



On the macroeconomic causes of exchange rate volatility

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Abstract

What are the causes of exchange rate volatility? When the second moments implications of theories of exchange rates determination are considered, long-term fundamental linkages between macroeconomic and exchange rate volatility can be envisaged. Moreover, as the exchange rate is an important determinant of aggregate demand, bidirectional causality should be expected. The results of the study support the above intuitions, pointing to important linkages and trade-offs relating exchange rates and macroeconomic volatility, with causality being stronger from macroeconomic volatility to exchange rate volatility than the other way around. An out of sample forecasting exercise shows how conditioning on macroeconomic information does improve medium- to long-term volatility forecasting.

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1. Introduction

What are the economic causes of exchange rate volatility? Second moments implications of fundamental models of exchange rate determination predict a linkage between exchange rate and macroeconomic volatility, particularly output, money growth, inflation and interest rate volatility. Recent contributions (e.g., Flood & Rose, 1995) have, however,

found that macroeconomic volatility is not an important source of exchange rate volatility for G-7 countries, as macroeconomic volatility shows little evidence of exchange rate regime dependence; i.e., unlike exchange rate volatility, macroeconomic volatility is not higher in regimes of floating rates than in regimes of fixed rates. Moreover, little evidence of trade-offs between macroeconomic and exchange rate volatility can be found, implying that switching from a system of flexible exchange rates to a system of fixed exchange rates would not lead, in general, to higher macroeconomic volatility.

However, the above findings are not inconsistent with the linkage between exchange rates and

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macroeconomic volatility predicted by fundamental models, since they refer to the medium-term horizon at most, while the long-term is the horizon of interest for the assessment of economic theory. Moreover, a weak response of macroeconomic variables to changes in exchange rate regimes and volatility can indeed be expected in the short- to medium-term under conditions of sticky prices (Duarte, 2003). Actually, non-macroeconomic determinants may be responsible for the strong persistence of volatility shocks. In fact, either the interaction in the market of agents with different time horizons (Muller et al., 1997), or the aggregation of a large number of news information arrival processes (Andersen & Bollerslev, 1997) may generate long memory in volatility. While the above factors may dominate macroeconomic shocks in the determination of short- to medium-term exchange rate volatility, in the long-term the role of fundamental (macroeconomic) volatility may become more evident. Interestingly, no empirical evidence concerning the long-term has been provided in the literature so far. Hence, the current paper fills this important gap in the literature by assessing long-term linkages between exchange rate and macroeconomic volatility.

The paper contributes to the literature in two ways.

Firstly, it provides empirical evidence on the linkage between exchange rates and macroeconomic volatility for the G-7 countries in the long-term, focusing on the most recent float period (1980–2006), which has almost been entirely neglected in the literature to date.

Secondly, accurate modelling of the persistence properties of the data has been carried out in the framework of a new fractionally integrated factor vector autoregressive (FI-F-VAR) model. This model allows us to investigate linkages across macroeconomic and exchange rate volatility involving both common deterministic and stochastic components, consistent with the evidence of structural change and stationary long memory in the volatility of financial asset returns and macroeconomic variables.¹ Hence, both long-term

(cobreaking) and medium-term (fractional cointegration) relationships can be investigated in the current framework, controlling for short-term dynamic linkages as well. Moreover, conditioning is made relative to a very large information set consisting of the entire G-7 macroeconomic structure, thereby allowing for a fine control of the interrelations occurring across currencies and macroeconomic factors. Accurate long-term volatility forecasting can therefore also be expected in the current framework, as conditioning can be made coherent with persistence properties and structural (economic) determinants. The multivariate setting of the analysis and the joint modelling of common break processes and common long memory factors are important elements of the novelty of this study.

The findings of the paper are clear-cut. Evidence of significant long-term linkages and trade-offs between macroeconomic and exchange rate volatility, particularly involving output and inflation volatility, and money growth volatility to a lesser extent, is found. Moreover, although causality is bidirectional, the linkage is much stronger from macroeconomic volatility to exchange rate volatility than the other way around. Hence, consistent with the seminal views of Friedman (1953), in a long-term perspective, focusing on macroeconomic stability may indeed be important for reducing excess exchange rate volatility; moreover, systemic volatility could not be eliminated by fixing exchange rates, as the latter may only come at the cost of macroeconomic instability.

Interestingly, significant cross-country interactions have been found as well, i.e. foreign countries' macroeconomic volatility may also be important for long-term exchange rate volatility. This last finding is consistent with the evidence of global real and nominal dynamics found in the literature for the G-7 countries.

Finally, an out-of-sample forecasting exercise does show that improved medium- to long-term volatility forecasting performance can be obtained by conditioning on macroeconomic information.

After this introduction, the paper is organized as follows. In Section 2 the econometric methodology is introduced. Then, in Section 3 the data are presented,

¹ For financial asset returns, see for instance Granger and Hyung (2004) for structural breaks; Andersen and Bollerslev (1997) and Baillie, Bollerslev, and Mikkelsen (1996) for long memory; and Baillie and Morana (2007), Lobato and Savin (1998) and Morana and Beltratti (2004) for both features. For macroeconomic volatility,

see Beltratti and Morana (2006) and Engle and Rangel (2008). Also see Baillie and Morana (2007) for a detailed account of the available evidence on the topic.

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