Economics Bulletin

Volume 29, Issue 4

What Causes the Volatility of the Balancing Item?

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Abstract

This paper analyzes the impacts of timing errors, capital flows and economic openness on the behavior of the balancing item. We choose Norway, Sweden, Philippines and South Africa as sample countries where the size of the balancing item is often excess the IMF's criterion of ‘smallness'. The empirical results show that the sources of the volatility of the balancing item are different among these four countries.

Citation: Mei-yin Lin and Hui-hua Wang, (2009) "What Causes the Volatility of the Balancing Item?", *Economics Bulletin*, Vol. 29 no.4 pp. 2738-2748.
Submitted: Jun 27 2009. **Published:** October 29, 2009.

1. Introduction

The compilation of a country's balance of payments accounts is in accordance with the double entry book-keeping principle. By the accounting identity, the total credit must be equal to the total debit. However, the raw records of cross-border transactions in the balance of payments are collected from different resources and the data may be recorded incorrectly (errors) or not recorded at all (omissions). Consequently, the net balance of errors and omissions are accounted for the balancing item (Fausten and Brooks, 1996, p.1303) which is a residual to balance the two sides of the transactions.

There are some different interpretations on the balancing item. First, if the credit and debit sides of a transaction are recorded in different time-periods, the balancing item is due to the timing errors. Duffy and Renton (1971) suggest that the lagged balancing item could be a possible explanatory variable to reflect the timing errors. Their empirical study of UK quarterly balancing item finds the coefficient on the lagged balancing item is significant and negative. The study of Japan's monthly balancing item by Tang (2006a) shows almost 70% of the balancing item could be explained by its history.

An additional explanation for the balancing item is it measures the unidentified short-term capital flows (hot money). This missing information included in the balancing item may arise to response the liberalization or deregulation of financial market. Duffy and Renton (1971) employ the change in exchange rate and interest rate differential to reflect the speculative or arbitrageurial motives for capital flows. The error allocation analysis appears that the short-term capital flows can explain the movement in the balancing item in particular quarters. Loungani and Mauro (2000), Edsel L. Beja (2005) introduce the item 'omissions and errors' as a residual method to measure the 'hot money' which provides estimates of the scale of capital flight.

Recently the literature focuses on the sustainability of the balancing item. The magnitude of the discrepancy should be within reasonable bounds and appears to diminish in the subsequent revision to show the accurate macroeconomic performance.[1] In other words, the balancing item should be a stationary time series with mean reversion to zero if there are no omissions or errors. There is evidence of structural instability or non-linear characteristic in the behavior of the balancing item. Meanwhile, Tang (2006b) indicates that economic openness does influence the pattern of Japan's balancing item. In summary, the previous literature shows there exists structural breaks in the balancing item series. The change in financial institution, capital flow and economic openness are considered to have impacts on the behavior of balancing item. However, most studies focus on the developed countries. Some emerging economies and developing countries have become more open in

[1] See Fausten and Pickett (2004) , Tang and Hooy (2007) and Mishra *et. al.* (2008).

international trade and financial market in the recent years. This may reflect on the volatility of the balancing item. This paper will analyze the factors influencing the balancing item and compare the differences among these sample countries.

1. The Analytical Framework

2.1. Sample Selection

To select the appropriate sample countries for study, we calculate the ratio of the balancing item to the sum of gross merchandise imports and exports for each member of International Monetary Fund (IMF), respectively. According to the *IMF Balance of Payments Manual*, a balancing item is considered 'too big' if the absolute value of this ratio exceeds 5%. We choose those countries where more than 20% of the observations exceed the IMF's 5% criterion of 'smallness'. The size of the balancing item in the selected countries seems to be larger more often than other countries. This drives us to the question what are the main sources of the unacceptable volatility of the balancing item.

2.2 Variables and Data

Based on the previous literature, it seems reasonable to capture the volatility of the balancing item from three aspects: timing errors, capital flows and economic openness. The lagged term of the balancing item (BI) will be a possible explanatory variable to measure the timing errors. The uncovered interest rate parity (UIP) shows that the domestic currency is expected to depreciate at a rate equal to the interest rate differential. Thus the change in the spot exchange rate (EX) and the interest rates differential between the domestic and U.S. (IRD) may determine the capital movement. And we employ these two variables as proxies for capital flows. It is conventional to use the sum of imports and exports deflated by GDP (TO) to measure trade openness. Besides, there is good evidence to show that the structural breaks in the balancing item series are relevant to the openness of financial market. We use the ratio of broad money supply to GDP (FD) to measure financial development.

Furthermore, we consider the seasonal dummy variables $(D_{1,}\ D_{2,}\ D_3)$ to reflect the influences of the seasonal factors.

In addition to the seasonal dummy variables, there are five variables in our model: BI , EX , IRD, TO , FD. The data set, obtained from the International Monetary Fund's *International Financial Statistics* (*IFS*), comprises quarterly 112 observations ranging from 1981:1 to 2007:4 for each economy. In the first selection stage, there are 20 countries where more than 20% of the observations exceed the IMF's 5% criterion of 'smallness'. We delete those countries whose data is not

sufficient for us to construct the five variables in the model. Only five countries are selected as our study samples: Norway (27.68%), Sweden (35.71%), United States (41.96%), Philippines (25.89%) and South Africa (39.29%).[2] Exchange rate is defined as the domestic currency price of a U.S. dollar. The government bond yield of United States is used to measure the interest rate differential between the domestic country and the foreign country in each economy. Therefore the sample countries for our study are the above-mentioned four countries, exclusive of Unite States. For the reason of data availability, we use M_1 of Philippines, M_2 of Norway and South Africa, M_3 of Sweden as the money supply definition to measure financial development in each country.

2.3 Econometric Methodology

Vector autoregressive (VAR) processes are a model for describing the dynamic interactions in a system of variables. Benkwitz *et al*. (2000) and Benkwitz *et al.* (2001) have proposed that a VAR model carrying too many insignificant coefficients will produce a rather wide coefficient intervals and the impulse response are not very informative. Consequently, they suggest a subset VAR model with zero constraints on some of the coefficients. If there is no priori knowledge of possible zero constraints, Lütkepohl (2005) propose three specific strategies for elimination of complete coefficient matrices: top-down strategy, bottom-up strategy and sequential elimination of regressors approach. Starting from a full VAR(p) model with K variables, the k -th equation is written as:

$$y_{k,t} = \alpha_0 + \alpha_{k1,1} \cdot y_{1,t-1} + ... + \alpha_{kK,1} \cdot y_{K,t-1} + ...+ \alpha_{k1,p} \cdot y_{1,t-p} + ... + \alpha_{kK,p} \cdot y_{K,t-p} + e_{k,t} \qquad (1)$$

The optimal model is selected by a specified criterion, for example the minimum of AIC or SC . For the top-down strategy, the equation (1) is estimated by LS at the first step. Then the equation with the constraint of zero value placed on the last coefficient $\alpha_{kK,p}$ is estimated again. If the value of the criterion for the restricted model is greater than for the unrestricted model, $y_{K,t-p}$ is retained in the equation. Otherwise it is deleted from the equation. The same procedure is repeated for the second last coefficient $\alpha_{kK-1,p}$, and so on up to α_0 . In each step, the variable is eliminated if the criterion does not decrease by that constraint of zero value on the coefficient compared to the smallest value obtained in the previous steps.

[2] The percentage of the observations exceeding the IMF's 5% criterion is shown in the parenthesis.

For the bottom-up strategy, only lags of the first variable (y_1) is considered initially by the specified criterion in the k -th equation. Given the optimal lag order of y_1 , lags of the second variable (y_2) are added into the equation. This procedure goes on until the lag order for each of the K variables is determined, conditional on the optimal lags of the previous variables.

In the strategy of sequential elimination of regressors approach, the zero coefficients are determined on the basis of the t -ratios of the estimators. The rule is to sequentially eliminate those variables with smallest absolute values of t -ratios until all t -ratios (in absolute value) are greater than some threshold value.

The procedure described above is repeated for each of the K equations in the three strategies. When zero restrictions have been obtained for each of the K equations, the restricted model may be estimated simultaneously by ML or FGLS. This is called subset VAR model. In this paper, we will partly adopt the general idea of subset VAR model. These three strategies are applied to choose the optimal restricted regression for the balancing item individually.

2. Empirical Results

2.1 Description of the Data

A summary view of the balancing item of each economy is provided in Figure 1. The balancing item seems to follow a path of increasing magnitude and volatility. The descriptive statistics for the variables involved in this examination are presented in Table 1. The balancing item series of each country is expected to show a large degree of non-normality. The non-zero skewness implies that the balancing item series does not follow a random process. Besides, we apply the ADF tests for unit roots of the variables. The results show that the balancing item of Philippines is $I(0)$ and all the other variables are $I(1)$.

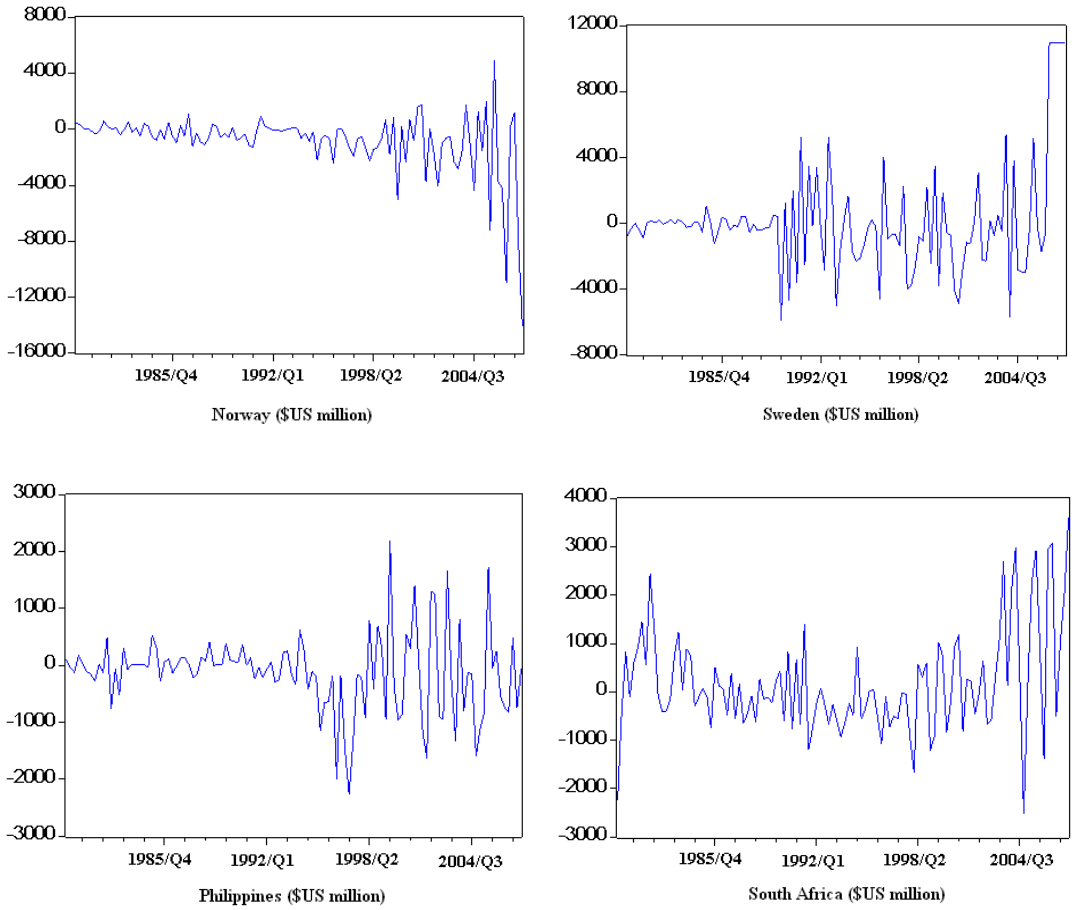

Figure 1 Plots of the balancing item

Table 1 Descriptive statistics

	Norway	Sweden	Philippines	South Africa
Variable: *BI*				
Mean	-856.269	76.366	-126.978	171.692
Std. Dev.	2291.472	3227.350	697.826	1075.662
Skewness	-2.974	1.619	0.038	0.922
Kurtosis	13.344	4.062	1.931	1.485
Variable: *EX*				
Mean	6.971	7.268	30.760	4.176
Std. Dev.	0.965	1.354	15.317	2.616
Skewness	0.457	0.234	0.287	0.737
Kurtosis	0.166	0.449	-1.138	-0.062
Variable: *IRD*				
Mean	0.919	0.996	7.392	6.029
Std. Dev.	1.924	2.105	6.153	3.244

Skewness	0.921	-1.121	1.321	-0.854
Kurtosis	0.435	4.589	3.090	-0.101
Variable: *TO*				
Mean	0.730	0.719	0.745	0.511
Std. Dev.	0.042	0.124	0.263	0.075
Skewness	0.323	0.394	0.133	0.265
Kurtosis	-0.337	-0.885	-1.349	-0.319
Variable: *FD*				
Mean	2.076	1.916	0.339	1.809
Std. Dev.	0.187	0.243	0.088	0.336
Skewness	-0.411	0.639	-0.100	0.620
Kurtosis	-0.853	0.011	-0.839	-0.150

3.2 Results of the Estimation for the Balancing Item Regression

The regression for balancing item is:

$$\Delta BI_t = \alpha_0 + \sum_{i=1}^{3} \alpha_{1i} \cdot D_{it} + \sum_{i=1}^{q} \alpha_{2i} \cdot \Delta BI_{t-i} + \sum_{i=1}^{q} \alpha_{3i} \cdot \Delta EX_{t-i} + \sum_{i=1}^{q} \alpha_{4i} \Delta IRD_{t-i} + \sum_{i=1}^{q} \alpha_{5i} \cdot \Delta TO_{t-i} + \sum_{i=1}^{q} \alpha_{6i} \cdot \Delta FD_{t-i} + e_t \quad (2)$$

The maximum lag order （ q ）is set to be 6. We apply the three strategies to select the regressors in the balancing item regression. The results are presented in Table 2, Table 3 and Table 4.

Table 2 reports the estimates of the balancing item regression by the top-down strategy. Trade openness is the most important factor to influence the balancing item of Norway. The effect is positive and the finding is similar to Tang's study for Japan. In Sweden, the seasonal dummy of the third quarter is the only significant variable in the regression. All the factors we consider in the regression do not affect the balancing item in Philippines. The most well fitted regression is South Africa. All the factors could explain the change in the balancing item of South Africa. The coefficients on seasonal dummies of the first quarter and the second quarter are positive and significant. And the positive estimates of the lagged interest rate differential variables indicate the magnificent size of balancing item would result from the capital flows. The more developed in the financial market, the more change in the balancing item. However, the influence of the change in the exchange rate is positive in the first lag and then turns to be negative in the third lag. The effect of the trade openness follows a 'V' shape. The influence is positive in the second lag and the sixth lag, and is negative in the fourth lag. The most interesting finding is that timing errors do not account for the change in the balancing item. This is contrary to the conclusion of the previous literature.

Table 2 Estimates of the *BI* regression by the top-down strategy

	Norway		Sweden		Philippines		South Africa	
	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
Constant	-4.066	-2.600*	-0.392	-0.634	-167.486	-2.312*	-3.966	-3.054**
D_1	---	---	---	---	---	---	7.013	3.688**
D_2	7.238	1.923	---	---	---	---	5.348	2.771**
D_3	---	---	-2.978	-2.338*	---	---	2.404	1.388
ΔEX_{t-1}	---	---	---	---	---	---	10.923	1.978*
ΔEX_{t-2}	-43.996	-1.795	---	---	1306.660	1.180	---	---
ΔEX_{t-3}	---	---	---	---	---	---	-25.767	-3.959**
ΔEX_{t-6}	---	---	---	---	---	---	-8.071	-1.393
ΔIRD_{t-1}	---	---	---	---	---	---	2.053	1.799
ΔIRD_{t-5}	---	---	0.125	1.352	---	---	2.780	2.581*
ΔIRD_{t-6}	---	---	---	---	-117.625	-0.880	---	---
ΔTO_{t-1}	100.187	2.697**	---	---	---	---	---	---
ΔTO_{t-2}	99.560	2.186*	---	---	---	---	18.134	2.155*
ΔTO_{t-4}	---	---	---	---	---	---	-22.307	-2.943**
ΔTO_{t-6}	---	---	---	---	---	---	23.364	3.094**
ΔFD_{t-2}	---	---	-11.502	-1.324	1603.859	1.524	---	---
ΔFD_{t-3}	---	---	---	---	---	---	-19.345	-1.316
ΔFD_{t-4}	---	---	---	---	---	---	47.055	3.167**
ΔFD_{t-5}	-74.699	-1.664	---	---	---	---	21.262	1.463
R^2	0.109	---	0.065	---	0.042	---	0.343	---
$Q(5)$	1.805	---	1.232	---	5.687	---	3.638	---
$Q(10)$	3.285	---	2.124	---	9.356	---	7.345	---

Note: The symbols *, ** indicate significance at 5%, 1% statistical level.

Table 3 presents the estimates of the balancing item regression by the bottom-up strategy. There is no significant estimate in the regression of Norway and Philippines. Like the result of the previous strategy, the seasonal dummy of the third quarter has negative influence on the Sweden's balancing item. The change in the exchange rate of the third lag has significantly negative coefficient in the regression of South Africa. We should notice that the estimations of the regressions by the bottom-up strategy do not provide a good fit to the data for each country.

The results of the balancing item regression by the sequential elimination of regressors approach are documented in Table 4. We delete those variables whose t-ratios (in absolute value) are smaller than 1.5 sequentially. It implies the significant

level is about 15%. In Norway, the variables selected by the sequential elimination of regressors approach are exactly identical to those selected by the top-down strategy. The results of Sweden and South Africa in Table 6 are also similar to those in Table 4. In Philippine, the seasonal dummy of the first quarter is significantly negative. Trade openness and financial development have slight impact s on the balancing item. The BI regression of Philippine is better fitted by the sequential elimination of regressors approach.

Table 3 Estimates of the BI regression by the bottom-up strategy

	Norway		Sweden		Philippines		South Africa	
	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
Constant	-1.255	-0.900	-0.590	-0.967	-126.978	-1.926	-0.297	-0.613
D_1	-4.359	-1.570	---	---	---	---	---	---
D_3	---	---	-2.355	-1.987*	---	---	---	---
ΔBI_{t-3}	---	---	0.021	0.234	---	---	---	---
ΔEX_{t-3}	---	---	---	---	---	---	-17.232	-3.002**
ΔIRD_{t-5}	---	---	---	---	---	---	1.349	1.377
ΔFD_{t-4}	---	---	---	---	---	---	19.822	1.741
ΔFD_{t-5}	---	---	---	---	---	---	20.789	1.857
R^2	0.022	---	0.036	---	0.000	---	0.123	---
$Q(5)$	0.386	---	1.319	---	5.238	---	2.739	---
$Q(10)$	1.581	---	2.376	---	9.546	---	8.801	---

Note: The symbols *, ** indicate significance at 5%, 1% statistical level.

Table 4 Estimates of the BI regression by the sequential elimination of regressors approach

	Norway		Sweden		Philippines		South Africa	
	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
constant	-4.066	-2.600*	---	---	---	---	-2.311	-2.824**
D_1	---	---	---	---	-430.809	-2.512*	6.140	4.032**
D_2	7.238	1.923	---	---	---	---	2.482	1.972*
D_3	---	---	-3.553	-3.447**	---	---	---	---
ΔBI_{t-4}	---	---	---	---	0.176	1.771	---	---
ΔEX_{t-1}	---	---	---	---	---	---	14.769	2.516**
ΔEX_{t-2}	-43.996	-1.795	---	---	---	---	---	---
ΔEX_{t-3}	---	---	---	---	---	---	-17.545	-3.097**

ΔEX_{t-4}	---	---	---	---	1733.832	1.538	-11.497	-2.020*
ΔEX_{t-6}	---	---	---	---	---	---	-9.935	-1.734*
ΔIRD_{t-1}	---	---	---	---	---	---	1.855	1.640
ΔIRD_{t-5}	---	---	---	---	---	---	2.579	2.414*
ΔTO_{t-2}	100.187	2.697**	---	---	---	---	---	---
ΔTO_{t-2}	99.560	2.186*	---	---	---	---	---	---
ΔTO_{t-4}	---	---	---	---	---	---	-16.436	-2.250**
ΔTO_{t-6}	---	---	---	---	-1224.048	-1.655	25.221	3.449**
ΔFD_{t-2}	---	---	---	---	1747.501	1.650	---	---
ΔFD_{t-4}	---	---	---	---	---	---	47.197	3.256**
ΔFD_{t-5}	-74.699	-1.664	---	---	---	---	---	---
R^2	0.109	---	0.043	---	0.079	---	0.319	---
$Q(5)$	1.805	---	0.936	---	2.082	---	3.399	---
$Q(10)$	3.285	---	2.090	---	6.671	---	7.819	---

Note: The symbols *, ** indicate significance at 5%, 1% statistical level.

3. Conclusions

The volatility of the balancing item could be explained by various sources in each country. Trade openness seems to determine the change in balancing item of Norway. Seasonal factor could account for the volatility in Sweden. However, it is difficult to conclude the factor influencing the balancing item of Philippines. We suppose the political disturbance may be a good reason to explain the instability. The most complex case is South Africa where all the variables have significant effects on the balancing item except for the lagged term of the balancing item. Moreover, the signs of the coefficients on the identical variable may be opposite in the different lags. It indicates the effect of a variable may be reverse after a transition lag. The point deserves explicit emphasis is that timing errors could not explain the volatility in each country. This conclusion is opposed to the finding of the previous literature.

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