

Modeling EUR/USD return volatility incorporating long run co-movements in exchange rates and US economic indicators

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The nature of long-run co-movements in exchange rates is informative, since it permits participants at the foreign exchange market to gain excess profits from trades. This study examined the possible cointegration relationships among major currencies paired with US dollar namely Euro, British Pound, Canadian Dollar, Australian Dollar, New Zealand Dollar, Switzerland Franc and Japanese Yen. Moreover, an attempt was made to improve the predictions of Euro against US dollar (EUR/USD) return volatility resulted from GARCH models by incorporating cointegrated exchange rates into the model. Aforementioned exchange rates at five minute frequency in 2013 were used for this study. Johansen test revealed that only the British Pound against US Dollar (GBP/USD) shares a common trend with EUR/USD in the long run. This long run relationship was modeled by vector error correction model. Consequently, the weak form of the efficient market hypothesis (EMH) violates with the existence of this long-run co movements of exchange rates. GARCH and IGARCH models were found to be appropriate to model the conditional volatility of EUR/USD percentage returns where the conditional mean was explicitly estimated by incorporating two lagged terms of GBP/USD return in the mean model as regressors. Forecasting power of the models was boosted by introducing several variance regressors in the conditional variance model. Given the result of cointegration analysis GBP/USD rate is included as one of the variance regressors. By considering the semi strong form of the EMH, a set of dummy variables to represent the time around the release of US non-farm payroll (NFP) and unemployment rate (UR) are included as the other set of variance regressors. Selection of aforesaid economic indicators is based on the literature which reveals these indicators are more influential on the exchange rate movements. Introduction of the abovementioned dummy variables in the conditional variance model is novel to this study. With respect to the Schwarz criterion IGARCH(1,1) model with aforesaid variance regressors found to be superior compared to GARCH model. The selected model concludes the level of the volatility of EUR/USD percentage returns is different at three time periods as 1. first fifteen minutes 2. second fifteen minutes 3. time except the first thirty minutes after the release of US NFP and UR.

Keywords: Cointegration, Economic Indicators, Foreign Exchange, GARCH, Volatility