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Real-Time Nowcasting of Short-Run of the Euro-Dollar Exchange Rate with Economic Fundamentals: Does the measure of Money Supply Matter?

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LCOB Research Day

- Motivations
- Nowcasting
- Divisia Monetary Aggregates
- Model
- Forecasting Preliminary Results

Motivations

- U.S. goods and services trade with the EU totaled nearly $1.1 trillion in 2016.
- Exports totaled $501 billion; Imports totaled $592 billion.
- In 2016, the United States was the largest importer of goods in the world with a share of 18
- Among the EU's trading partners, the United States was the largest partner for EU exports of goods in 2017, and the second largest for EU imports of goods.
- In 2017, among EU Member States, the United Kingdom was the largest importer of goods from the United States and Germany was the largest exporter of goods to the United States.

Motivations (cont.)

- Those transactions involved many partners operating with different currencies (US Dollar or Euro)
- Knowledge of the nominal exchange rate between US Dollar and Euro today and in the future is very important for multinational enterprises (contracts)
- The nominal exchange rate is the price of one currency in terms of another one
- Recent Financial crisis (2007-2009)
- Economic and Financial Data have different frequencies released date
- Monetary models of exchange rates are based on the stability of money demand function
- Measure of money by central banks are not most of time accurate.

- Recent Financial crisis (2007-2009)
- Economic and Financial Data have different frequencies released date
- Monetary models of exchange rates are based on the stability of money demand function
- Measure of money by central banks are not most of time accurate (Barnett 1978, 1980)
- Divisia Monetary Aggregates (user cost of money)
- This paper proposes a multivariate state space model that takes into account not only the asynchronous information inflow, but also the instability of the money demand to predict four weeks spot exchange rate.

Nowcasting

- Nowcasting is the prediction of the present, the very near future and the very recent past in economics.
- The method can track the real-time flow of the type of information monitored by central banks because it can handle large data sets with staggered data-release dates
- Each time new data are released, the nowcasts are updated on the basis of progressively larger data sets that, reflecting the unsynchronized data-release dates, have a "jagged edge" across the most recent months.

Mixed Frequencies Data

- We use data at two frequencies, weekly and monthly.
- To mix these two frequencies, we consider all series as being of weekly frequency and treat monthly data as weekly series with missing observations.
- We use end period data (Last Friday of each week for weekly data and of each month for monthly data)
- We take also into account the fact that some months has five Fridays instead of four

Mixed Frequencies Data (cont.)

- The approximated arithmetic mean with the goemetric mean for the case of four weeks can be written as

$$Y_t = 4(X_t.X_{t-1}.X_{t-2}.X_{t-3})^{\frac{1}{4}}$$

where X_t denotes the monthly aggregate of weekly series and Y_t is a monthly series which is observable on the last Friday of each month.

- Taking the logs and four-period differences for all t, we obtain

$$\Delta_4 lnY_t = \frac{1}{4}(\Delta_4 lnX_t + \Delta_4 lnX_{t-1} + \Delta lnX_{t-2} + \Delta_4 lnX_{t-3})$$

- Let $\Delta_4 lnY_t = g_t$, and $\Delta lnX_t = x_t$, after little algebra the previous equation becomes

$$g_t = \frac{1}{4}x_t + \frac{2}{4}x_{t-1} + \frac{3}{4}x_{t-2} + x_{t-3} + \frac{3}{4}x_{t-4} + \frac{2}{4}x_{t-5} + \frac{1}{4}x_{t-6}$$

- Similarly, the case for five-Friday month can be written as

$$g_t = \frac{1}{5}x_t + \frac{2}{5}x_{t-1} + \frac{3}{5}x_{t-2} + \frac{4}{5}x_{t-3} + x_{t-4} + \frac{4}{5}x_{t-5} + \frac{3}{5}x_{t-6}$$

$$+\frac{2}{5}x_{t-7} + \frac{1}{5}x_{t-8}$$

Divisia Monetary Aggregates

- The simple sum monetary aggregates do not consider the degree of "moneyness" or liquidity of different monetary assets. They overstate significantly the money stock (Barnett and Chang 2008).
- Moneyness measures the liquidity of monetary assets. Currency and coin are the most liquid (hundred percent liquid) and other monetary assets are not hundred percent liquid
- The alternative measure of money, Divisia Monetary Aggregate Index, proposed by Barnett (1978, 1980), has the advantage over "simple sum" since it considers both the prices (foregone interest rates) and quantities of monetary assets' liquidity services (money aggregate).
- Prices of monetary assets are measured by the user costs or the opportunity costs of holding the asset for its liquidity services rather than investing it to obtain a much higher interest rate (Barnett 1980).

Divisia Monetary Aggregates (cont.)

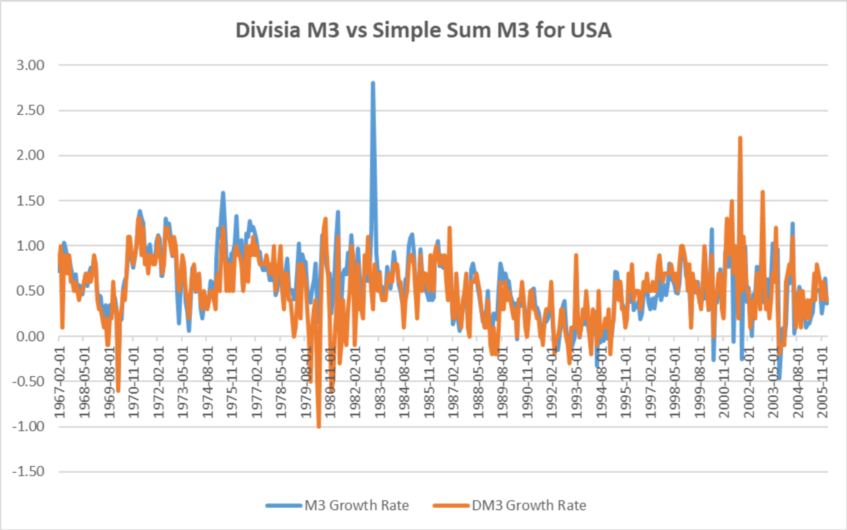
- User Cost of monetary asset i is

$$\pi_{it} = \frac{P_t(R_t - r_{it})}{(1 + R_t)}$$

where R_t is the benchmark rate at time t, r_{it} is asset $i's$ own rate of return at time t, and P_t is the price index.

- The benchmark rate is the highest rate of return over the class of monetary assets.

Divisia Monetary Aggregates (cont.)



- The sticky price model is subsumed in the following equation for determination of the exchange rate

$$s_t = \beta_0 + \beta_1 \hat{M}_t + \beta_2 \hat{i}_t^l + \beta_2 \hat{i}_t^s + \beta_3 \hat{\pi}_t + \beta_4 T\hat{B}_t + \beta_5 I\hat{P}_t + u_t$$

  where s_t denotes the logarithm of spot exchange rate at time t, M_t[1] denotes the growth of money supply between two successive periods, i^s is the short-run interest rate, i^l is the long-run interest rate, π is the inflation rate, TB is the trade balance as proportion of the GDP, IP is the industrial production growth, and u is an error term. The circomflex is the intercountry difference

- We estimate the model using the MLL in a Mixed Frequencies Dynamic Factor Model

[1] M^{ss} and M^{div} will denote simple sum and Divisia monetary aggregates

Preliminary Results

	Out-of-sample Nowcastings		
Model	1-week hirizon	2-week	4-week
M^{DIV}	1.2103	1.2037	1.226
M^{SS}	1.24	1.2012	1.218
Data	1.2105	1.2033	1.229

Preliminary Results

Measures of Forecast accuracy (MSPE[2])			
Model	1-week hirizon	2-week	4-week
M^{DIV}	0.348	0.321	0.286
M^{SS}	0.424	0.412	0.381

[2]Mean Squared Prediction Error

Thank you very much!!!