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# Markov-switching regimes and the monetary model of exchange rate determination: Evidence from the Central and Eastern European markets<sup>☆</sup>

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### ABSTRACT

This paper examines the dynamic relationship between the bilateral exchange rates of 10 Central and Eastern European emerging markets against the euro and their fundamentals, using data from the early 1990s to the middle of 2010, within the framework provided by the monetary model of exchange rate determination. Given that these countries have adopted alternative exchange rate regimes over this period, we employed a Markov-switching vector error correction model which allowed for regime shifts in the entire set of parameters and the variance-covariance matrix. The main finding of the analysis was that depending on the nominal exchange rate regime in operation, the adjustment to the long run implied by the monetary model of the exchange rate determination came either from the exchange rate or from the monetary

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fundamentals. Moreover, based on a Regime Classification Measure, we showed that our chosen Markov-switching specification performed well in distinguishing between the two regimes for all cases.

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## 1. Introduction

The seminal works of [Meese and Rogoff \(1983a,b\)](#) on the forecasting ability of the monetary model to the exchange rate determination led to the emergence of a sizeable literature that attempted to develop alternative model specifications which would take into consideration a set of important features of nominal exchange rates and fundamentals. [Engel and Hamilton's \(1990\)](#) important contribution provided evidence that a Markov-switching model of exchange rate outperforms the naïve random walk model. The intuition behind the Markov-switching models relies on the evidence offered by several studies that the monetary model performs well for some sub-period of the total sample but not for others and also that sudden regimes changes have been observed ([Meese, 1990](#)). [Frydman and Goldberg \(2001\)](#) have shown that such regime changes occurred in the case of the dollar-deutschmark exchange rate over the recent float. [Mahavan and Wagner \(1999\)](#), [Marsh \(2000\)](#), [Taylor and Peel \(2000\)](#), [Taylor et al. \(2001\)](#), [Clarida et al. \(2003\)](#), [Frömmel et al. \(2005a,b\)](#) and [De Grauwe and Vansteenkiste \(2007\)](#) were among the first studies to analyze the monetary model in a Markov-switching model for a set of main bilateral exchange rates and they provided support in favour of a fundamental model. [Bacchetta and van Wincoop \(2009\)](#) argued that large and frequent variations in the relationship between the exchange rate and macroeconomic fundamentals become evident when structural parameters in the economy are unknown and subject to changes. Furthermore, [Frömmel et al. \(2005a,b\)](#) examined the Real Interest Differential (RID) variant of the monetary model within the Markov-switching approach and showed that in a two-regime model, one regime accurately described the RID monetary model and in addition it exhibited significant out-of-sample forecasting performance.

[Cheung et al. \(2005\)](#) argued that the instability of the monetary model in the data generating process might provide an explanation when model specifications that work well in one period do not necessarily work well in another period. [Sarno et al. \(2004\)](#), using the same long span data set of [Rapach and Wohar \(2002\)](#), estimated appropriate Markov Switching-Vector Error Correction Model (MS-VECM) for Belgium, Finland, France, Italy, the Netherlands, Portugal, Spain and Switzerland and provided evidence in support of regime switching in the long run relationship implied by the monetary model. A further interesting result was that monetary fundamentals provided the mechanism of adjustment to the long-run equilibrium during periods of fixed exchange rates whereas the exchange rate adjusted to restore deviations from long-run equilibrium during periods of flexible exchange rate regimes. [Sarno and Valente \(2009\)](#) demonstrated that exchange rate models that use the information content of fundamentals in an optimal way change often which implies frequent shifts in the parameters. [Altavilla and De Grauwe \(2010\)](#), using a model in which chartists and fundamentalists interact, studied the dynamic interaction between the exchange rate and its fundamentals. With the estimation of a Markov-switching model, they found that the relationship between the exchange rate and its fundamentals was unstable. The time-varying nature of the coefficients of the monetary model was further confirmed in a recent study by [Beckmann et al. \(2009\)](#). [Lee and Chen \(2006\)](#) demonstrated that the time series process implied by the Markov-switching models was consistent with the widely used dirty floating exchange rate regime. Moreover, they found that the implied exchange rate process was state-dependent and approximated by an autoregressive representation in each state. Finally, [Ducker and Neely \(2007\)](#) provided strong evidence that the Markov-switching regime models created ex ante trading rules in the foreign exchange market and delivered strong out-of-sample portfolio returns for several major currencies.<sup>1</sup>

<sup>1</sup> [Taylor and Peel \(2000\)](#), [Taylor et al. \(2001\)](#) and [Kilian and Taylor \(2003\)](#) employed models that allow for smooth transition between two states, further supporting the hypothesis that exchange rate adjustment towards equilibrium paths is nonlinear.

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