Monetary Shocks and Real Exchange Rates in the Long Run

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Introduction
In Rogers (1999), the author explored the importance of monetary shocks on real exchange rates. Using the VAR (vector autoregression) technique to identify shocks and annual observations of 6 data series (prices, output, government spending, exchange rate, monetary base and money supply) from 1889 to 1992, he found that monetary shocks accounted for about 40.6% of the variability in real exchange rate movements, which implies that monetary shocks are important for exchange rate fluctuations. In the introduction of his paper, Rogers makes one claim, he states that he uses “annual observations from 1889, the earliest availability of the US GNP components.” That claim turns out to be inaccurate as Prof. Craighead was able to find data that goes all the way back to 1790. Hence the purpose of this project is to make use of the longer term data (1790-2011) to replicate Rogers’ research and see if his results hold up. The longer time series allows us to assess whether there are variations in the importance of monetary shocks during different time periods and across various monetary and exchange rate regimes. My role in this project mainly involved tracking down the data, digitalizing the paper data, and investigating the properties of the data in Eviews. I mainly focused on testing for stationarity.

Data Sources
Finding and pruning the data was a large part of this project. Back in the 16th and 17th century Britain used gold and specie instead of common currency, so a lot of careful conversions had to be done. In addition, we had to splice together several different data sets to get the full span of 220 years, but at each splice we checked to make sure the data seemed consistent.

We wanted to use for both the US and UK the real exchange rate, interest rates, price level, real GDP, industrial production, tariffs, the monetary base, and government spending. We got our data from several sources, including the Bank of England, Federal Reserve, World Bank, UK Office of National Statistics, OECD, and many papers (including most importantly Broadberry’s “British Economic Growth”).

Conclusions and Future Research
The results showed that most of the data, when looked at in levels, did not exhibit stationarity (except for interest rates and the real exchange rate). This is consistent with economic theory. First differencing the series that are nonstationary in levels appear to solve the unit root problem. Here we use two different types of stationarity tests for robustness, the Augmented Dickey Fuller test and the Kwiatkowski–Phillips–Schmidt–Shin Test. For most of the series both tests reach the same conclusions regarding the stationarity of the series being tested. This gives us more confidence regarding the accuracy of the results.

Future Research:
Now that we know the unit root properties of the data, the next step would be to conduct cointegration tests to make sure the VAR model is specified correctly. After these initial tests are completed, we will be able to run the VAR using long-run identifying restrictions to identify monetary shocks and analyze the impact of these shocks on real exchange rate fluctuations.

Stationarity -- On a technical level, a time series \( y_t \) is stationary if its probability distribution does not change over time, i.e. if the joint distribution of \( (y_{t-1}, y_{t-2}, \ldots, y_{t-k}) \) does not depend on \( t \); otherwise \( y_t \) is said to be nonstationary. Stationarity requires the future to be like the past, at least in a probabilistic sense. For time series regressions, if the dependent variable and the regressors are nonstationary, then conventional hypothesis tests, confidence intervals, and forecasts can be unreliable. Hence it is important to know the stationarity properties of the data before conducting further analysis.

Literature cited