The Impact of a Net Increase in Japanese Investment in Foreign Assets on the Yen Rate

Hideki Nishigaki
Hitotsubashi University, Commerce and Management

Abstract

The yen 's value on a real effective exchange rate basis has already fallen to its lowest level since the 1985 Plaza Accord. In particular, Japanese retail investors have recently tried to diversify their portfolio by purchasing higher-yielding assets denominated in a foreign currency through investment trust funds. In this paper, we examine the effect of a net increase in the foreign investment by Japanese investors on the exchange rate by using the structural vector autoregression (SVAR) method. Our empirical results suggest that a net increase in the investments by Japanese investors can significantly depreciate the yen rate. Moreover, we found that the main factor responsible for the movements of the yen rate against the dollar is demand shock. This result implies that the main reason for the depreciation of the yen is the weak Japanese demand. If the Japanese domestic demand expands further, the yen rate will appreciate more.

Citation: Nishigaki, Hideki, (2007) "The Impact of a Net Increase in Japanese Investment in Foreign Assets on the Yen Rate." *Economics Bulletin,* Vol. 6, No. 40 pp. 1-9
Submitted: September 14, 2007. **Accepted:** October 11, 2007.
URL: http://economicsbulletin.vanderbilt.edu/2007/volume6/EB-07F30016A.pdf

f_t^{f}

1. Introduction

The yen's value on a real effective exchange rate basis has already fallen to its lowest level since the 1985 Plaza Accord. Many economists state that there are some factors accounting for the depreciation of the yen; one of them is that Japanese investors aggressively sell their assets and purchase overseas assets. In particular, Japanese retail investors have recently tried to diversify their portfolio by purchasing higher-yielding assets denominated in a foreign currency through investment trust funds. Most of the components of the investment trust are dollar denomination.

Thus, Japanese households have become important players in the so-called yen carry trade. Years of extraordinary low interest rates at home crimp the returns that Japan's savers and others can earn on bank accounts and other Japanese assets. Financial reform has also facilitated this trend. Banks have been selling these financial products to retail depositors since 1998 after regulatory changes; they now view this business as a key profit source.

In this paper, we examine the effect of an increase in the foreign investment by Japanese investors on the exchange rate by conducting a time series analysis.

The remainder of the paper is organized as follows. In Section 2, we present the structural vector autoregression (SVAR) methodology and data. The empirical results are presented in Section 3; Section 4 provides the robustness check. Section 5 provides some concluding remarks.

2. SVAR methodology and Data

There are many previous studies on the foreign exchange rate. Our model in this paper is based on Huang and Guo (2006) and Mehrara and Oskoui (2006), which focused on the impacts of the movement of oil price on the foreign exchange rate.

We produce a simple economic model wherein an increase in Japanese investment in foreign assets may affect the real exchange rates as well as other macroeconomic factors. Based on a stochastic version of the open economy Mundell-Fleming-Dornbusch model, we consider the case that there are other structural demand and supply shocks that also influence the real exchange rates as follows:

$$f_t = f_{t-1} + \varepsilon_t^f \quad (1)$$

$$y_t^s = s_t + \alpha f_t \quad (2)$$

$$y_t^d = d_t + \beta e_t \qquad (3)$$

$$m_t = p_t + \gamma y_t^s - \delta i_t \qquad (4)$$

$$i_t = E(e_t) \qquad (5)$$

$$y_t^s = y_t^d = y_t \qquad (6)$$

$$\sim s_t = s_{t-1} + \varepsilon_t^s \quad d_t = d_{t-1} + \varepsilon_t^d \quad m_t = m_{t-1} + \varepsilon_t^m$$

where f is the Japanese foreign investment; s, capacity output ; d, aggregate demand; e, real exchange rate (US dollar/Japanese Yen); m money stock ; p price level and y, the relative real gross domestic product (GDP).

The observed movements in the variables can be ascribed to four serially uncorrelated structural shocks consisting of foreign asset investment shocks, supply shocks, real demand shocks and monetary shocks.

Equation (1) depicts the evolution of Japanese investment in foreign asset. f represents the ratio of Japanese investment in foreign assets to total financial assets. We treat f as being exogenous to other variables.

We employ the data from Flow of Funds produced by the Bank of Japan. Here, foreign assets comprise foreign currency deposits, outward direct investment, outward investment in securities and foreign currency investment trusts. The investment trusts data is obtained from the assets of publicly offered investment trusts of contractual type produced by the Investment Trust Funds Association, Japan.

f expanded from 3.4% in March 1998 to 7.8% in March 2007. Meanwhile, particularly for the households, the ratio jumped from 0.8% to 2.8%. Japanese households have invested in overseas bonds and equities Most of the assets are denominated in US dollars.

Equation (2) depicts the output in terms of technology and foreign investment. We expect the sign of α to be positive. The relative real output is defined in terms of the log of real GDP in Japan minus the log of real GDP in the US. The data are obtained from Japan's Cabinet Office and the US Bureau of Economic Analysis.

Equation (3) depicts the demand, which is an increasing function of the domestic real exchange rate. e provides the US dollar price of the Japanese yen. We deflate the exchange rate by the consumer price index (CPI) and convert it into a single index using 2000 = 100.

Equation (4) depicts the money demand function. p is defined in terms of the log of Japanese CPI minus the log of the US CPI. These data are obtained from Datastream.

Equation (5) shows an approximation of the uncovered interest parity under a rational expectation, and Equation (6) shows the goods market equilibrium relationship.

In this paper, the autonomous portion of supply and demand is assumed to follow a random walk process for simplicity.

Solving equation (1)–(6) yields the following:

$$\Delta f_t = \varepsilon_t^f \tag{7}$$

$$\Delta y_t = r\varepsilon_t^f + \varepsilon_t^s \tag{8}$$

$$\Delta e_t = \frac{1}{\phi}(r\varepsilon_t^f + \varepsilon_t^s - \varepsilon_t^d) \tag{9}$$

$$\Delta p_t = \varepsilon_t^m + (-k + \frac{\tau}{\phi})\varepsilon_t^s + (-kr + \frac{\tau r}{\phi})\varepsilon_t^f - \frac{\tau}{\phi}\varepsilon_t^d \tag{10}$$

In this context, only foreign investment shocks will affect the foreign investment in the long run. The relative real GDP will be provided by accumulations of the supply and Japanese foreign investment shocks.

Here, the time path of the price level will be influenced by all shocks.

This is consistent with the theory developed by Clarida and Gali (1994)

In this model, a specific policy variable like the monetary policy is not included because the interest rate has been nearly zero.

The SVAR model specified in this section comprises foreign investment, real GDP, real exchange rate and real price level.

As suggested in the above analysis, these variables are necessary to identify four structural shocks consisting of foreign investment, aggregate supply, aggregate demand and monetary shocks.

First, let us consider a structural moving average representation of the model:

$$X_t = A_0\varepsilon_t + A_1\varepsilon_{t-1} + \ldots = \sum_{i=0}^{\infty} A_i\varepsilon_{t-i} \tag{11}$$

In the matrix form, it is

$$X_t = A(L)\varepsilon_t \tag{12}$$

where $X_t = [\Delta f_t, \Delta y_t\ \Delta e_t\ \Delta p_t]'$ and A is a 4 × 4 matrix that defines the impulse.

Here, we impose three restrictions.

First, the identifying assumption that distinguishes between the demand and supply shocks implies that the domestic output level is determined only by the supply side factors (aggregate supply and foreign investment shocks) in the long run.

Second, all but monetary shocks are positioned to have a long-run effect on the real exchange rate. The restriction that the nominal shock can have only short-term effects on the real exchange rate is in line with a conventional theory (see Clarida & Gali, 1994).

We write the system as follows:

$$\begin{pmatrix} \Delta f_t \\ \Delta y_t \\ \Delta e_t \\ \Delta p_t \end{pmatrix} = \begin{pmatrix} A_{11}(L) & 0 & 0 & 0 \\ A_{21}(L) & A_{22}(L) & 0 & 0 \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & 0 \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) \end{pmatrix} \begin{pmatrix} \varepsilon_t^0 \\ \varepsilon_t^s \\ \varepsilon_t^d \\ \varepsilon^m \end{pmatrix}$$

In the same vein as Amisano and Giannini (1997), we estimate a reduced-form VAR model for the observed variables, rather than directly recover estimates from the structural moving average model in Equation (11). In the modified VAR model, the external variable follows an autoregressive (AR) process, while the three domestic variables are modeled as functions of their own lags and lags of external variables.

All the variables, except f_t, are entered into natural logarithms.

The data are monthly observations from January 1998 to March 2007. The data for f and y are quarterly data; however, we converted these into monthly data by using the EViews software.

3. Estimation Results

Prior to conducting the SVAR analysis, we tested the order of integration for all time series. The results of the unit root test (Augmented Dickey-Fuller (ADF) test) indicated that the level of each series is non-stationary. All the four endogenous variables are considered as integrated to the order of one. The lag length in the VAR system is three months[1].

We performed the Johansen tests to check the cointegration for the VAR model. Consequently, the null hypothesis of at least one cointegration equation is rejected. This suggests that the first difference VAR should be an appropriate specification.

The impulse response functions serve the central role in assessing how and to what extent the structural shocks influence e_t.

Figure 1 displays the responses of e_t to a one-standard deviation innovation of a particular structural shock on all the variables over a 12-month period.

With regard to the f shock (Shock1), an increase in the Japanese investors' preference for foreign assets could depreciate the yen rate. However, the effect is nearly zero in six months.

With regard to Shock2 (structural supply shock), the positive shock to supply will initially depreciate the yen rate.

With regard to Shock3 (structural demand shock), the positive shock to demand will appreciate the yen rate.

With regard to Shock4 (structural monetary shock), the real yen rate initially depreciates and then appreciates back to the long-run equilibrium level. This result is consistent with the evidence of Dornbusch's overshooting model with respect to the impact of structural monetary shock on the real exchange rate.

Table 2 reports the variance decomposition. The variance decomposition of e_t suggests that the shocks in demand shock (Shock3) explain more than 70% of the variance of e_t. On the other hand, the shocks in investment in foreign assets (Shock1) have the second biggest effect on the e_t over a 12-month period.

4. Robustness Check

We examined the robustness of the results shown above.

First, we employed the cumulative sum of recursive residuals (CUSUM) test

[1] We changed the lag length from three months to six months. However, our conclusion did not change.

proposed by Brown *et al*. (1975) in order to assess parameter constancy. If the plots of CUSUM lie outside the area between the two critical lines, the parameters and variance are said to be unstable. However, each of the four reduced VAR equations indicates that the elasticities are stable.

We changed the first point of the range of estimation from 1998M1 to 2004M3 in order to investigate whether the Japanese official intervention (which stopped existing since 2004M3) affects the stability of the parameter. However, the conclusion of our analysis has changed slightly.

5. Conclusion

In this paper, we paid attention to the effect of the Japanese preference for foreign assets on the yen rate. The objective of this paper was to examine the main factor affecting the yen rate by constructing a four-dimensional version of the SVAR model. Several important conclusions were derived from our analysis.

First, our results suggest that an increase in the foreign investments by Japanese investors including households can significantly depreciate the yen rate. We note that the yen may decline further with a possible acceleration in the foreign investment boom among households.

Second, we found that the main factor responsible for the movements of the yen rate against the dollar is demand shock. This result implies that the main reason for the depreciation of the yen is the weak Japanese demand. In fact, the Japanese economy has recovered since 2002, but the Japanese CPI is still nearly zero with a reflection of the weak demand.

If the Japanese domestic demand expands further, the yen rate will appreciate.

References

Amisano, G., and C, Giannini (1997) *Topics in Structural VAR Econometrics* 2d ed. Springer: New York.

Brown, R.L., J. Durbin., and J.M. Evans (1975) “Techniques for testing the constancy of regression relationships over time” *Journal of the Royal Statistical Society* **37**, 149-92.

Chaudhuri, K., and B. C. Daniel (1998) “Long-run equilibrium real exchange rates and oil prices” *Economics Letters* **56**, 231-238.

Chen, S. (2004) "Real exchange rate fluctuations and monetary shocks: A revisit *International Journal of Finance and Economics* **9**, 25-32.

Clarida, R., and J. Gali (1994) "Sources of Real Exchange Rate Fluctuations: How Important are Nominal Shocks?" NBER Working Paper 4685

Dornbusch, R. (1976) "Expectations and exchange rate dynamics" *Journal of Political Economy* **84**, 1161-1176.

Huang, Y., and G. Feng (2006) "The role of oil price shocks on China's real exchange rate" *China Economic Review.*

Mehrara, M., and K. Oskoui (2006) "The sources of macroeconomic fluctuations in oil exporting countries: A comparative study" *Economic Modeling.*

Zhou, S. (1995) "The response of real exchange rates to various economic shocks" *Southern Economic Journal* **61**, 936-954.

Figure 1: Impulse Responses of the Yen Rate to Structural Shocks

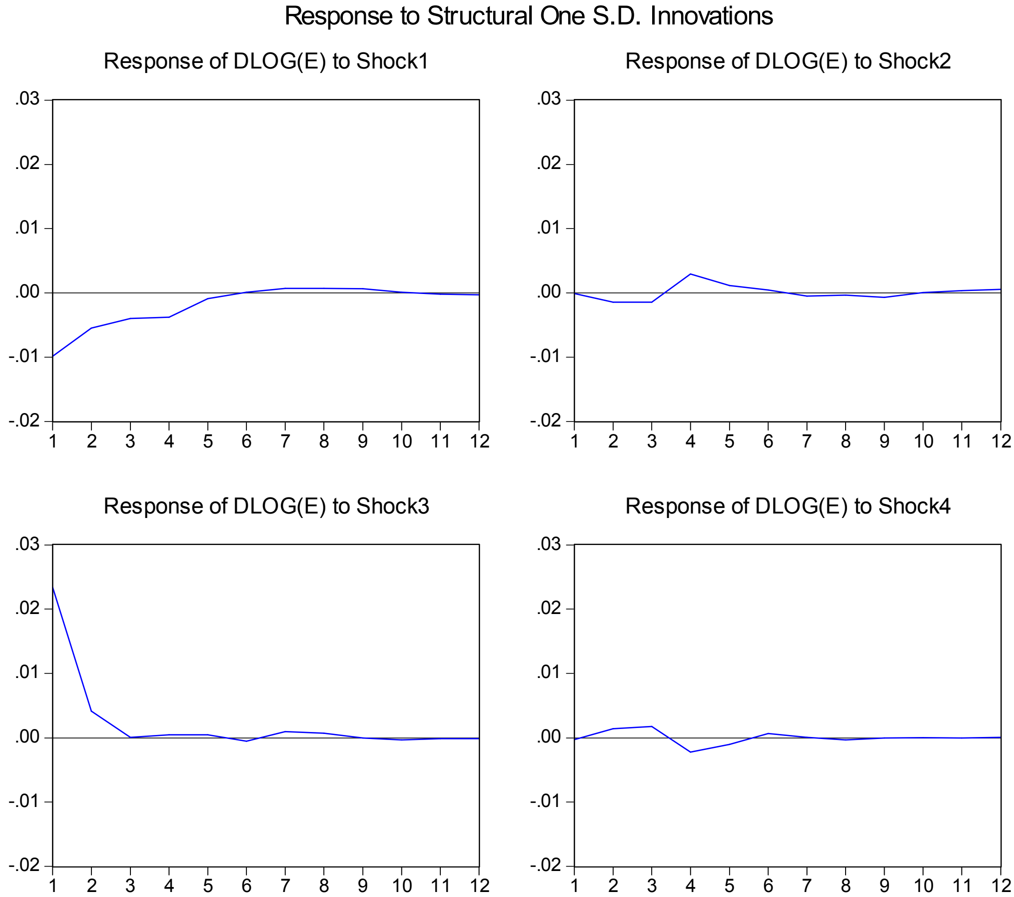

Table 1: Variance Decomposition of RE

Period	Shock1	Shock2	Shock3	Shock4
1	15.04	0.00	84.95	0.01
2	18.25	0.30	81.16	0.29
3	19.94	0.57	78.78	0.70
4	21.11	1.71	75.83	1.34
5	21.12	1.89	75.51	1.48
6	21.10	1.91	75.46	1.53
7	21.11	1.94	75.41	1.53
8	21.15	1.96	75.35	1.54
9	21.18	2.02	75.26	1.54
10	21.18	2.02	75.26	1.54
11	21.18	2.04	75.25	1.54
12	21.18	2.07	75.21	1.54