



## **EXCHANGE RATE BEHAVIOUR OF EAST EUROPEAN TRANSITIONAL ECONOMIES**

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### **Abstract**

Eastern European countries, which are candidates for accord into the Exchange Rate Mechanism (ERM) and the eventual move towards Euro, find exchange rate management a tedious challenge. This paper examines the underlying factors that move exchange rates and helps us to contribute towards streamlining policies and strategies in moving these countries forward. The new findings on exchange rate determinants for this group of transitional economies are based on parity factors as well as non-parity factor effects. The evidence that emerges from this paper is that non-parity factors including economic growth rate, current account and capital flows are significantly correlated with exchange rates. The results are robust whichever data set is used, high-frequency and low-frequency data sets.

Keywords: Exchange rates, Prices, Trade and capital flows, Foreign debt, Reserves, Growth

JEL Classification: F31, F32, C33, E31, F43

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### **1. Introduction**

Eastern European countries have plans to join and some are already very close to being in the European Union (EU). Some of them are considering membership in Exchange Rate Mechanism (ERM) and eventually are likely to adopt the Euro as their currency. It is essential that monetary and inflationary policies are in line with the other more developed EU countries prior to the likely merger with the Euro zone. In this context of former Soviet satellites seeking to fully incorporate into a different exchange rate mechanism, it is vital that a study is done to understand the factors that affect their exchange rate movements based on their current separate currencies. Insufficient attention to the role of exchange rate movements during the pre-ERM period will impede the effectiveness of their macroeconomic policies.

Czech Republic and Poland fixed their exchange rates at the beginning of the transition from a centrally planned to a market economy, but later gradually

moved from pegs to the current more flexible currency regime. These transition countries have experienced relatively high inflation and marked changes in their currencies. It is part of the consequences of opening their economies to external trade and investments, and the strong productivity growth in the traded sector. Romania has had a floating regime since 1991 but they started to increase management of their exchange rates since then and are currently under a managed float with Euro dollar as a reference currency. Slovenia, Hungary and Slovakia have managed floats with target monetary growth and interest rates in line with the other EU countries.<sup>1</sup>

Empirical evidence on the behaviour of exchange rates across the world has been mixed. This paper tests the two parity theorems jointly using panel estimation methods - both time series and cross-sectional tests at the same time that maximizes the use of information in a data set. The tests are done within a cluster of countries that are heavily trade-related as Eastern European economies. Many researchers have pointed out that exchange rate is determined by a number of fundamentals and omission of some of these variables is perhaps the main reason why prior results yielded mixed findings (Meese and Rogoff: 1983, 1988, Frankel and Rose: 1996a, and Muscatelli, Spinelli and Trecroci: 2007) and these studies were not able to support parity theorems. Much effort at studying exchange rates between pairs of countries has yet provided little consistent findings and so newer approaches using multi-country framework as in this research paper using pooled time series panel data methodology for a group of countries is needed as are already evident in recent literature.

It is the aim of this study to extend the literature by looking systematically at the contributions of parity and non-parity variables. The resulting findings can be expected to lead to improved understanding of the dynamics of how exchange rates are determined by factors beyond traditional parity conditions. The remainder of this paper is divided into five sections. The next section contains a brief overview of the current literature relevant to this study. Section three describes the methodology, followed by the presentation of the findings in section four. The paper ends in section five with a conclusion.

## **2. Literature on Exchange Rates**

More central banks across Eastern Europe are adopting monetary adjustment towards the European Monetary System in order to be included as a party to the Union. There exist many issues that need to be assessed in each respective economy prior to the merging of the currency region. During this transition stage, it is vital that major hurdles other than monetary and inflationary expectations controls be in place but exchange rate stability and ability of each economy to join at an appropriate exchange rate is of utmost importance. Moreover, Eastern European countries have experienced changes in political and economic transformations in the last decade or two. Their exchange rate credibility is vital

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<sup>1</sup> IMF: Annual report, 2006 and IMF: "Exchange Arrangements and Exchange Restrict", October 2007.

for attracting international trade and investment to speed up the overall growth and development of these nations. Understanding exchange rate movements and the effects of fundamentals will alleviate mismanagement of exchange rates as these countries prepare for a common currency.

The concept of *Purchasing Power Parity* (PPP) is nothing new and it is a very long term expectation of how currency achieves equilibrium exchange rate in the long run. It has been sometimes rated as a poor tool even in the long run (Murray and Papell; 2005, Kuo and Mikkola; 2001, Lothian and Taylor; 2000, MacDonald; 1993 and Rogoff; 1996). With years of high exchange rate volatility in the world following the breakdown in 1973 of the Bretton Woods System, studies to verify the PPP have failed to show that the PPP holds in the short term.<sup>2</sup> The apparent lack of evidence on PPP under the floating regimes that followed the breakdown in most cases motivated the development of the sticky price hypothesis, which is an over-shooting exchange rate model of Dornbusch (1976). However with longer time series and more sophisticated methodology, studies have shown some significant results consistent with the sticky price hypothesis.<sup>3</sup>

According to PPP, the exchange rate will adjust relative rapidly to the ratio of domestic and foreign price levels according to equation (1) with exchange rate defined as domestic currency units in terms of one unit of foreign currency. Where the change in exchange rate  $E$  is a function of price differentials, where  $j$  represents country,  $t$  represents time period,  $P$  represents prices,  $d$  domestic and  $f$  foreign.

$$\ln E_{jt} = a_j + b_j \ln \left( \frac{P_t^d}{P_t^f} \right)_j + \mu_{jt} \quad (1)$$

Another theory that comes to affect exchange rate of a currency is the *Interest Rate Parity* (IRP) theory which suggests that the interest rate differential between any two currency areas adjust the exchange rates of the two areas. This may be more relevant to emerging nations when current world financial market is increasingly liberalized and therefore subjected to global interest rate influence.<sup>4</sup> In theory, the foreign exchange market should be in equilibrium when deposits of all currencies offer the same rate of return provided that open economic and

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<sup>2</sup> Adler and Lehman (1983) found that the deviations from PPP follow a random walk without reverting back to PPP for 43 countries. Studies including Juselius and MacDonald (2004), and Sertelis and Gogas (2004) found contradictory or at best weak evidence on PPP.

<sup>3</sup> Parsley (2007), Mark and Sul (2001), Schnabl and Baur (2002), and Smallwood (2007) found considerable evidence for long run relation and concluded that fundamentals play a significant role in determining exchange rates.

<sup>4</sup> Studies that provided evidence include Mark (1995), Ehrmann and Fratzscher (2005) and Chaboud and Wright (2005) found measures of long run expected changes in exchange rates highly correlated with interest rate differentials. However recently, Bekaert, Wei and Xing (2007) found mixed results for interest parity.

capital movements are permitted. According to the uncovered interest rate parity, the ratio of changes in exchange rate  $E$ , within a time period  $t$ , is a function of domestic interest rate  $i^d$ , and foreign interest rate  $i^f$ .

$$\frac{E_{t+1}}{E_t} = \left( \frac{1 + i_t^d}{1 + i_t^f} \right) \quad (2)$$

There are other variables which are correlated with exchange rate movements as predicted by mainstream economic theories. Inclusion of these variables should assist researchers in their attempt to explain exchange rate behaviour.<sup>5</sup> In recent years there has been increased interest in these factors, given the conflicting empirical evidence on price parity theories. Exchange rate determination has not only been linked to parity conditions as in Cassel (1918), Keynes (1923) and Fisher (1930), or trends in productivity as in Balassa (1964) and Samuelson (1964) but to other international trade, capital and investment issues.

Studies of financial crises in Latin America and East Asia have been motivated by an interest in the roles of *balance of payments, trade and capital flows*. Trade liberalization has introduced volatility in the balance of payments, and the increase in *current account* flow directly affects currencies. Trade in goods accounts for a large proportion of GDP in Asia and the European developing countries. Sudden outflow of capital including *portfolio and foreign direct investment* is another major concern when it drastically affects exchange rates as were seen during the financial crises of Brazil, East Asia, and Mexico. It is well documented that the recent currency crises were due to vast changes in these variables, including Kim (2000) and Kaminsky and Reinhart (1999). Recent studies by Lee and Chinn (2006), Baharumshah and Masih (2005), and Bergin (2006) found relation between current account, output growth, inflation and exchange rate. In relation to trade and capital flows, *international reserves* act as a mean to defend a country's currency and provides credibility to currency value and therefore is another factor affecting exchange rate determination.<sup>6</sup>

On the part of the government management, Calvo, Leiderman and Reinhart (1994) on Latin American countries, and Marini and Piersanti's (2003) study covering Asian countries found that a rise in current and expected future *budget deficits* generated appreciation in exchange rates. Hsiao and Hsiao (2001) found a unidirectional causality from short-term *external debt/international reserves* ratio to exchange rates in Korea. Similar to Martinez (1999) on Mexico, Frankel

<sup>5</sup> Frankel and Rose (1996b) on current account and government budget deficits; Calvo, Leiderman and Reinhart (1994) on capital flows, inflation and current account deficits; and Aizenman and Marion (2002) on reserve and credibility; Hagen and Zhou (2007); and others.

<sup>6</sup> Korea's usable reserve fell from US\$28 billion to a mere US\$6 billion when their currency went on a free fall in December 1997: Aizerman and Marion (2002). Brazil's reserves fell from US\$75 billion to less than half of that before the currency collapsed in 1998: Dornbusch and Fisher (2003).

and Rose (1996b) studied a large group of developing countries and found that the level of debt, foreign direct investment, foreign interest rates, foreign reserves and growth rates affect exchange rates significantly.

Papell and Theodoridis's (1998) study on *openness to trade*, exchange rates and prices found stronger evidence of PPP for countries with less exchange rate volatility and shorter distance from other countries but not for countries with greater openness to trade. Using a panel of OECD countries, Canzoneri, Cumby and Diba (1999) found that when relative productivity of traded goods grew more rapidly in Italy and Japan than in Germany, both lira and yen appreciated in real terms against Deutschemark. MacDonald and Wojcik's (2003) study on EU accession countries found that *productivity*, as well as private and government consumption significantly affect exchange rate behaviour. Frommel, MacDonald and Menkhoff (2005), Vlaar (2007) and Bailey, Millard and Wells (2001) found evidence of a relationship between productivity, growth and exchange rates. Chinn (2000) provided evidence on productivity explanation for long-run real exchange rate movements in East Asia: Japan, Indonesia, Korea, Malaysia and Philippines but not for Singapore, China, Thailand and Taiwan.

### 3. Data and Methodology

The data relating to exchange rates between individual countries, and the United States (U.S.) dollar as the foreign unit are observed at end of observation periods. The *International Financial Statistics* (IFS) is the major source for these data for both quarterly and yearly time series. Price variable of Consumer Price Index (CPI) of individual countries; Treasury-bill and money market rates are used to arrive at the interest differentials between countries. U.S. short term Treasury-bill rate is the foreign interest rate for measuring interest differentials between countries. Changes in exchange rates, prices and interest differentials are calculated using natural logarithm.

The non-parity current and capital flow variables include: trade balance (Trade) from imports and exports of goods, current account balance (Cur), balance of payments (BOP) from overall balance, capital flows include both inflows and outflows of foreign direct investment (FDI) and portfolio investments (Pt), total reserves (TRes) as well as foreign debt (FD). Monetary expansion data is broader money<sup>7</sup> (M2) which includes both money and quasi-money. Growth rate (Prodty) is measured by change in Gross Domestic Product (GDP) per capita. The set of dummy variables includes exchange regimes which are grouped into three categories: free-float, exchange band/managed, and fixed regime. Trade openness is measured by total trade (TTrade), that is, the sum of total imports and exports, as a proportion of GDP. Incomplete data are sourced from DataStream, World Bank as well as individual country's Central Banks and Statistical Departments.

The countries included in this study consist of eight in the Eastern European region: Czech Republic, Hungary, Poland, Romania, Russia, Slovak, Slovenia and Turkey and data relate to the period 1994-2004 with quarterly and yearly data. The reasons behind the choice of countries are the high level of inter-trade between countries in the similar geographical region and the availability of

information on these nations. This study investigates exchange rates until 2004 because it recognizes that some of these Eastern European countries have moved into the EU with other exchange rate arrangement since then.

#### 4. Pooled Series Panel Model

As the sample data are limited to just over a decade of transition since the most useful time series are available only on an annual basis: similar studies typically use panel estimation for a larger number of these economies. Both seemingly unrelated regression (SUR) and fixed effect (FE) pooled data model are employed to investigate exchange rate behaviour. SUR allows cross-sectional variations in the data set, and thus yields robust estimates of the test statistics according to Zellner, 1962. As a system of equations, this method can be applied here rather than estimating the equation in one cross section thus losing the time series variations in each country, which would be wasteful as it would leave out information in the data set. SUR is estimated using generalized least squares algorithm. Since SUR technique utilizes information on the correlation between the error terms, the resulting estimates are more precise than estimates from least squares: it also yields lower standard errors and higher  $R^2$ .

More recent studies have also concentrated on longitudinal data set. These panel data sets are more oriented toward cross-sectional analyses. Panel data provides a richer environment for the development of estimation techniques with robust test results. It allows the use of time-series cross-sectional data to examine issues that could not be studied in either cross-section or time-series settings alone. By allowing cross-sectional variation or heterogeneity to affect estimations, the resulting estimates are robust. We use the fixed effect approach here because it permits the constant term to be the country-specific variations in the regression as stated in Greene, 2003. This is referred to as the least squares dummy variable (LSDV) model. The random effect model is not appropriate for our tests. We also assume that the issue of ambiguous relationship may be minimized through the use of instrumental-variables (IV) regression. The Hausman (1978) test statistics proposed by Davidson and MacKinnon (1993) for endogeneity is applied.

In summary, this econometric model recognizes the relationships between fundamentals and exchange rate movements. The analysis of the determinants of exchange rates is carried out by estimating the pooled and panel data regressions as follows, where the subscripts  $i$  and  $t$  index country and time, respectively.

$$\begin{aligned}
 ER_{it} = & aD_i + b\left(\frac{P}{P^*}\right)_{it} + c\left(\frac{I}{I^*}\right)_{it} + dTrade_{it} + eCur_{it} + eBOP_{it} \\
 & + fInFDI_{it} + gOtFDI_{it} + hInPt_{it} + jOtPt_{it} + kFDebt_{it} + mTRe s_{it} \\
 & + nPr od_{it} + pBdgt_{it} + qTTrade_{it} + rTM y_{it} + s Re gime_{it} + \varepsilon_{it}
 \end{aligned} \tag{3}$$

The fixed effect approach allows the constant term to vary from one cross-section unit to another (the LSDV model). This helps to control for unobserved

components of country heterogeneity (through having country-specific constant terms) that may in fact drive both exchange rates and other country characteristics included in the regressions. Diagnostic tests including Unit root tests and Variance Inflation Factor (VIF) that shows how the variance of an estimator is inflated by the presence of multicollinearity are shown in tables 1 and 2.

Some data tests were conducted to ensure that the results are robust. This included the stationarity tests using the latest KPSS procedure. As is well known, this test is a better test than the earlier tests such as the ADF tests such that the resulting interpretation is robust in a small as well as large sample.

The test results as is evident from the statistics in the table, the variables in our tests are stationary, and that the results from both tests suggest that the variables are stationary with the exception of two variables entering the regression.

**Table 1:** Non-Parity Variables VIF and Tolerance Measure

Variables	Eastern Europe	
	VIF	Tolerance
LNP	1.679	0.596
LNI	1.807	0.553
Trade/GDP	3.873	0.258
Cur/GDP	3.863	0.259
BOP/GDP	2.796	0.358
InFDI/GDP	1.184	0.845
OutFDI/GDP	1.096	0.912
InPt/GDP	1.992	0.502
OtPt/GDP	1.234	0.811
TRes/IM	2.061	0.485
Bgt/GDP	1.331	0.751
TMy/GDP	1.961	0.510
PROD	2.052	0.487
FD/GDP	1.382	0.724
TTrade/GDP	1.731	0.578
Regime	1.587	0.630

\* VIF values of more than 10 shows significant multicollinearity.

**Table 2:** Unit Root Tests for Parity and Non-Parity Variables

Variables	Eastern Europe		
	ADF Test		KPSS Test
	t-stats	Model (lag)	KPSS statistic
lnER	-11.76***	C(0)	0.431*
lnP	-1.51	C(4)	0.158
lnI	-6.93***	C(2)	0.415*
Trade/GDP	-6.35***	C(7)	0.131
Cur/GDP	-8.58***	C(6)	0.131
BOP/GDP	-15.24***	C(2)	0.151
lnFDI/GDP	-26.67***	C(0)	0.112
OutFDI/GDP	-8.86***	C(7)	0.098
lnPt/GDP	-15.96***	C(2)	0.100
OutPt/GDP	-7.52***	C(7)	0.381*
TRes/IM	-14.30***	C(0)	0.034
Bdgt/GDP	-16.99***	C(2)	0.083
TMy/GDP	-11.48***	C(6)	0.134
Prody	-11.13***	C(6)	0.167
FD/GDP	-14.70***	C(2)	0.062
TTrade/GDP	-8.35***	C(6)	0.248

Note 1: Critical values for ADF tests at 10, 5 and 1% levels of significance are respectively, -2.59, -2.90 and -3.53 with a constant and -3.17, -3.48 and -4.09 with a constant and a deterministic trend. Critical values for KPSS tests at 10, 5 and 1% levels of significance are respectively, 0.35, 0.46 and 0.74 with a constant and 0.12, 0.15 and 0.22 with a constant and a linear trend.

Note 2: For the ADF tests, the unit root null is rejected if the value of the ADF t-statistics is less than the critical value. For the KPSS tests, the null of stationarity is rejected if the value of the KPSS statistic is greater than the critical value. \*, \*\* and \*\*\* denote statistical significance at 10, 5 and 1% level. The critical values for the ADF tests are from MacKinnon (1991).

## 5. Findings and Interpretation

From the results using quarterly data, and the data for one - to three-year intervals are summarized in Table 3. The coefficient for interest rate is statistically significant for all time period intervals from the short to long run. The price coefficient does not have the expected sign as predicted by the PPP and it is insignificant for all time periods. Thus, for the region of EE transitional/developing countries, the interest parity is holding but the price parity is not found to be statistically significant, probably due to the slow adjustment of prices

**Table 3: SUR and Fixed Effects Results for Eastern Europe (continued)**

Eastern Europe Observation	Quarterly		Yearly		2 Yearly		3 Yearly	
	SUR $\clubsuit$	Fixed effects $\clubsuit$ #	SUR $\clubsuit$	Fixed effects $\clubsuit$ #	SUR $\clubsuit$	Fixed effects $\clubsuit$ #	SUR $\clubsuit$	Fixed effects $\clubsuit$ #
	147	147	42	42	27	27	18	18
Intercept	.029 (2.34)**	.050 (2.56)*	-.011 (-0.26)	.009 (0.11)	.248 (3.86)*	.427 (3.59)**	.399 (3.79)*	-30.179 (-5.72)**
Parity Price	-.002 (-0.58)	-.010 (-2.43)**	.023 (1.17)	-.024 (-0.73)	-.022 (-1.11)	-.135 (-4.67)*	-.099 (-1.11)	-.017 (-0.10)
Interest	.177 (7.98)*	.165 (8.10)*	.857 (9.65)*	.503 (2.83)*	2.010 (12.09)*	1.575 (3.39)**	3.029 (8.29)*	2.913 (2.91)**
Non-Parity Trade/GDP	-.450 (-2.31)**	-.309 (-1.80)**	-.236 (-0.23)	.252 (0.26)	.227 (0.18)	2.479 (2.05)**	-	-
BOP/GDP	.018 (0.23)	.002 (0.02)	.531 (1.21)	-.204 (-0.47)	1.587 (1.89)**	-1.512 (-2.40)**	2.001 (3.15)*	3.618 (4.03)**
Cur/GDP	.274 (1.49)	.229 (1.52)	-1.032 (-0.91)	-.107 (-0.16)	-1.171 (-0.78)	-1.359 (-1.04)	-.001 (-0.70)	-2.147 (-5.72)**
InFDI/GDP	.247 (1.47)	.312 (1.97)**	-.900 (-0.93)	.044 (0.05)	-.128 (-0.15)	-2.485 (-1.74)	-.001 (-3.09)*	4.621 (5.72)**
OutFDI/GDP	.006 (0.02)	.028 (0.16)	-2.640 (-0.84)	10.778 (1.41)	-1.269 (-0.26)	-25.624 (-3.50)**	-	-
InP/GDP	-.145 (-1.25)	-.093 (-0.92)	-.034 (-0.05)	-.594 (-0.69)	-2.085 (-1.64)	-1.611 (-3.66)**	.001 (0.96)	-4.413 (-5.72)**

Table continues on the next page

Table 3: SUR and Fixed Effects Results for Eastern Europe

OutPt/ GDP	-1.09 (-0.31)	-0.01 (-0.10)	.648 (0.50)	1.932 (2.40)**	-1.249 (-0.55)	-3.122 (-6.07)*	-	-
TRes/ Im	.003 (0.09)	-0.11 (-0.25)	.257 (0.79)	.289 (1.09)	-.076 (-0.31)	.764 (3.49)**	-.364 (-1.12)	-1.618 (-2.25)
ForD/ GDP	-0.14 (-0.10)	-0.069 (-0.94)	-2.722 (-2.13)**	-.110 (-0.07)	-	-	-	-
Prody	19.715 (1.00)	-101.719 (-2.64)*	-83.978 (-2.66)*	-141.419 (-5.09)*	-104.265 (-2.70)**	45.532 (0.45)	-134.242 (-4.96)*	-212.936 (-8.60)*
Bdgt/ GDP	-1.47 (-2.14)**	-0.069 (-0.94)	2.703 (5.24)*	1.781 (1.89)***	-	-	-	-
TMyl/ GDP	-0.660 (-15.20)*	-0.538 (-4.75)*	-0.670 (-1.87)***	-.229 (-0.56)	-.237 (-0.53)	-2.191 (-1.90)	-	-
Regime	.004 (0.38)	.002 (0.21)	.066 (2.25)**	.095 (2.04)***	-.064 (-1.43)	-.126 (-2.72)**	-	-
TTrade/ GDP	.064 (1.15)	.114 (1.84)**	-.199 (-1.27)	.006 (0.03)	-.318 (-3.14)*	-.357 (-1.00)	-.354 (-1.03)	1.127 (1.29)
Adj R <sup>2</sup> F-prob	0.808 0.000	0.823 0.000	0.937 0.000	0.952 0.000	0.962 0.000	0.969 0.000	.999 0.000	0.796 0.167

The number of observations for SUR and Fixed effects is lower due to Hungary without full data until 1995, Poland without portfolio outflows data until and incomplete data for Slovakia from 2001. ♣Pooled General Least Squares with Cross-section SUR that estimates a feasible GLS specification correcting for both cross-section heteroscedasticity and contemporaneous correlation. ♠Fixed effects Pooled GLS with cross section weights where Eviews estimates a feasible GLS specification assuming the presence of cross-section heteroscedasticity. #With White's cross-section standard errors & covariance correction by treating pooled regression as a multivariate regression with an equation for each cross section and computing White-type robust standard errors for the system of equations. ♦With cross-section SUR (PCSE) using Panel Correlated Standard Error methodology standard errors & covariance correction. Numbers in parentheses are t-statistics. \*, \*\*, \*\*\* represent 1%, 5%, 10% significance level respectively. F-prob represents F-probability values and Adj R<sup>2</sup> represents adjusted R-squared values.

to exchange rates (and the short data period available from 1994). Since most of these countries are newly formed, when a lengthier time period is available in the future, later studies might be able to furnish us with more theoretically consistent results.

The role of non-parity fundamentals cannot be ignored both in the short as well as the longer term. Quarterly trade balance is statistically significant in affecting exchange rates in the shorter period where improvement in trade improves the value of the domestic currency.

Government's monetary expansion also plays an important part in influencing exchange rates in the shorter term when monetary expansion is needed to sustain rapid economic growth resulting in a positive effect on domestic exchange rates.

Trade openness has a negative effect with exchange rates in the shorter period - quarterly intervals - but it has a positive relationship with exchange rates in the longer period of two-year intervals. Growth rate is also a statistically significant variable in the determination of exchange rates where faster growth rates strengthen the domestic exchange rates especially after taking into consideration individual country effects in the fixed effect model. Fiscal budget balance is marginally significant in influencing exchange rates at one-year intervals however budget surplus corresponds to a fall in currency value which is inconsistent with theoretical understanding. The other fundamentals including balance of payments, capital flows, and accumulation of reserves are insignificant in affecting exchange rates in the shorter term.

In the longer term for this region of developing countries in Eastern Europe, interest parity continues to hold and higher interest rates deteriorate the value of the domestic currency in accordance with the prediction of IRP. The coefficients for current account and portfolio inflows are positively related to exchange rates and are statistically significant in three-year intervals. Conversely, foreign debt and accumulation of reserves have incorrect signs but are also insignificant in determining exchange rates in this region. Growth and interest rates continue to be statistically significant in the longer period in affecting the currency values of these countries. On the other hand, monetary expansion and trade openness do not continue to be influential in the longer run.

In summary, (1) interest rate, (2) current account balance, (3) capital flows and (4) growth rate are major driving forces of exchange rates in the longer term. However in the interim periods of one and two-year intervals, other non-parity variables budget, monetary expansion and trade openness are marginally significant in determining exchange rates.

## 6. Conclusion

The results presented in this paper constitute a modest contribution to extend the literature on exchange rate behaviour for the region of trade-related transition economies in Eastern Europe by considering the extent to which parity *and* non-parity variables influence the movements of exchange rates systematically. These

results are robust as these are obtained from pooled panel data to test the theories for a group of *trade-related* countries. We find that non-parity fundamentals (1) growth rate, (2) current account balance and (3) capital flows are significant drivers of exchange rates. That these factors are so important to this region is highlighted by these tests in contrast with results for other regions such as ASEAN countries. We believe the tests developed in this study led to improved results, helped to identify new fundamentals that are related to exchange rates while the puzzle of the short term versus long term behaviour is made obvious by applying different data frequencies from quarterly to several years. These transition economies would be well equipped to find an appropriate exchange rate stability to be admitted into the EU and also eventually to be able to manage their currency fluctuations within the regional currency area.

Last but not least, this study may be constrained by the lack of data in terms of both length of time series and quality and reliability: our most reliable source is the IFS of the International Monetary Fund. We also assume that exchange rates have been free to adjust according to macroeconomic fundamentals and central bank intervention is relatively minor. Even though some of these countries are having managed or pegged exchange rates, the results are still useful as a starting point for an investigation of the behaviour of their exchange rates. A permanent peg system is never a solution to inflationary problem indefinitely in the long run for small open economies. In the case of transition economies, there should be a more flexible exchange rate arrangement once inflation has been eliminated with strong financial and banking system in place.

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