Likewise, \ \ \varepsilon_{t-1}^{-} = \varepsilon_{t-1} \ if \ \varepsilon_{t-1} \leq 0$

and

$\varepsilon_{t-1} = 0 \ \ if \ \varepsilon_{t-1} > 0.$

3.3 The CGARCH model

The CGARCH model breaks down volatility by two components, a permanent and a transitory one. Permanent volatility component consists of a time-invariant permanent level (ω), an AR term (ρ) and the forecasted error (φ).

The short term volatility component is obtained by the substraction of the long term volatility out of the total volatility, meaning

$$(3.7) \ \ h_t^2 - q_t = \alpha_1 * \left(\varepsilon_{t-1}^2 - q_{t-1}\right) + \gamma * \left(\varepsilon_{t-1}^2 - q_{t-1}\right) * D_{t-1} + \beta_1 * \left(h_{t-1}^2 - q_{t-1}\right)$$

The forecasted error (φ) represents the difference between the lag in the squared realized residual and the forecast from the model (based on information available at time t-2). Engle and Victor (1993) reveal that CGARCH represents a GARCH (2,2) model, being less restrictive than a GARCH (1,1) model.

3.4 The data

The study valorizes exchange rate and interest rate data extracted on a monthly basis for the sample of five CEE countries (Bulgaria, Czech Republic, Hungary, Poland and Romania) during the time period 1997-2011 from the European Central Bank website. The monthly observations extend at the level of the bilateral exchange rates reflecting both the euro and dollar parities of the national currencies of CEE countries.

Indeed, one main criterion for the build up of this sample of countries consists precisely of the consistency of their monetary regimes. The countries that represent the focus of the present study have not adopted the unique currency yet and still benefit of their monetary autonomy.

4. Discussion and results

4.1 Analysis of the statistical output

When testing for UIP it turned out that the residuals were heteroscedastic and autocorrelated. We therefore decided to test for UIP using different GARCH models, in particular we tested EGARCH, CGARCH and TGARCH for all countries and for the Dollar and Euro denominations. Out of all models tested, we then chose the 'most appropriate' one in terms of minimizing the Schwartz and Akaike criterion. Table 1 summarises the results.

Table 1: Overview of the GARCH Regression Results

	UIP confirmation		**UIP failure**	
Model	**Euro exchange rate**	**Dollar exchange rate**	**Euro exchange rate**	**Dollar exchange rate**
TGARCH			Czech Republic	
EGARCH	Bulgaria		Romania	Poland Romania
CGARCH			Hungary Poland	Czech Republic Hungary

It turns out that UIP is rejected for all countries but one, namely Bulgaria. Moreover, different countries follow different data generating processes concerning their conditional standard deviations of the residuals. For example, for Romania the EGARCH was valid whilst for the Czech Republic it was the TGARCH model. Given the overwhelming evidence of UIP rejection in the CEE countries we may now ask what may have contributed to this result. Obviously, at this stage, we can only describe factors which are unique to the UIP countries. To test for these factors goes beyond the scope of this paper and requires further research.

The analysed countries show similarities in terms of macroeconomic development since overcoming communism; these countries have followed a transition process from centralized planned economies to market based economies.

In addition, all these countries are still autonomous in terms of monetary policy, having their own national currencies. The monetary regimes of these countries are characterized by similarities as all the countries implemented the inflation targeting policy, supported by a controlled floating exchange rate, except for Bulgaria which has in place a currency board regime since 1997.

In essence, the successful currency board leads to stable exchange rate expectations which in turn are reflected in the total failure of the UIP in terms of Bulgarian leva parity against dollar while the parity against euro reveals a full confirmation of the UIP theory.

Moreover, Bulgaria reveals the highest share of euro-denominated exports into GDP (25%)[6] out of the CEE countries. Hence, the failure of the Dollar denominated UIP test. As a result, the acceptance of UIP for Bulgaria was implicit; a currency board (starting in 1997) implies a tight control on exchange rate dynamics, which leads to a high degree of exchange rate predictability, implying the mitigation of risk premia.

For the Czech Republic UIP was rejected in case of both currencies. This could be explained by a potential risk aversion and implied high risk premia resulting in a difference between the interest rate differential and the expected change in the exchange rate. Despite a floating exchange rate regime towards the Dollar as well as the Euro, the Czech central bank is regularly intervening in the currency markets in order to stabilise the exchange rate volatility. Our results suggest that this does not lead to a stabilisation of the exchange rate expectations due to the discrete nature of those interventions.

Figure 1 reveals that the Czech Krona has appreciated against the Euro for the last ten years. However, the figure also reveals a volatile behaviour of the exchange rate,

[6] Eurostat data for the year 2011.

which may have contributed to unstable expectations, especially for the years 2007/2008.

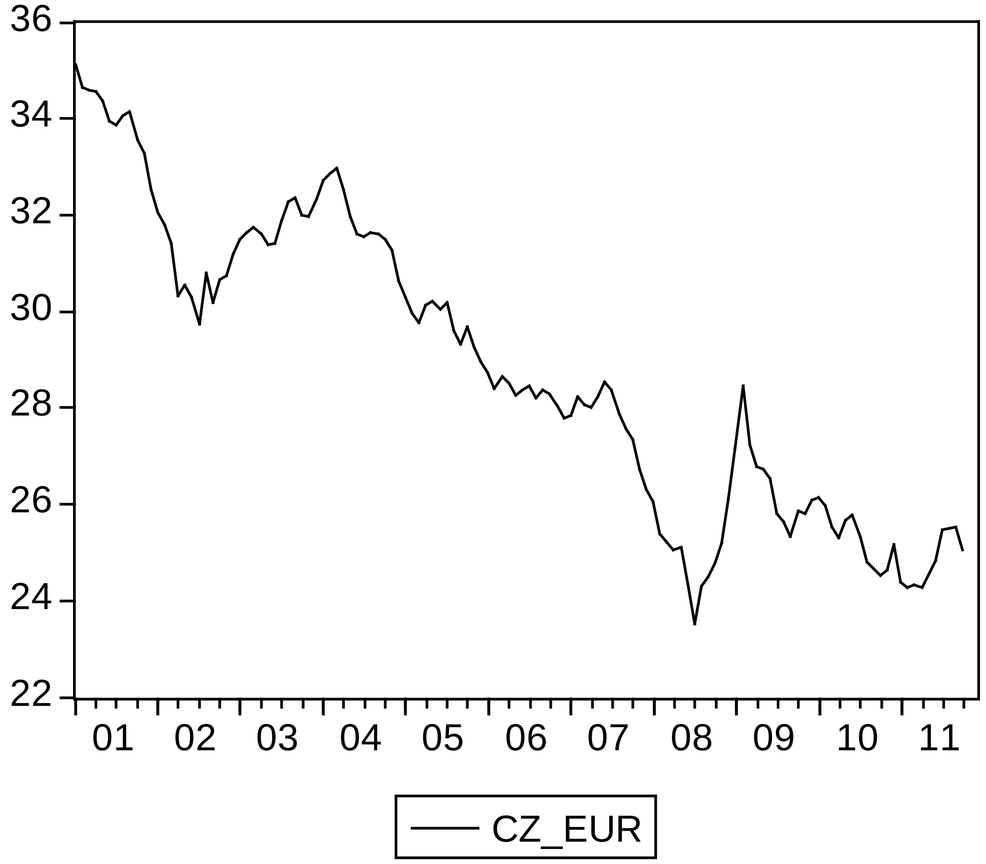


Figure 1: Czech-Euro exchange rate

For Hungary, the CGARCH model revealed that the coefficient of the temporary component is bigger than the permanent one. We interpret this that the country has flexible macroeconomic structures enabling it to absorb potential shocks. In this context, the additional risk premiums reflected by the UIP failure do not imply a speculative behavior. This interpretation of our findings is in line with Ghoshray and Morley (2012) who found similar results.

Poland also rejects the UIP, though depending of the analysed currency the conditional standard deviation follows different processes. For the US-Dollar it is the EGARCH while for the Euro it is the CGARCH.

Romania also rejected UIP. In this context, the exchange rate differential encompasses an additional risk premium. The dynamics of conditional standard deviation is somewhat different for the two currency pairs (figures 2 and 3). The peaks are more pronounced in case of the dollar exchange rate while the persistence is lower on shorter time-periods. In contrast the euro's conditional standard deviation exhibits a persistence on longer periods of time; nevertheless, the standard deviation is decreasing during the last period of time.

Figure 2: Romanian leu/Euro parity

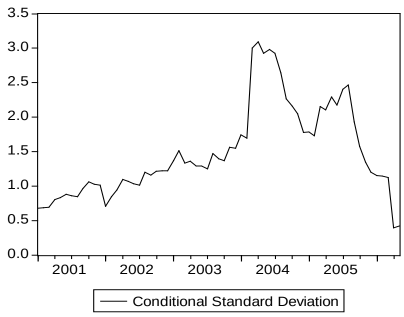
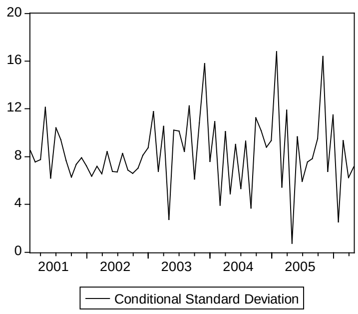


Figure 3: Romanian leu /Dollar parity



We interpret the reduced Euro volatility of Romania in the recent years as an increasing focus of the Romanian economy towards the EU leading to a more stable exchange rate expectation. This cannot be claimed for the US

In summary, the empirical results highlight that UIP is not confirmed. This predominant failure at the level of the CEE countries can be explained in the light of the violation of the assumptions that underlie the UIP theory. For this theory to hold, it is essential that a large number of factors occur such as perfect capital mobility, risk neutrality and negligeable transaction costs and so on. In addition, identical assets in terms of default risk, liquidity and maturity are also required for UIP confirmation.

The underlying fundamentals of CEE countries, characterized by macroeconomic instability may have led to imperfect capital mobility, high transaction costs as well as risk aversion.

Past studies unveiled that emerging countries exhibit a higher macroeconomic instability, especially due to their low potential to conduct counter-cyclical monetary and fiscal policies (Kočenda and Poghosyan, (2010), Frankel and Poonawala (2010)).

An example of a CEE specific fundamental are the inflation dynamics which frequently violated the convergence criteria and eroded financial stability, contributing to an additional risk premium that envisaged the reward of the risk aversion behavior.

A review of the inflationary process in the CEE countries reveals a pathway with strong inflation pressures (figures 4-6); indeed, in shorter periods of time, there is a temporary downturn dynamic, but the predominant feature encompasses a gradual increase.

The inflationary pressures were explained through the prism of the transition process from the centralized planned economy to the market economy; in this context, shocks originating both in the supply and demand side, reflected in administered prices and excises duties adjustments, as well as various developments in commodity prices, conducted to the inflationary pressure.

Figure 4: Inflation Rates of Bulgaria and Czech Republic

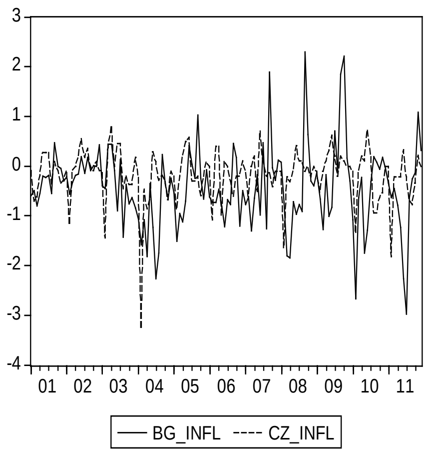


Figure 5: Inflation Rates of Hungary and Romania

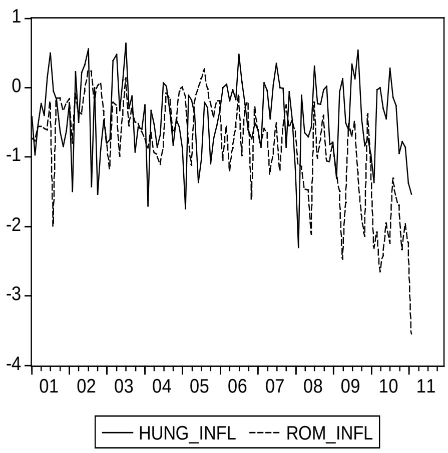
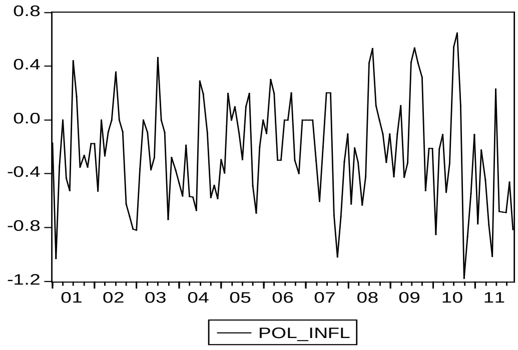


Figure 6: Inflation Rate of Poland



The initial inflationary pressure may be the result of the catching up process and the associated overheating phenomenon. This aspect is potentiated in the context of the fixed exchange rate regime that does not offer the opportunity to operate appropriate adjustments in order to accommodate the money supply to the evolution of the macro-financial variables.

Essentially, the catching up process favored an accelerated economic growth in the CEE countries; prior to financial crisis outbreak, Bulgaria, Czech Republic and Romania unveiled an average economic growth of more than 5%, while Hungary and Poland revealed an economic growth superior to 4%. Francis et. al (2002) pointed out that sustained economic growth conducts to the stabilization of the national currency; in the absence of an interest rate decline, excess returns increase and trigger the rejection of the UIP theory.

Another potential explanation for the UIP failure might consist of the deterioration public finance indicators; except for Bulgaria that exhibits a budget deficit that complies with the requirements imposed by the relevant convergence criteria (below 3% threshold level), the other CEE countries have not revealed compliance as for this indicator. Concerning public debt, Hungary seems to be the only country that revealed breaches of the 60% predetermined level. All the other countries unveil an important fiscal discipline from this perspective; for example, Bulgaria and Romania have an average public debt for this period of 16% and 30%, which is extremely conservative taking into account the reference value.

The worsening of public finance indicators occurred in the context of a series of structural deficiencies; these deficiencies are reflected in a low level of government revenues collection. During the period 2004-2011, all the CEE countries reported relatively low average revenue as a proportion of GDP (Bulgaria and Romania – 30%, Czech Republic, Bulgaria, Hungary and Poland – 40%) while countries from the euro-zone reported values in excess of 100% for this indicator. Apart from that taxes made up less than 50 % of government revenue in Hungary, the Czech Republic and Slovakia in 2011, but almost 85 % of government revenue in Denmark.

The low level of government revenues collection has been explained by inefficient policies in this field determined by volatility or loopholes in the fiscal legislation framework that changed frequently under the impact of different political regimes (Kocenda et. al (2008)). In addition, official statistics reported that on average 40% out of taxable amounts currently remain undeclared in Romania and Bulgaria, highlighting the fiscal evasion phenomena.

Other studies brought forth important value of corruption index for Bulgaria and Romania during the last decade, revealing that corruption risks in these two countries were widespread. The assessments performed for Romania and Bulgaria identified problematic areas: for Bulgaria there have been set forth a weak institutional framework and politically oriented management and business, while in Romania the assessment pointed out deficiencies in the public sector, triggered by significant involvement of political parties.

As for the other CEE countries (Czech Republic, Hungary and Poland), official statistics relative to the corruption index unveiled a better situation in comparison with Bulgaria and Romania; nevertheless, some structural changes are still required in order to ensure the harmonization with the euro area.

Moreover, the integration of these countries in the EU required the amendment of legal framework in order to ensure compliance with the requirements imposed at the European level. Previous researches uncovered that the adaptation of the legal framework in various fields (financial and banking system, fiscal system, consumer protection) was not sufficient for the purposes of real convergence process since the amendments were of formal nature; in essence structural reforms were required in order to accelerate the catching up process. Their absence gave incentive to important deficiencies that determined the risk aversion behavior among investors and the corresponding risk premiums.

The deterioration of budget balance contributes indirectly to inflationary pressures taking into consideration the mandatory financing process; from this perspective, the spiral effects might give incentive to additional inflationary effects.

A similar effect might be explained in the light of the current account deficit that these countries revealed in the last decade; prior to the financial crisis outbreak, all the CEE countries have shown an important current account deficit, being in most of the cases demand driven. Since macroeconomic structures were not solid enough in order to cover the high consumption by internal production, the imports were predominant.

At the end of 2008, share of net foreign asset position in GDP has deteriorated in most of the countries, reaching negative values of almost 100% in case of Hungary and 80% in case of Bulgaria and Romania.

Nevertheless, Zorzi et. al (2009) revealed that catching up process favored the financing of current and capital account deficits by the intermediary of foreign direct investments to an extent of more than 100% in case of Bulgaria, Czech Republic, Poland and Romania. The potential for this financing mechanism decreased once ignited the financial crisis to almost 50%, but meanwhile, demand collapsed and the need for financing followed a similar trajectory.

Nevertheless, the predominant rejection of the UIP theory at the level of the countries under review highlights that the equilibrium of the trade balance does not necessarily incur a positive impact on interest rate differential, shedding light on potential structural causes that lead to the accumulation of additional risk premiums (Balfoussia and Wickens (2007)).

In line with these aspects, an important structural element that might explain the failure of this theory consists of the financial system development degree; previous researches[7] revealed that there is a notable gap between the euro area and Central and Eastern Europe concerning the weight of financial system into GDP, which reached 1584% in 2000 and 2287% in 2010 in the euro area, while in case of Central and Eastern European countries, it reaches much lower levels.

The highest value of the indicator is recorded in Poland (248% of GDP in 2000 and 372% in 2010), followed closely by the Czech Republic (85% in 2000 and 98% in 2010), Hungary (80% in 2000 and 87.73% in 2010) and Bulgaria (50% in 2000 and 95% in 2010).

---

[7] Triandafil (2011).

Romania occupies the last position in the ranking of European Central and Eastern countries in the financial system development degree, which in 2000 had a share of 32% of GDP and 50% in 2010.
Apart from that, the financial system is predominantly banking oriented. In opposition with the euro area where the banking system represents only 4% out of the financial system, the average value for this indicator amounts to 80% in the CEE countries. In spite of other studies that revealed the accelerated rhythm of the financial integration in this geographical area during the last decade (Ferreira and Leon-Ledesma, ((2007)), significant discrepancies in the real convergence process between CEE countries and euro zone triggered by differences in the financial system development degree still persist. As such, financial system depth is still in an early stage, resulting in important transaction costs, which adds on other layers of risk premiums that determines the deviation from the UIP theory.

As mentioned partly above the exchange rate regime in all countries is a controlled floating one, involving discretionary interventions from the central banks. These interventions have been considered in the literature as triggers for deviations from UIP (Cihac and Mitra, (2009)). Previous researches unveiled important interventions made by central authorities in order to sustain the exchange rate dynamic in Czech Republic, Hungary, Poland and Romania beginning with 90's; most of the researches brought forth that these interventions are effective only in the short run, favoring a slight appreciation of the national currency (Egert, (2007), Fidrmuc and Horváth ((2008)), which brings forth the UIP theory rejection. Kocenda and Poghosyan (2010) underlined the important effect that monetary policy exerts on the behavior of exchange rates in Central and Eastern economies, unveiling the contribution of this effect in the pricing of contingent claims achieved by investors.

Conclusions

The objective of this paper is twofold: on one hand, it envisages to test UIP at the level of the CEE countries while on the other hand, it encompasses the identification of factors which may have determined the predominant failure of this theory and which are specific to the CEE countries.

Initially, the rejection of the theory was explained in the light of the violation of the assumptions that underlie the UIP theory. For this theory to hold, it is essential that a large number of assumptions are vaild; perfect capital mobility, risk neutrality and negligeable transaction costs and so on. In addition, identical assets in terms of default risk, liquidity and maturity are required for UIP confirmation.

The underlying fundamentals of CEE countries, characterized by an important macroeconomic instability resulting in imperfect capital mobility, high transaction costs as well as risk aversion.

The research puts a special emphasis on the inflation processes in these countries; the important inflationary pressures that frequently implied violation of convergence criteria determined the erosion of the financial stability, contributing to an additional risk premium that envisaged the reward of the risk aversion behavior.

The inflationary pressures can be explained by the transition process from a centralized planned economy to the market one. In this context, shocks originating both in the supply and demand side, reflect in administered prices and excises duties adjustments, as well as various developments in commodity prices, conducted to the inflationary pressure.

Other possible explanations involve the catching up process and the overheating phenomenon of the economy that bring in significant effects on the inflationary pressures. This aspect is enforced by the fixed exchange rate regime that does not offer the opportunity to operate appropriate adjustments in order to accommodate the money supply to the evolution of the macro-financial variables.

Another potential explanation for the UIP failure might consist of the deterioration public finance indicators.

The deterioration of budget balance contributes to uncertainty regarding the macroeconomic development and therefore destabilizes exchange rate expectations.

A similar effect might be explained in the light of the current account deficit that these countries revealed in the last decade.

Nevertheless, the predominant rejection of the UIP theory in these countries highlights that the equilibrium of the trade balance does not necessarily incur a positive impact on interest rate differential, shedding light on potential structural causes that lead to the accumulation of additional risk premiums (Cihac and Mitra, (2009)).

In line with these aspects, an important structural element that might explain the failure of UIP is the degree of development of the financial system.
In spite of the accelerated rhythm of the financial integration in this geographical area during the last decade, significant discrepancies in the real convergence process between CEE countries and the Eurozone still persist. As such, the depth of the financial system in the economy is still at an early stage, resulting in high transaction costs, which adds another layer of risk premiums that determines the deviation from the UIP theory.

Apart from that, the research unveiled inconsistencies at the level of the institutional framework which is marked by important involvement of the political factor. For this reason, the accumulation of additional risk premiums and the implicit rejection of the UIP occurred.
The paper contributes to the creation of a complex perspective on the ability of these countries to comply with the Maastricht convergence criteria. The research sheds light on the countries limited capacity to achieve nominal and real convergence envisaged in the not too distant future.

Bibliography

Alper, C. E., O. P. Ardic, and S. Fendoglu (2009), *The economics of uncovered interest parity condition for emerging markets: a survey*, Journal of Economic Surveys, Vol. 23, No. 1, pp. 115-138.

Baillie, R. T. and T. Bollerslev (2000), *The forward premium anomaly is not as bad as you think*, Journal of International Money and Finance, Vol. 19, no. 4, pp. 471-488.

Balfoussia, C. and M. Wickens (2007), *Macroeconomic Sources of Risk in the Term Structure*, mimeo, Department of Economics, University of York

Bansal, R. and M. Dahlquist (2000), *The forward premium puzzle: different tales from developed and emerging economies*, Journal of International Economics, Vol. 51, No. 1, pp. 115-144.

Bekaert G. et al. (2007), *Uncovered Interest Rate Parity and the Term Structure*, Journal of International Money and Finance, 26, 1038-1069.

Boubakri, S. and C. Guillaumin (2010), *Financial Integration and Exchange Risk Premium in CEECs, Evidence from the ICAPM*, Available at http,//europeanintegration.org/?p=91.

Bratsiotis, G. J., and W. Robinson (2006), *Currency composition of debt, risk premia and the 1997 Korean crisis*, Economic Modelling 22: 459-471.

Ca' Zorzi, M., Chudik Alexander and A. Dieppe (2009), *Current account benchmarks for central and eastern Europe - a desperate search?*, European Central Bank

Chaboud A.P. and J.H. Wright (2005), *Uncovered Interest Parity: It works but not for long*, Journal of International Economics, 66(2), 349-362.

Cihák M. and S. Mitra (2009), *The Financial Crisis and European Emerging Economies*, Finance a úver--Czech Journal of Economics and Finance, 59(6):541–553.

Chinn, M. D. and G. Meredith (2004), *Monetary policy and long-horizon uncovered interest parity*, IMF Staff Papers, Vol. 51, No. 3, pp. 409-430.

Conway, P. (2012), *The exchange rate as nominal anchor: A test for Ukraine*, Journal of Comparative Economics, Volume 40, Issue 3, August 2012, Pages 438–456

Engle, Robert F and K. Ng. Victor (1993), *Time-Varying Volatility and the Dynamic Behavior of the Term Structure*, Journal of Money, Credit and Banking, Blackwell Publishing, vol. 25(3), pages 336-49, August.

Dandan, L., A Ghoshray and B. Morley (2011), *Uncovered Interest Parity and the Risk Premium*, University of Bath, Department of Economics in its series Department of Economics Working Papers with number 02/11.

Domowitz, I., Glen, J. and Madhavan, A. (1998), *Country and Currency Risk Premia in an Emerging Market*, The Journal of Financial and Quantitative Analysis 33(2): 189- 216.

Egert, B. (2007), *Central bank interventions, communication and interest rate policy in emerging European economies*, Journal of Comparative Economics, Elsevier, vol. 35(2), pages 387-413, June.

Ferreira, A. L., and M.Leon-Ledesma (2007), *Does the Real Interest Rate Parity Hold?, Evidence for Emerging and Developing Countries*, Journal of International Money and Finance 26(3): 364-382.

Fidrmuc J and R. Horváth (2008), *Volatility of Exchange Rates in Selected New EU Members: Evidence from Daily Data*, Economic Systems, 32(2):103–118.

Frankel, J. A. and J. Poonawala (2010), *The forward market in emerging currencies: Less biased than in major currencies*, Journal of International Money and Finance, 29(3), 585–598.

Filipozzi, F. and K. Harkmann (2010), *The financial crisis in Central and Eastern Europe: The measures and determinants of the exchange market pressure index and the money market pressure index*, Research in Economics and Business: Central and Eastern Europe, Vol. 2, No. 2, pp. 5-36.

Flood, R. P. and A. K. Rose (2002), *Uncovered interest parity in crisis*, IMF Staff Papers, Vol. 49, No. 2, pp. 252-266.

Francis, B., Hasan, I. and D. M., Hunter (2002), *Emerging market liberalization and the impact on uncovered interest rate parity*, Journal of International Money and Finance, vol. 21, issue 6, pages 931-956

Frankel, J., and C. Okongwu (1996), *Liberalized Portfolio Capital In°ows in Emerging Markets: Sterilization, Expectations, and the Incompleteness of Interest Rate Convergenc*e, International Journal of Finance and Economics 1(1): 1-23.

Froot A.K. and K. Rogoff (1994), *Perspectives on PPP and Long-Run Real Exchange Rates*, NBER Working Paper, No. 4952.

Fujii, E. and M. Chinn (2001) *Fin de Siecle* Real Interest Parity. National Bureau of Economic Research, Working Paper 7880.

Horobet, A., S. Dumitrescu and D. G. Dumitrescu (2009), *Uncovered interest parity and financial market volatility*, Romanian Economic Journal, Vol. XII, No. 32, pp. 21-45.

Horobet, A., S. Dumitrescu and D. G. Dumitrescu (2010), *Implications of volatility for uncovered interest parity testing*, in Matousek, R. (ed.): *Money, Banking and Financial Markets in Central and Eastern Europe. 20 Years of Transition*, Palgrave Macmillan.

Hughes Hallett, A. and C. Richter, (2002), *Are Capital Markets Efficient? Evidence from the Term Structure of Interest Rates in Europe*, The Economic and Social Review, Vol. 33(3), pp. 333-356.

Hughes Hallett, A. and C. Richter, (2011), *Are the New Member States Converging on the Euro Area?: A Business Cycle Analysis for Economies in Transition*, Journal of Business Cycle Measurement and Analysis, Vol. 2011(2), pp. 49-68.

Li, D., Ghoshray, A. and B. Morley (2012), *Measuring the risk premium in uncovered interest parity using the component GARCH-M model*. International Review of Economics & Finance, 24, pp. 167-176.

Kočenda, E. and T. Poghosyan, (2010), “Exchange Rate Risk in Central European Countries.” Finance a úvěr – Czech Journal of Economics and Finance, 60(1), pp. 22-39.

Kocenda E, Kutan AM and TM Yigit (2008): Fiscal Convergence in the European Union. North--American Journal of Economics and Finance, 19(3):319–330.

Lothiana, J. R. and L. Wu (2011), *Uncovered interest-rate parity over the past two centuries*, Journal of International Money and Finance, Vol. 30, No. 3, pp. 448-473.

Mansori, K. S. (2003), *Following in their footsteps: comparing interest parity conditions in central European economies to the euro countries*, CESifo Working Paper, No. 1020.

Mehl, A. and L. Cappiello (2007), *Uncovered interest parity at distant horizons. Evidence on emerging economies and nonlinearities*, ECB Working Paper, No. 801, European Central Bank.

Marey, P. S. (2004a), *Uncovered interest parity tests and exchange rate expectations*, Computing in Economics and Finance 54, Society for Computational Economics.

Marey, P. S. (2004b), *Exchange rate expectations: controlled experiments with artifcial traders*, Journal of International Money and Finance 23: 283-304.

Orlowski, L.T. (2005), *The Development of Financial Markets in Poland*, International Finance 0502007, EconWPA.

Pesaran, H. M. and M.Weale (2006), *Survey Expectations*, In Elliott, G., Granger C.W.J. and Timmermann A. (Eds.), Handbook of Economic Forecasting, North-Holland.

Posta, V. (2012), *Estimation of the time-varying risk premium in the Czech foreign exchange market*, Prague Economic Papers, 2012, vol. 2012, issue 1, pages 3-17

Rabemananjara, R. and J. M. Zakoian (1993), *Threshold Arch Models and Asymmetries in Volatility*, Journal of Applied Econometrics, Vol. 8, No. 1, 31-49.

Sarmidi, T. and H. Salleh (2010), *Dynamic inter-relationship between trade, economic growth and tourism in Malaysia*, MPRA Paper 21056, University Library of Munich, Germany.

Sarno, L. (2005), *Towards a Solution to the Puzzles in Exchange Rate Economics: Where Do We Stand?*, Canadian Journal of Economics 38: 673-708.

Taylor A.M. (2002), *A Century of Purchasing-Power Parity, The Review of Economics and Statistics*, 84(1), 139-150.

Triandafil, C. M. (2011), *The Analysis Of The Convergence Criteria. Empirical Perspective In The Context Of The Sustainable Character Highlight*, Working Papers of National Institute of Economic Research 111205, National Institute of Economic Research.

Verdelhan, A. (2006), *A Habit-Based Explanation of the Exchange Rate Risk Premium*, Mimeo, Boston University.

Zhang, Y. (2006), *Does the Horizon Matter? – The Uncovered Interest Parity Reconsidered*, International Journal of Applied Economics, 3(2), 61-79.

Appendix no.1 – Regression results of the GARCH models at the country level

Table 1 – Statistic output for the EGARCH model in case of Bulgaria (leva euro exchange rate)

Dependent Variable: BG_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 10:37
Sample(adjusted): 2001:01 2005:07
Included observations: 55 after adjusting endpoints
Failure to improve Likelihood after 1 iteration
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
VAR_LEVA_EUR	0.005905	0.053081	0.111255	0.9114
Variance Equation				
C	1.337703	2273.834	0.000588	0.9995
|RES|/SQR[GARCH](1)	0.010000	100.9132	9.91E-05	0.9999
RES/SQR[GARCH](1)	0.010000	90.29484	0.000111	0.9999
EGARCH(1)	0.010000	1655.973	6.04E-06	1.0000

Mean dependent var	1.955800	S.D. dependent var	0.000000
S.E. of regression	2.047269	Akaike info criterion	4.357998
Sum squared resid	209.5654	Schwarz criterion	4.540483
Log likelihood	-114.8449	Durbin-Watson stat	0.008988

Table 2 – Statistic output for the TGARCH model in case of Czech Republic (krona euro exchange rate)

Dependent Variable: VAR_CZ_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 10:40
Sample(adjusted): 2001:01 2002:04
Included observations: 16 after adjusting endpoints
Convergence achieved after 118 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
VAR_EUR_CZK	-831172	8.450001	-0.962269	0.3359
Variance Equation				
C	632.9076	512.1554	1.235772	0.2165
ARCH(1)	1.383560	0.446689	3.097369	0.0020
(RESID<0)*ARCH(1)	-1.740127	0.106803	-16.29282	0.0000
GARCH(1)	0.870573	0.298178	2.919646	0.0035

R-squared	-0.089329	Mean dependent var	-58.93750
Adjusted R-squared	-0.485449	S.D. dependent var	219.9138
S.E. of regression	268.0286	Akaike info criterion	12.57734
Sum squared resid	790232.9	Schwarz criterion	12.81878
Log likelihood	-95.61874	Durbin-Watson stat	1.437509

Table 3 – Statistic output for the CGARCH model in case of Czech Republic (krona dollar exchange rate)

Dependent Variable: VAR_CZK_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 10:40
Sample(adjusted): 2001:02 2011:10
Included observations: 129 after adjusting endpoints
Convergence achieved after 237 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
VAR_USD_CZK	-0.042929	0.415667	-0.103279	0.9177
VAR_CZK_USD(1)	-0.583197	0.025736	-22.66058	0.0000
Variance Equation				
Perm: C	64.81344	46.30229	1.399789	0.1616
Perm: [Q-C]	0.951311	0.029152	32.63253	0.0000
Perm: [ARCH-GARCH]	-0.462079	0.142967	-3.232063	0.0012
Tran: [ARCH-Q]	1.083415	0.129035	8.396298	0.0000
Tran: [GARCH-Q]	-0.250709	0.092932	-2.697759	0.0070
R-squared	0.282066	Mean dependent var	0.285015	
Adjusted R-squared	0.246758	S.D. dependent var	12.11288	
S.E. of regression	10.51271	Akaike info criterion	7.240141	
Sum squared resid	13483.08	Schwarz criterion	7.395325	
Log likelihood	-459.9891	Durbin-Watson stat	2.195861	

Table 4 – Statistic output for the CGARCH model in case of Hungary (forint euro exchange rate)

Dependent Variable: VAR_IR_HUNG
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 10:49
Sample(adjusted): 2001:01 2011:08
Included observations: 128 after adjusting endpoints
Convergence achieved after 9 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
SQR(GARCH)	0.000769	0.092213	0.008338	0.9933
VAR_IR_HUNG	-0.061472	0.022053	-2.787465	0.0053
VAR_EUR_HUNG(1)	0.258765	0.079385	3.259641	0.0011
Variance Equation				
Perm: C	4.410671	1.439320	3.064414	0.0022
Perm: [Q-C]	0.974425	0.027226	35.79064	0.0000
Perm: [ARCH-GARCH]	0.021230	0.030606	0.693664	0.4879
Tran: [ARCH-Q]	0.071916	0.078514	0.915961	0.3597
Tran: [GARCH-Q]	-0.640152	0.202736	-3.157561	0.0016
R-squared	0.128306	Mean dependent var	0.138228	
Adjusted R-squared	0.077457	S.D. dependent var	2.136537	
S.E. of regression	2.052125	Akaike info criterion	4.234120	
Sum squared resid	505.3459	Schwarz criterion	4.412372	

Log likelihood	-262.9837	Durbin-Watson stat	1.768573

Table 5 – Statistic output for the CGARCH model in case of Hungary (forint dollar exchange rate)

Dependent Variable: VAR_IR_USD
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 10:50
Sample(adjusted): 2001:02 2011:10
Included observations: 129 after adjusting endpoints
Convergence achieved after 28 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-0.008367	0.003355	-2.493688	0.0126
VAR_USD_HUNG	0.077754	0.054499	1.426706	0.1537
VAR_HUNG_USD(1)	-0.702103	0.029339	-23.93083	0.0000
VAR_HUNG_USD(2)	-0.243981	0.043642	-5.590546	0.0000
Variance Equation				
Perm: C	100.0178	53.19676	1.880149	0.0601
Perm: [Q-C]	0.744625	0.600529	1.239949	0.2150
Perm: [ARCH-GARCH]	0.363640	0.020323	17.89334	0.0000
Tran: [ARCH-Q]	0.428973	0.143587	2.987539	0.0028
Tran: [GARCH-Q]	0.275235	0.456050	0.603520	0.5462

R-squared	0.319845	Mean dependent var	0.242625
Adjusted R-squared	0.274501	S.D. dependent var	11.82905
S.E. of regression	10.07554	Akaike info criterion	7.009786
Sum squared resid	12181.97	Schwarz criterion	7.209308
Log likelihood	-443.1312	Durbin-Watson stat	1.915949

Table 6 – Statistic output for the CGARCH model in case of Poland (zlot euro exchange rate)

Dependent Variable: VAR_POL_IR
Method: ML - ARCH (Marquardt)
Date: 08/12/12 Time: 19:42
Sample(adjusted): 2001:01 2011:07
Included observations: 127 after adjusting endpoints
Convergence achieved after 23 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	0.030834	0.049338	0.624950	0.5320
VAR_POL_EUR	0.170935	0.049654	3.442543	0.0006
VAR_POL_EUR(1)	0.451548	0.072079	6.264618	0.0000
VAR_POL_EUR(2)	-0.076208	0.075281	-1.012323	0.3114
VAR_POL_IR(1)	-0.037258	0.046579	-0.799879	0.4238
VAR_POL_IR(2)	-0.101563	0.053180	-1.909783	0.0562
Variance Equation				
Perm: C	4.274553	1.332452	3.208036	0.0013
Perm: [Q-C]	0.907794	0.104624	8.676693	0.0000

Perm: [ARCH-GARCH]	0.114773	0.059064	1.943187	0.0520
Tran: [ARCH-Q]	-0.068395	0.054691	-1.250555	0.2111
Tran: (RES<0)*[ARCH-Q]	0.263968	0.088782	2.973205	0.0029
Tran: [GARCH-Q]	-0.911144	0.055283	-16.48152	0.0000
R-squared	0.287209	Mean dependent var		0.148675
Adjusted R-squared	0.219029	S.D. dependent var		2.546397
S.E. of regression	2.250317	Akaike info criterion		4.398478
Sum squared resid	582.3513	Schwarz criterion		4.667220
Log likelihood	-267.3034	Durbin-Watson stat		1.825969

Table 7 – Statistic output for the EGARCH model in case of Poland (zlot dollar exchange rate)

Dependent Variable: VAR_POL_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 15:01
Sample(adjusted): 2001:02 2011:09
Included observations: 128 after adjusting endpoints
Convergence achieved after 26 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-0.006306	0.004682	-1.346812	0.1780
VAR_POL_USD	-0.049348	0.055255	-0.893089	0.3718
VAR_POL_USD(1)	-0.734109	0.021157	-34.69826	0.0000
VAR_POL_USD(2)	-0.250650	0.026608	-9.419987	0.0000
		Variance Equation		
C	-0.030848	0.345326	-0.089330	0.9288
|RES|/SQR[GARCH](1)	1.919678	0.214627	8.944232	0.0000
RES/SQR[GARCH](1)	0.016608	0.134549	0.123437	0.9018
EGARCH(1)	0.667056	0.068469	9.742386	0.0000
R-squared	0.273984	Mean dependent var		0.166396
Adjusted R-squared	0.231633	S.D. dependent var		11.84368
S.E. of regression	10.38176	Akaike info criterion		6.851139
Sum squared resid	12933.71	Schwarz criterion		7.029391
Log likelihood	-430.4729	Durbin-Watson stat		1.682151

Table 8 – Statistic output for the EGARCH model in case of Romania (leu euro exchange rate)

Dependent Variable: VAR_ROM_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 15:04
Sample(adjusted): 2001:01 2006:05
Included observations: 65 after adjusting endpoints
Convergence achieved after 29 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-0.143081	0.084957	-1.684144	0.0922
VAR_ROM_EUR	-0.005522	0.004495	-1.228589	0.2192
VAR_ROM_EUR(1)	0.249605	0.045220	5.519825	0.0000
Variance Equation				
C	0.014328	0.464351	0.030856	0.9754
|RES|/SQR[GARCH](1)	1.155124	0.332275	3.476414	0.0005
RES/SQR[GARCH](1)	-0.071082	0.155038	-0.458482	0.6466
EGARCH(1)	-0.603821	0.220460	-2.738910	0.0062
R-squared	0.199946	Mean dependent var	-0.306114	
Adjusted R-squared	0.117182	S.D. dependent var	1.804226	
S.E. of regression	1.695221	Akaike info criterion	3.652943	
Sum squared resid	166.6790	Schwarz criterion	3.887108	
Log likelihood	-111.7206	Durbin-Watson stat	1.658797	

Table 9 – Statistic output for the EGARCH model in case of Romania (leu dollar exchange rate)

Dependent Variable: VAR_ROM_IR
Method: ML - ARCH (Marquardt)
Date: 11/11/12 Time: 15:05
Sample(adjusted): 2001:02 2006:04
Included observations: 63 after adjusting endpoints
Convergence achieved after 34 iterations
Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
VAR_ROM_IR	0.034565	0.018238	1.895221	0.0581
VAR_ROM_USD(1)	-0.629622	0.053343	-11.80319	0.0000
VAR_ROM_USD(1)	0.013068	0.035954	0.363456	0.7163
Variance Equation				
C	0.449799	0.416900	1.078911	0.2806
|RES|/SQR[GARCH](1)	1.023536	0.279045	3.668003	0.0002
RES/SQR[GARCH](1)	-0.916004	0.229488	-3.991510	0.0001
EGARCH(1)	0.694267	0.110383	6.289612	0.0000
R-squared	0.335654	Mean dependent var	0.499247	
Adjusted R-squared	0.264474	S.D. dependent var	10.19254	
S.E. of regression	8.741409	Akaike info criterion	6.920581	

Sum squared resid	4279.085	Schwarz criterion	7.158707
Log likelihood	-210.9983	Durbin-Watson stat	2.108529