

Determining the EUR/USD exchange rate with U.S. and German government bond yields in the post-crisis period

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Abstract

This research shows how U.S. and German government bond yields can determine the EUR/USD exchange rate in the short run. After presenting the discussion on fundamental, technical and microstructure approach exchange rate determination models, a conclusion is made that out of the components of fundamental models the interest rates could be the best determinants for explaining exchange rate fluctuations in the short term. For the research the mostly traded currency pair, the EUR/USD, was chosen and 2-year, 10-year U.S. and German government bond yields were selected as determinants of the exchange rate. After performing the linear regression procedure it has shown that the model can determine 5 per cent of the daily EUR/USD fluctuations with a change in 2-year U.S. government debt yield being the greatest determinant in the model. It affects the exchange rate as it is stated in the uncovered interest rate parity model – when the yield increases, the USD declines against the euro and vice versa. Another finding is that an increase in the German 10-year government bond yield increases the price of the euro and the increase in the U.S. 10-year debt yield leads to an appreciation of the USD.

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1. Introduction

The foreign exchange market is the largest market in the world with rapidly increasing trading volumes. The latest data from the [Bank for International Settlements \(2013\)](#) show that in 2007 the overall daily turnover of foreign exchange products (spot contracts and currency derivatives both traded over the counter and in exchanges)

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was \$3.456 tn., in 2010 it increased by 19.33 per cent up to \$4.124 tn., and in 2013 it was \$5.505 tn., which shows an increase of 33.49 per cent. The increase of currency trading volumes is usually explained by an increase in international trade. Levels of foreign direct investments and portfolio investments are also increasing, with fund managers having greater exposure to financial market instruments overseas, and therefore a greater demand for foreign currencies. Moreover, developments of information technologies also add to increasing currency trading volumes—now it is easier to access the market especially for the retail participants. King and Rime (2010) argue that the part of the retail traders in 2013 composed approximately 8–10% of the overall daily turnover in the market, which is already more than the size of international trade, which, according to Lyons and Moore (2009), is 6%. Therefore the structure of market participants is changing.

Since the collapse of the Bretton Woods system there were many attempts to determine the exchange rates. Based on the market analysis types, two main groups of foreign exchange forecasting models can be distinguished. Fundamental models, which can be also called macro-economic models, state that the fluctuations of exchange rates depend on macro-economic determinants, like inflation, or consumer price index, monetary base, gross domestic product, interest rates, international trade, etc. Some examples of the models are the purchasing power parity model, the interest rate parity model, the monetary model, the Dornbusch sticky price model, etc. (for further discussion on fundamental exchange rate forecasting models see Macerinskiene & Balciunas, 2013). On the other hand, there are many discussions whether these models can forecast the exchange rates in the short term and it has been agreed that in the short run the exchange rate disconnect puzzle (Bachetta & van Wincoop, 2006; Evans & Lyons, 2002; Sarno & Taylor, 2002) exists, because many researches show that the fundamental models fail to determine the short term exchange rates better than a random walk. Technical analysis models are based on the assumption that the price of an asset depends on its price in the past. There is a wide discussion on the technical analysis use for analysing securities' prices since it eliminates the assumption that the markets are efficient (for further discussion see Kirkpatrick and Dahlquist (2013), for the survey of the results of the trading strategies based on technical analysis models see Schulmeister (2008) and de Zwart et al. (2009)). Another one – the microstructure approach - can be used to determine the exchange rates in the short run. In the microstructure approach models it is stated that the exchange rates are determined by market participants' positioning or order flow. On the other hand, Chinn and Moore (2011); Jalil and Feridun (2010); Rime et al. (2007); Sager and Taylor (2008); Vitale (2007) discuss that application of the microstructure approach model faces many challenges. Since the foreign exchange market is the over-the-counter market by its nature, it is complicated to collect order flow information from its participants. Therefore there is no common model, which could show the best results in determining the short term exchange rate.

Boschen and Smith (2012) find that the uncovered interest rate parity model, which states that the exchange rates fluctuate based on the interest rates of the two economies, shows that the interest rates can determine the exchange rate better than they did in the past because of the increasing size of the market and increasing heterogeneity of the market participants. Therefore it is reasonable to provide additional research on how the exchange rates can be determined by the interest rates in the short run, by using 2-year and 10-year government bond yields. The **problem** of the research: how do government yields determine the exchange rate in the short run? The **objective**: to distinguish and evaluate the possibilities for determining the exchange rates with government bond yields. The **tasks** of the research: to provide the discussion on exchange rate forecasting with uncovered interest rate parity; to provide a model for determining the exchange rates with government bond yields. Methods used in the research: analysis and synthesis of scientific literature, linear regression, analysis of statistical data.

2. Literature review

The uncovered interest rate parity states that there are no excess profits available from investing into the same risk assets in different countries when the exchange rate fluctuations are taken into account, as it is stated in Fig. 1.

Fig. 1 shows an example of a deposit placed in a bank on the 1st of January for one year, the interest rate for deposits in domestic currency is r . At the end of the period, on the 31st of December, the investment will be worth $1000 \text{ EUR} \times (1+r)$. The investor also has a possibility to exchange the currency on the 1st of January at the exchange rate s and to receive the interest rate for deposits in foreign currency r^* . At the end of the period the investor will have received the foreign interest rate for the foreign currency deposit, and he/she will have to

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