Asset Prices, Real Exchange Rate and Current Account Fluctuations: Some Structural VAR Evidence for Thailand

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November 2016

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Abstract:

This paper employs quarterly data during 2008Q1 and 2016Q2 to examine the impacts of shocks to asset prices and real exchange rate on the current balance in Thailand. The structural VAR model is used. The results show that the shocks to real effective exchange rate and housing prices can better explain fluctuations in the current account.

Keywords: Housing prices, stock prices, real exchange rate, current account, structural VAR

JEL Classification: F31, F32, F40, G10

1. Introduction

Controversial debates among researchers about what factors determine current account have been triggered since the emergence of current account imbalances in advanced countries in the past. In previous empirical studies, there are many shocks that cause current account fluctuations. Ahmed and Park (1994) find that domestic absorption shocks are the crucial shocks explaining trade balances in small open economics. Lee and Chinn (2006) find that temporary shocks have only short-run effects on current account. Two of various shocks that affect current account are real exchange rate and asset prices. Obstfeld and Rogolf (1995) indicate that real exchange rate movements cause current account fluctuations even in new open economies while Blanchard and Giavazzi (2002) point to the importance of the current account effects of exchange rate shifts. A decrease in real exchange rate can cause a large current account deficit and vice versa. Blanchard et al. (2005) indicate that main forces behind the large US current account deficits are an increase in US demand for foreign goods and an increase in foreign demand for US assets along with an appreciation of the US dollar. However, Krugman (2007) points out that the sharp drop in the US dollar can cause the crisis, but it is not clear if this crisis can cause macroeconomic problems.

For the role of stock markets on current account fluctuations, Mercereau (2003) develops a simple model to analyze the impact of stock markets on the current account. The model suggests that it is optimal for a country to run current account deficit even though people do not expect the stock boom to last. Furthermore, the current account may help predict future stock market performance in the sense of causal relationship. Fratzscher and Straub (2009) examines the impact of equity-price shocks on current account positions for the G-7 economies during 1974 and 2007. They find that such shocks impose a sizable impact. However, the impacts vary across countries. Holinski and Vermeulen (2012) examine whether shocks to asset prices transmit into the trade balance for a group of five most industrialized countries. They find that a negative stock price shock causes trade balance to improve for the US, UK and France. This impact is not observed for Germany and Japan. In addition, a negative to UK housing prices also improve the trade balance. Fratzscher et al. (2010) find that equity market shocks and housing price shocks are major determinants of the US current account. The real exchange rate shocks are less relevant and exert only temporary effect on the US trade balance. Berg (2013) uses a panel vector autoregressive (VAR) model to examine the relationship between stock prices and current account for 17 OECD countries during 1980 and 2007 and finds that shocks to stock prices and exchange rates have a sizable effects on current account. Fratzcher and Straub (2013) investigate the relationship between asset prices and trade balance in 38 industrialized and emerging market economies. They find that domestic equity price shocks exert a sizable impact on trade balance, especially for the US. The impacts are less pronounced in other economies. Antonakakis et al. (2015) employ time-varying approach to examine dynamic correlations of trade balance and stock prices in the US during 1792 and 2013. They find that the correlations are positive during 1800 and 1870, and negative thereafter. Therefore, the relationship between stock prices and trade balance can be either positive or negative depending on the signs of the wealth effect channel and the exchange rate channel.

This paper contributes to the existing literature in that it examines the impacts of shocks to stock prices, housing prices and real exchange rate on the current account in an emerging market economy during 2008Q1 and 2016Q2. The structural vector autoregressive (SVAR) model is used in the analysis. The results show that the impact of housing price shocks on the current account is more pronounced than the impact of stock price shocks. The rest of this paper is organized as follows: Section 2 describes the data and the results of contemporaneous relationship. Section 3 describes the structural VAR model used in the analysis. Section 4 presents the empirical results and the last section gives concluding remarks.

2. Data and Some Initial Results

2.1 Data

The data are obtained from various sources. The current account balance, exchange rate and housing price indexes are obtained from the Bank of Thailand. The consumer price index is obtained from Ministry of Commerce while nominal GDP is obtained from the office of National Economic and Social Development Board.

The dataset used in this study comprises quarterly data from 2008Q1 to 2016Q2 with 34 observations.[1] The variables used in the analysis are current account, asset prices and exchange rate. The current account variable is defined as the ratio of current account balance and GDP. The asset prices are housing price and stock market prices. These two indices are deflated by consumer price index to convert them to real price series. The exchange rate variable is the series of real effective exchange rate index. The tests for unit root are necessary to ensure that the three variables are stationary because the VAR model requires that all series are stationary. The results of unit root tests are reported in Table 1.

Table 1 Results of Unit Root Tests.

Variable	PP (c)	PP (c+t)
Level:		
ca	-4.392***(0.002)	-4.348***(0.000)
reer	-0.256 (0.263)	-2.581 (0.291)
hp	-0.938 (0.763)	-2.435 (0.356)
sp	-0.861 (0.788)	-2.240 (0.240)
First Difference		
Δ*reer*	-5.058***(0.001)	-4.959***(0.001)
Δ*hp*	-5.633***(0.000)	-5.539***(0.001)
Δ*sp*	-4.643***(0.001)	-5.454***(0.001)

Note: The variables are: *ca* (current account balance to GDP), *reer* (real effective exchange rate index, *hp* (real housing price index) and *sp* (real stock market index. *** denotes significance at the 1 percent level.

The Phillips and Perron (PP) tests with constant (c) and with constant and a linear trend (c+t) are performed. The results in Table 1 show that the variable ca does not contain a unit root and thus it is I(0) series. Other variables contain a unit root and thus they are I(1) series.

2.2 Results of OLS Analysis

The short-run relationship among current account, real effective exchange rate, and asset prices (real housing prices and real stock prices) can be estimated by ordinary least squared (OLS) method using stationary variables. These short-run relationships can be expressed as:

$$ca_t = a_{01} + b_{11}\Delta reer_t + b_{21}\Delta hp_t + \varepsilon_{1t} \qquad (1)$$

and

$$ca_t = a_{02} + b_{12}\Delta reer_t + b_{22}\Delta sp_t + \varepsilon_{2t} \qquad (2)$$

[1] The sample size is limited by the availability of housing price index. The housing price index of single detached house is used.

The results from the estimated equations are reported in Table 2.

Table 2 Short-Run Relationships.

Panel A: Estimated Eq. (1)		
Variable	Coefficient	t-statistic
Δ*reer*	-0.225	-0.767
Δ*hp*	-0.721**	-2.292
intercept	3.334***	
R^2 = 0.150	F = 2.652	D-W = 1.554
Panel B: Estimated Eq. (2)		
Variable	Coefficient	t-statistic
Δ*reer*	-0.135	0.677
Δ*sp*	0.006	0.720
intercept	2.614	3.242
R^2 = 0.018	F = 0.280	D-W = 1.563

Note: The variables are: *ca* (current account balance to GDP), *reer* (real effective exchange rate index, *hp* (real housing price index) and *sp* (real stock market index. ***, and ** denote significance at the 1 and 5 percent level.

The results of OLS estimate of short-run relationships in Eqs. (1) and (2) reveal that real effective exchange rate seems to be negatively related to current account. However, the coefficients this variable in both equations are not significant. Real housing prices significantly impose a negative impact on current account while real stock prices insignificantly impose a negative impact on current account. Eqs. (1) and (2) exhibit serial correlation and should not be reliable. Therefore, a structural VAR model can be used to analyze the impacts of shocks on the current account.

3. Structural VAR Model

The underlying structural equation is expressed as:

$$AY_t = C(L)Y_t + Bu_t \tag{3}$$

where u_t is the stochastic error, which is normally distributed with mean of zero and constant variance.

However, Eq. (3) cannot be estimated directly due to identification issues. Instead, the alternative unrestricted VAR model can be estimated and the model can be expressed as:

$$Y_t = A^{-1}C(L)Y_t + A^{-1}Bu_t \tag{4}$$

Since matrices *A*, *B* and *C* in Eq. (4) are not separately observable, Eq. (3) can be recovered from Eq. (3) by imposing restrictions on the specified VAR model to identify an underlying structure. This is the model proposed by Blanchard and Quah (1989).

A simple model is defined for the estimate of the VAR models, which comprises three variables. The first VAR model is [ca, reer, hp] and the second model is [ca, reer, sp]. In the first step of estimation, an unrestricted VAR model with three variables in their levels with a constant is estimated. According to Sim et al. (1990), it is improper to take the difference form of variables to the VAR model because the tendency in variables will be lost. In this study, the variables, *reer, hp* and *sp*, fail to pass unit root test. However the primary purpose of this paper is to estimate the SVAR model using variables in their levels to analyze the dynamic relationship among these variable rather than parameter estimation.

The second step is to impose restrictions on the short-run behavior of the VAR system in Eq. (4). The random stochastic residual $A^{-1}Bu_t$ can be estimated from the residual e_t of the estimated unrestricted VAR model by the following expression:

$$A^{-1}Bu_t = e_t \tag{5}$$

By reformulating Eq. (5), $A^{-1}Bu_t u_t^{'} B^{'} A^{'-1} = e_t e_t^{'}$ can be obtained. Since $u_t u_t^{'} = I$, thus

$$A^{-1}BB^{'}A^{'-1} = e_t e_t^{'} \tag{6}$$

Let k be the number of variables in the system. The symmetry property of Eq. (6) requires imposing $k(k+1)/2$ restrictions on the $2k^2$ unknown elements in matrices A and B. Therefore, additional k(3k-1)/2 restrictions must be imposed. The restriction scheme is in the form:

$$Ae_t = Bu_t \tag{7}$$

The matrices A and B by the specification using the Cholesky decomposition should be:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ a21 & 1 & 0 \\ a31 & a32 & 1 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} a11 & 0 & 0 \\ 0 & a22 & 0 \\ 0 & 0 & a33 \end{bmatrix}$$

With 3 variables in the system, the number of restrictions is 9.[2] The identifying restriction is imposed in terms of the vector of residuals, e_t, which is obtained from the estimate of unrestricted VAR model. The vector of the fundamental random errors, u_t, is obtained from the structural system. The results from the estimated SVAR model can be used to obtain the impulse response functions and structural variance decompositions.

[2] Blanchard and Quah (1989) impose long-run restrictions on the system such that some variables have no long-run effects while the restrictions mentioned above are short-run restrictions, which determine which variables are allowed to have non-zero response to a given shock in the identified system.

4. Empirical Results

The estimated impulse responses of the current account due to a one-standard deviation shocks in real effective exchange rate and real housing prices are displayed in Figure 1. The response horizon measured in quarters is given on the horizontal axis. It is apparent that real exchange rate shocks start to cause the current account to decrease in the second quarter. The negative impact gradually decreases and dissipates in the seventh quarter. This result is in line with Blanchard and Giavazzi (2002), but the current account effect of exchange rate shift is temporary. The housing price shocks cause the current account to increase in the second quarter. This positive impact decrease thereafter, but never dissipate. The impact of housing price shock on the current account seems to be consistent with the finding by Fratzscher et al. (2010).

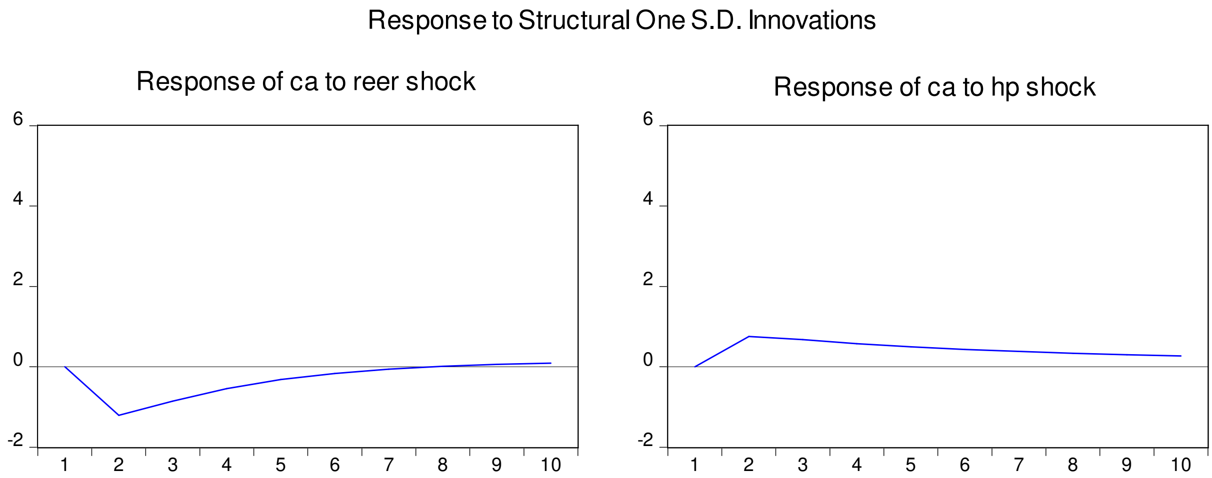

Figure 1. Impulse Responses of the Current Account to Shocks to Real Effective Exchange Rate and Real Housing Prices.

Table 3 reports the variance decompositions of the current account, which allow for calculation of the proportion of the fluctuations in a series due to its own shocks versus shocks to the other variables.

Table 3 Forecast Error Variance Decomposition of Current Account Explained by Shocks to Real Effective Exchange Rate and Real Housing Prices.

Forecast Horizon	Real Exchange Rate	Real Housing prices
1	0.00	0.00
2	7.82	3.05
5	12.39	7.67
10	12.13	10.20

Note: The number in each row shows the percentage of current account fluctuations explained by shocks.

The results are in accordance with the impulse response analysis. The results show that two quarters after the impact, the shocks to real effective exchange rate explain 7.82 percent of fluctuations in the current and 3.05 percent explained by the shocks to housing prices.

The estimated impulse responses of the current account due to a one-standard deviation shocks in real effective exchange rate and real stock prices are displayed in Figure 2. It can be observed from the figure that the negative impact of shocks to real exchange rate on the current account is almost negligible even though this impact lasts until the ninth quarter. The impact of shocks to stock prices on the current account starts with a lag of one quarter. The current account starts to fall slightly after the first quarter and remains significant thereafter.

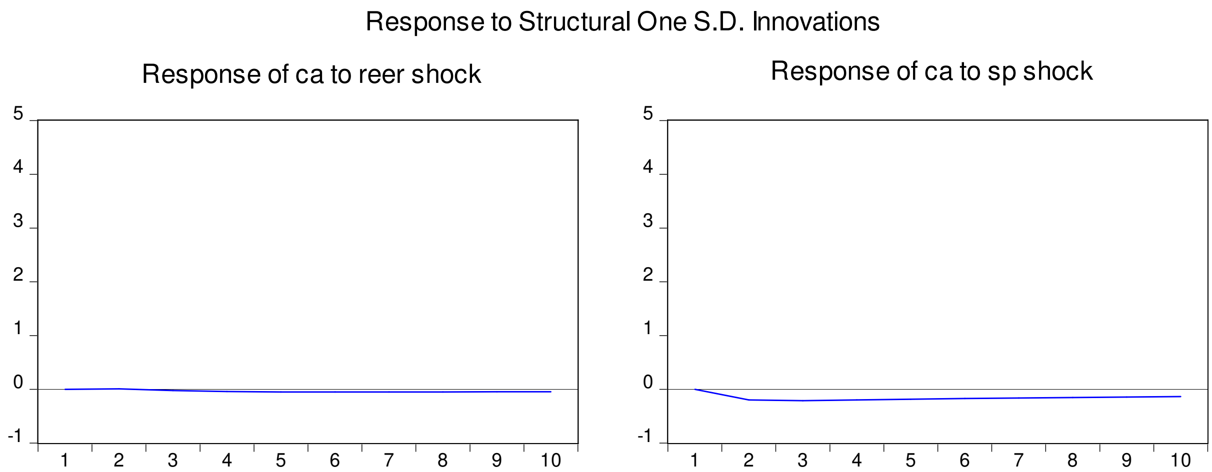

Figure 2. Impulse Responses of the Current Account to Shocks to Real Effective Exchange Rate and Real Stock Prices.

Table 4 reports the variance decomposition of current account due to shocks to real effective exchange rate and shocks to real stock prices.

Table 4 Forecast Error Variance Decomposition of Current Account Explained by Shocks to Real Effective Exchange Rate and Real Stock Prices.

Forecast Horizon	Real Exchange Rate	Real Stock prices
1	0.00	0.00
2	0.00	0.19
5	0.02	0.74
10	0.08	1.29

Note: The number in each row shows the percentage of current account fluctuations explained by shocks.

The results in Table 4 indicate that both shocks to real exchange rate and real stock prices are not primary sources of the fluctuations in current account. However, real stock price shocks seem to be slightly more important than real exchange rate shocks. More precisely, two quarters after the impact, the shocks to real effective exchange rate do not explained fluctuations in the current account and only 0.19 percent explained by the shock to real stock prices. This result is contradictory to some previous findings in advanced countries, for examples, the findings by Blanchard et al. (2005) and Fratzscher and Straub (2009).

It can be concluded that the model that comprises housing prices, real effective exchange rate, and the current account is more applicable in the case of Thailand. For policy implications, the measures that prevent domestic currency depreciation and stimulate the housing market can improve the current account at least in the short run. However, there are other important shocks that can exert more substantial impacts on the current account that policy makers should be aware, such as supply shocks and output shocks (see Karadimitropoulos and leon-Ledesma, 2009, among others).

5. Concluding Remarks

This paper examines the impacts of shocks to asset prices and real effective exchange rate on the current account in Thailand during 2008Q1 and 2016Q2. The structural VAR model with short-run restrictions is used to obtain the identified system. It is found that the response of the current account to the shocks to real effective exchange rate and housing prices is more apparent than the response of the current account to real effective exchange rate along with stock prices. In other word, the model that allows for interactions among housing prices, real effective exchange rate and the current account seems to better explain the current account fluctuations. Based upon the results from this study, policymakers should take into account the importance of foreign exchange market and the housing market boom that can affect the current account.

This paper has some limitations due to the availability of housing price data, which give relatively small sample size for the analysis. Furthermore, other factors that can have substantial impacts on the current account are excluded. Therefore, the analysis of the more complete structural model is left for future research.

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