

Does Exchange Rate Volatility Influence the Balancing Item in Japan? An Empirical Note

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This study provides preliminary empirical support on the impact of exchange rate volatility on Japan's balancing item using subset VAR (Vector Autoregression) approach although small. The finding of this study adds an empirical dimension on the trade literature, particularly for Japan, and opens a door for further debate.

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I. INTRODUCTION

One of the concerns of policymakers is the reliability of balance of payments statistics which are deemed to provide signals about likely directions of economic policy as well as trade policy. Ideally, the recorded balance of payments would always balance but it can prove very difficult in material world due to the difficulties involved in the measuring and recording of balance of payments data. Realistically, the balance of payments accounts are constrained by the problem of 'adding up'. This simply that total debit must not equal to total credit of balance of payments accounts. As a consequent, a balancing item is added to the data to validate the double entry bookkeeping principle – it obtained simply by calculating the difference between total recoded credit transactions and total recorded debit transactions per time period (Brooks and Fausten, 1998, pp.31). In other words, the net balance of errors (transactions are recorded incorrectly) and omissions (transactions are not recorded at all) constitutes the balancing item (Fausten and Brooks, 1996, pp.1303).

A study by Fausten and Brooks (1996) examined the balancing item in Australia's balance of payments accounts. Using data-driven approach, they run a regression (Ordinary Least Square, OLS) of the balancing item on the gross transactions flows of the main components of the balance of payments. The results clearly rejected the hypothesis that recording mistake constitutes a major source of the balancing item. They further

highlighted the potential role of economic influences on the time pattern of the balancing item via exchange rate (proxy of relative price) that affects all cross-border transactions, and the extent of economic openness (Fausten and Brooks, 1996, pp. 1311). Empirical results from the OLS regression models showed that exchange rate volatility, and the degree of economic openness failed to influence the Australia’s balancing item. With the recent advance development in time series analysis, OLS regression used in Fausten and Brooks (1996) is unsatisfactory to draw a conclusive finding. Other related studies are Duffy and Renton (1971), and Tombazos (2003).

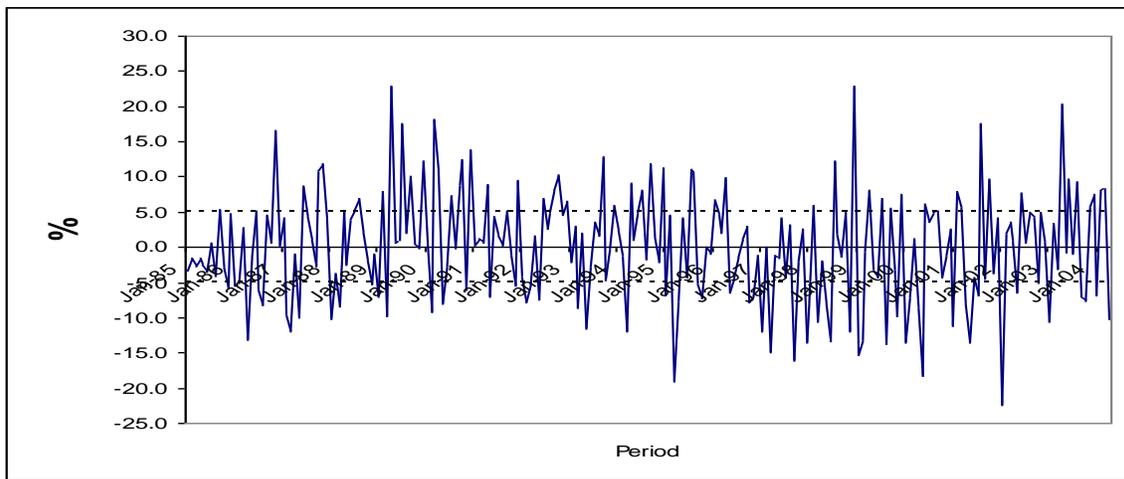


Figure 1. Ratio of balancing item on the sum of gross merchandise imports and exports (%) in Japan for period Jan-1985 to April-2004

Based on literature search, study on balancing item in Japan was not a culture yet. More specifically, this study aims to empirically explore the impact of exchange rate volatility on Japan’s balancing item of balance of payments accounts. This relation has been initially examined by Fausten and Brooks (1996, pp.1311) as supplementary exercise onto their work. Indeed, Japan serves as a suitably empirical example to apply the framework highlighted by Fausten and Brooks (1996). Visual inspection from Figure 1, Japan’s balancing item has been considered as “too big” for most of the sample periods.¹ Perhaps, it is an unclear business on the literature of the Japanese trade issues. Employing more advance econometric time series techniques such as subset VAR

¹ As contained in the IMF Balance of Payments Manual, a balancing item is considered “too big” if it exceeds 5% of the sum of gross merchandise imports and exports.

(Vector Autoregression) approach and, consequently Granger causality, impulse responses function, and variance decomposition approaches, the empirical results show, to certain extent that the exchange rate volatility contains information about Japan's balancing item behaviour.² Even though VAR is conventionally employed to examining the dynamic impact of random shocks on systems of interrelated variables, Benkwitz et al. (2000) and Benkwitz et al. (2001) have recently pointed out that if a VAR carries too many insignificant coefficient estimates, the standard bootstrap procedure used in this context often produced confidence intervals which were rather wide and hence the impulse responses were not very informative, so that nothing much could be said about the actual underlying relations. In this relation, they proposed subset VAR models where zero restrictions are placed on some of the coefficients. Provided the restrictions are correct, the subset specification yields confidence bands that are substantially narrower than in the unrestricted model, so that the impulse responses can be estimated more precisely and allow for easier interpretation. In this study, the initial VAR for exchange rate volatility and balancing item in Japan, have been estimated and, the estimates show many insignificant coefficients, thus it supports the use of subset VAR.³

II. VARIABLES AND DATA

The variables used in this study are balancing item (BI_t , measured in billion yen), and exchange rate volatility (V_i). The literature has documented many methods in generating the exchange rate volatility. No single method to its measurement has become widely accepted. Additionally, McKinezie (1999, p.77-78) has documented nine measures used to generate exchange rate volatility. Three of them were employed in this study because of its simplicity. The methods are (1). $V1_t$ = Absolute percentage change of the spot exchange rate; (2). $V2_t$ = Variance of the spot ER around its trend which is predicted

² This study does not employ the new-known approach of cointegration for examining the possible long run relationships between exchange rate volatility and balancing item in Japan. Perhaps, economic theory should be used to support the use of cointegration approach. As noted, the influences of exchange rate volatility on balancing item are an empirical issue instead of theoretical argument. Balancing item is fundamentally accounting matter from the balance of payments accounts, and no economic theory to say about its economic relations. The relationships between balancing item and exchange rate volatility can be explained from the behavioural economics' viewpoint.

³ The conventional VAR estimates with 12 lag length (in month) are not reported here, but available from author upon request.

from $LnER_t = b_0 + b_1 t_t + b_2 t_t^2 + e$; and (3). $V3_t =$ ARIMA model residuals. ER is the exchange rate series (Spot rate - USD/JPY). The monthly data is obtained from OECD Main Economic Indicators. Due to the data unavailability, the sample period used in this study covers January 1985 to April 2004.

In order to use VAR approach, the involved time series - endogenous variables must be stationary or $I(0)$. The Phillip-Perron test (PP test) has been carried out to test for the stochastic properties of the involved series. The results show that all the variables (BI_t , $V1_t$, $V2_t$ and $V3_t$) are stationary, $I(0)$. Therefore, VAR approach is appropriate for analyzing the impact of exchange rate volatility on balancing item in Japan's balance of payments accounts.

III. EMPIRICAL RESULTS

This section reports the estimates of subset VAR, and the results of Granger causality, impulse responses function and variance decomposition approaches. Table 1 illustrates the estimations of subset VAR. The last month exchange rate volatility, $V_{i,t-1}$ does influence positively the pattern of Japan's balancing item, and the previous exchange rate volatility is informative for balancing item. More interestingly, the last month balancing item, BI_{t-1} does influence its current pattern negatively, but positive impacts over the 8, 9 and 12 months. The portmanteau tests support no autocorrelation of the subset VAR models.

Table 1. Estimates of Restricted VAR (Coefficient)

Dependent variable: BI			
Lagged endogenous term:-	$V_i=V1$	$V_i=V2$	$V_i=V3$
BI(t-1)	-0.160**	-0.143**	-0.141**
BI(t-3)		0.087	0.098
BI(t-8)	0.178***	0.182***	0.167***
BI(t-9)	0.146**	0.141**	0.147**
BI(t-12)	0.246***	0.249***	0.243***
$V_i(t-1)$	2251.365**	2749.389***	364838.906***
$V_i(t-2)$		-2907.122***	
$V_i(t-7)$	-2135.544*	1832.021***	216419.251*
$V_i(t-9)$		-1581.538**	
$V_i(t-12)$			-218667.828*
Portmanteau test	32.355	37.0237	34.5032
(p-value)	(0.9953)	(0.9135)	(0.9534)

Notes: Since this study emphasizes on the influences of exchange rate volatility on balancing item, thus the VAR estimates for V1, V2 and V3 are not reported here. *, **, and *** denote significant at 10%, 5% and 1% respectively. A maximum of 12 months lag length (one year) was imposed onto initial VAR models and, the Sequential Elimination of Regressors /Testing Procedure has been employed in order to derive the subset VAR with zero restrictions on the parameters based on AIC (Akaike information criteria). The subset VAR is then estimated with the feasible generalized least squares (GLS). A Portmanteau test (Lütkepohl, 1993) for residual autocorrelation may be applied if a pure VAR process possibly with subset restrictions but without exogenous variables has been fitted – the null hypothesis is no residual autocorrelation.

Looking ahead, given the endogenous variables are $I(0)$, standard Granger causality approach was used in order to examine the causal relationship from the exchange rate volatility to balancing item in Japan. The causality specifications are based on the unrestricted VAR estimations with lag length of 12 months. The results statistically reject the null hypothesis of “V2 do not Granger-cause BI” at 11% level, and of the null hypothesis of “V3 do not Granger-cause BI” at 6% level. But, this is not the case for V1. In general, these empirically reveal that the past exchange rate volatility (V2 and V3) contain information on Japan’s balancing item behaviour.

Table 2. Results of Granger Causality Tests

HO:	Test statistic (F-version):	p-value:
V1 do not Granger-cause BI	0.7623	0.6895
V2 do not Granger-cause BI	1.5295	0.1105
V3 do not Granger-cause BI	1.7585	0.0532

In order to investigate the responses of Japan’s balancing item corresponding to a shock of exchange rate volatility as well as its own shock, impulse responses analysis has been carried out here. The bootstrap procedure proposed by Hall (1992) or Efron and Tibshirani (1993) was employed for estimation. The first panel shows the response of balancing item to its own shock and, other panels present the stock of exchange rate volatility V1, V2 and V3 on Japan’s balancing item behaviour. Visual inspection from the first panel in Figure 1, its own shock (BI) initially led to a decline in balancing item during the first month, and has a temporary positive effect between month 7 and month 13. For a shock in exchange rate volatility (V1, V2 and V3), the responses for balancing item are seem to be consistent among them; a temporary positive effect on balancing item within the second month following by a negative effect between month 6 and month 8. The responses of balancing item to its own shock and exchange rate shock are neutralized with zero effect after month 15.

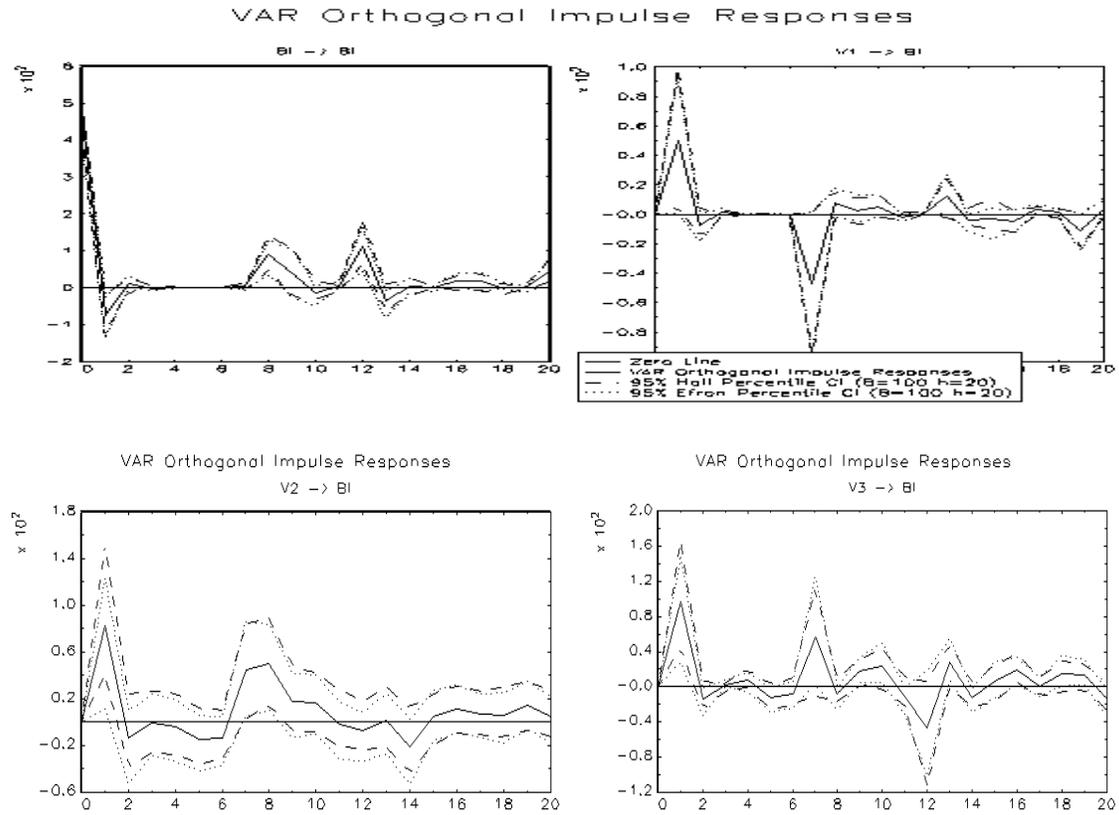


Figure 1. Impulse Responses Analysis

Table 3 presents the estimates of variance decomposition analysis. The results clearly indicate that more than 90% of the Japan's balancing item can be explained by itself. The exchange rate volatility (V1, V2 and V3), however, explains 2%, 6% and 7% of Japan's balancing item pattern at the month 20.

Table 3. VAR Forecast Error Variance Decomposition
 Percentages of forecast error in BI accounted for by:

forecast horizon	BI	V1	BI	V2	BI	V3
1	100	0	100	0	100	0
2	99	1	97	3	96	4
3	99	1	96	4	96	4
4	99	1	96	4	96	4
5	99	1	96	4	96	4
6	99	1	96	4	96	4
7	99	1	96	4	96	4
8	98	2	95	5	94	6
9	98	2	95	5	94	6
10	98	2	95	5	94	6
11	98	2	94	6	94	6
12	98	2	94	6	94	6
13	98	2	95	5	93	7
14	98	2	95	5	93	7
15	98	2	95	5	93	7
16	98	2	95	5	93	7
17	98	2	95	5	93	7
18	98	2	95	5	93	7
19	98	2	95	5	93	7
20	98	2	94	6	93	7

IV. CONCLUDING REMARKS

This study explores the impact of exchange rate volatility on Japan's balancing item of the balance of payments accounts. Consistently, the results of subset VAR, Granger causality, impulse responses function and variance decomposition analyses support the view that Japan's balancing item in balance of payments accounts is statistically influenced by exchange rate volatility as well as its past information although small. This is an important preliminary finding that the exchange rate volatility plays an unavoidable role on the reliability of balance of payments accounts statistics. Thus, a manageable exchange rate policy on its volatility is crucial in order to guarantee the quality of the balance of payments accounts statistics which provide signals about likely directions of economic (and trade) policy from the eyes of policymakers. No study is free from limitation. Perhaps, for further investigation other economic variable(s) can be introduced into a bivariate framework (BI and V_i) by considering that omitted variable(s) would affect the results such as the economic openness (ratio of imports and exports on GDP) as noted in Fausten and Brooks (1996).

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References

- Benkwitz, A., Lutkepohl, H. and Neumann, M. H.(2000) Problems related to confidence intervals for impulse responses of autoregressive processes, *Econometric Reviews*, **19**, 69-103.
- Benkwitz, A., Lutkepohl, H. and Wolters, J.(2001) Comparison of bootstrap confidence intervals for impulse responses of German Monetary Systems, *Macroeconomic Dynamics*, **5**, 81-100.
- Brooks, R., and Fausten, D. (1998) *Macroeconomics in the Open Economy*. Addison Wesley Longman Australia Pty Limited, South Melbourne, Australia.
- Duffy, M., and Renton, A. (1971) An analysis of the U.K. balancing item, *International Economic Review*, **12**, 448-464.
- Efron, B., and Tibshirani, R.J. (1993) *An Introduction to the Bootstrap*. Chapman and Hall, New York.
- Fausten, D. K., and Brooks, R. D. (1996) The balancing item in Australia's balance of payments accounts: an impressionistic view, *Applied Economics*, **28**, 1303-1311.
- Hall, P. (1992) *The Bootstrap and Edgeworth Expansion*. Springer, New York.
- Lütkepohl, H. (1993) *Introduction to Multiple Time Series Analysis* (2ed), Springer, Verlag, Berlin.
- McKenzie, M.D. (1999) The impact of exchange rate volatility on international trade flows, *Journal of Economic Surveys*, **13**, 71-106.
- Tombazos, C. G. (2003) New light on the 'impressionistic view' of the balancing item in Australia's balance of payments accounts, *Applied Economics*, **35**, 1369-1378.