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The effects of monetary policy shocks on exchange rates: A structural vector error correction model approach

Kyungho Jang ^{a,*} and Masao Ogaki ^b

^a Department of Finance, Economics and Quantitative Methods, University of Alabama at Birmingham, Birmingham, AL 35294, USA

^b Department of Economics, Ohio State University, Columbus, OH 43210, USA

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This paper investigates the effects of shocks to US monetary policy on the dollar–yen exchange rate, using structural Vector error correction model (VECM) methods with long-run restrictions. We compare our estimates of the impulse responses with those based on levels Vector autoregression (VAR) with standard recursive order restrictions. The empirical results based on the long-run restrictions are found to be more consistent with standard models of exchange rate determination than the results based on the recursive order restrictions. *J. Japanese Int. Economies* **18** (1) (2004) 99–114. Department of Finance, Economics and Quantitative Methods, University of Alabama at Birmingham, Birmingham, AL 35294, USA; Department of Economics, Ohio State University, Columbus, OH 43210, USA.

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1. Introduction

This paper examines the effects of shocks to US monetary policy on the dollar–yen exchange rate, using structural Vector error correction model (VECM) methods with long-

* Corresponding author.

E-mail addresses: kjang@uab.edu (K. Jang), mogaki@econ.ohio-state.edu (M. Ogaki).

run restrictions. We compare our estimates of the effects with those of Eichenbaum and Evans (1995) based on levels Vector autoregression (VAR) with standard recursive order restrictions.

The standard exchange rate model (see, e.g., Dornbusch, 1976) predicts that a contractionary shock to US monetary policy leads to appreciation in US nominal and real exchange rates. However, empirical evidence for two important building blocks of the model is mixed at best. These two building blocks are Uncovered interest parity (UIP)¹ and long-run Purchasing power parity (PPP).² Therefore, it is not obvious whether or not this prediction of the model holds true in the data. Eichenbaum and Evans (1995) directly investigate this prediction by estimating impulse responses to US monetary shocks and find evidence in favor of the prediction, even though their results do not support some aspects of the standard exchange rate model.

In order to investigate the impulse responses to a monetary policy shock, it is necessary to identify the shock by imposing economic restrictions on an econometric model. When economic restrictions are imposed, the econometric model is called a structural model. Both the choice of the econometric model and the choice of the set of restrictions can affect the point estimates and standard errors of impulse responses. For this reason, it is important to study how these choices affect the results.

Most variables used to study exchange rate models are persistent, and usually modeled as series with stochastic trends and cointegration. In such a case, both levels VAR and the VECM can be used to estimate impulse responses. Levels VAR is more robust than the VECM because it can be used even when the system does not have stochastic trends and cointegration. Perhaps for this reason, it is used in most studies of impulse responses and by Eichenbaum and Evans (1995). However, the structural VECM has some important advantages in systems with stochastic trends and cointegration. First, other things being equal, estimators of impulse responses from the structural VECM are more precise. For example, levels VAR can lead to exploding impulse response estimates even when the true impulse response is not exploding. This possibility is practically eliminated with the structural VECM. Second, it is possible to impose long-run restrictions as well as standard recursive order restrictions to identify shocks.

Long-run restrictions are attractive for the purpose of this paper because they are more directly related to macroeconomic models. For example, one of the recursive order assumptions used by Eichenbaum and Evans is that the exchange rate is not included in the Fed's information set when it makes monetary policy decisions. Such an assumption is not found in standard exchange rate models. The assumption is also not very realistic because exchange rate data are available to the Fed up to the minute as pointed out by Faust and Rogers (2000).³ In contrast, long-run restrictions used in this paper such that a monetary

¹ The UIP states that the expected rate of appreciation of the domestic currency is equal to the difference between the foreign interest rate and the domestic interest rate.

² The long-run PPP means that the real exchange rate is stationary.

³ Faust and Rogers avoid this problem by using nonstandard short-run restrictions to identify the monetary policy shock. Their empirical results are more consistent with standard exchange rate models than those of Eichenbaum and Evans. It is beyond the scope of this paper to compare results from long-run restrictions and those from nonstandard short-run restrictions.

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