A Comparative Study on the Current Account in China under Pegged Exchange Rate Regime and Floating Exchange Rate Regime

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Abstract- The purpose of this paper is to explore the behaviors of current account under pegged exchange rate regime and floating exchange rate regime. The quarterly data from 1994 to 2016 is applied to establish a vector auto regression model to analyze the operating mechanism among current account, real exchange rate, real GDP and interest rate. The empirical analysis results show that the terms of trade and real exchange rate have a little effect on current account under the pegged exchange rate regime. However, the results also show that the terms of trade and real exchange rate have relative greater effect on current account under the floating exchange rate regime. Even though its behavior is bigger than that of pegged exchange rate regime, it is still not very significant. Therefore, this paper provides a new suggestion that always imputing the current account deficit to impact of exchange rate regime is unreliable.

Keyword- Current Account; Terms of Trade; Real Exchange Rate; Exchange Rate Regime; Vector Auto-regression Model

I. INTRODUCTION

Since the reform and opening-up, the foreign trade is always one of the most important engines to promote the economic growth in China. The large amount of export & import and foreign exchange reserve also keep China’s economic growth in a high speed. To reach the international current account balance is a major target in China in terms of macro economy. Recently, the international current account has been located in double favorable balance. Namely, the balance of current account and the balance of export and import stay in a favorable level in China. The international current account of China remains positive until to now. Especially in 2004, the current account has a largely increased. In 2008, the favorable amount of current trade balance arrives at the maximum up to about 4206 billion U.S. dollar. Even though it start decreasing after 2009, but it still keeps in a high positive level. Figure 1 shows the change of current account of China.
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Vol. 8 No. 1 April 2018 ISSN: 2509-0119

Fig. 1: Change of Current Account of China

Fig.1 indicates that the current account in China is positive from 1998 to 2016. It can be divided into two periods. One period is from 1998 to 2008. During this period, the current account is still keeping increasing trend. Another period is from 2008 to 2016. In this period, the current account is fluctuating up and down on the middle line of 50 billion U.S. dollar.

In general, it is reported that there are three major reasons that result in keeping China’s current account favorable. The first is that China has a abundant cheap labor resource, relative political circumstance home and abroad and favorable foreign policy. China is often called the world of product processing center. Due to economic globalization, the manufacturing industry is moving to China around the world. The second is that China is always faced with a great pressure of currency appreciation. Therefore, quantities of companies reduce their import and expand their export so as to avoid the exchange rate risk. The third is that the consumption in China is always less the savings. Its gap between two of them is generally offsetting by international market demand. In fact, the economic growth has a significant export-orient characteristic. On the period of economic transformation, the dual economic structure is in contradiction. Specifically speaking, excess production capacity happens in manufacturing industry. However, the short demand also occurs in tertiary industry. To solving this contradiction needs to rely on the export. After 2009, the favorable balance of current account is decreasing significantly. This may be affected by the global economy crises and industrial structure adjustment.

To this end, this paper is organized as follows: Part 1 is an introduction. Part 2 reviews empirical studies which are explored by the previous researches about this topic. Part 3 discusses the methodology used in this paper. Part 4 presents the empirical analysis results. Part 5 provides the conclusion.

II. LITERATURE REVIEW

This part of this paper will present the selected research sources by various authors that deal with the association among current account, exchange rate and terms of trade. But this paper provides a new scope to discuss this proposition.

Aquino and Espino (2013) provide evidence on the Harberger-Laursen-Metzler (HLM) effect for the case of Peru. The HLM effect is the deterioration in the savings level of an economy due to a decline in their terms of trade for a given level of investment. This deterioration is caused

Source: CELnet Statistical Database
by lower revenues which worsen the current account. They estimate VAR models that match up the following variables: terms of trade, export prices, import prices, current account, investment and saving. Their results show that an unanticipated-permanent increase in the terms of trade (or export prices) improves the current account and saving rises. However, this effect disappears as investment grows faster than saving. On the other hand, an increase in the price of imports negatively affects the current account. Gniassoun and Mignon (2013) study current-account imbalances by paying a particular attention to exchange-rate misalignments. They rely on a nonlinear model linking the persistence of current account imbalances to the deviation of the exchange rate to its equilibrium value. Estimating a panel smooth transition regression model on a sample of 22 industrialized countries, they show that persistence of current-account imbalances strongly depends on currency misalignments. More specifically, while there is no persistence in cases of currency undervaluation or weak overvaluation, persistence tends to augment for overvaluations higher than 11%. In addition, whereas disequilibria are persistent even for very low overvaluations in the euro area, persistence is observed only for overvaluations higher than 14% for non-eurozone members. Chinn and Wei (2013) examine this assertion systematically by using data on over 170 countries over the 1971–2005 period. They find no strong, robust, or monotonic relationship between exchange rate regime flexibility and the rate of current account reversion, even after accounting for the degree of economic development and trade and capital account openness. This finding presents a challenge to the Friedman (1953) hypothesis and a popular policy recommendation by international financial institutions.

Gniassoun and Coulibaly (2014) study the sustainability of current accounts in Sub-Saharan Africa and determining whether this sustainability depends on the exchange rate regime. Relying on a formal theoretical framework and recent panel cointegration techniques, their findings show that current accounts have been globally sustainable in Sub-Saharan Africa countries over the 1980–2011 period. However, this sustainability has been lower for countries operating a fixed exchange rate regime or belonging to a monetary union. They also find that the difference in the level of sustainability could be explained by a higher persistence in the current account adjustment of countries operating under rigid exchange rate regimes. Lu and Shao (2014) Based on the framework of the intertemporal equilibrium model, they analyze the effect of transmission mechanism of Harberger-Laursen-Metzler effect. The impacts on current account that changes in terms of trade depend on the track of income changes over time, and the comparison between subjective discount factor and actual discount factor. By constructing the ARDL model, they explore whether there exists Harberger-Laursen-Metzler effect in China between 1995Q1 and 2014Q2. The results show that it holds. They build SVAR model for further analysis of the relationship between terms of trade and changes in current account. The consequences show that the fluctuations of terms of trade have the same impacts on the current account and export output. The terms of trade and the current account change in the same direction, which verifies the existence of H-L-M effect to a higher degree. The policy implication of this paper is that the Chinese government wouldn’t only focus on RMB exchange rate, but also the intertemporal changing trend of domestic income and savings. This would lead to a better accommodation of current account balance. Wang (2014) uses the vector error correction model to explore the linkage between current account and exchange rate. His result shows that the appreciation of China’s currency can better the current account. Wang (2014) sets Mexico as an example to search for the operating mechanism between current account imbalance and exchange rate under pegged
exchange rate. He finds that on this condition the exchange rate has a negative on current account.

Kollmann (2015) finds that standard macro models cannot explain why real exchange rates are volatile and disconnected from macro aggregates. Recent research argues that models with persistent growth rate shocks and recursive preferences can solve that puzzle (e.g., Colacito and Croce, 2013). I show that this result is highly sensitive to the structure of financial markets. When just a bond is traded internationally, then long-run risk generates insufficient exchange rate volatility. A long-run risk model with recursive-preferences can generate realistic exchange rate volatility, if all agents efficiently share their consumption risk by trading in complete financial markets; however, this entails massive international wealth transfers, and excessive swings in net foreign asset positions. By contrast, a long-run risk, recursive-preferences model in which only a fraction of households trades in complete markets, while the remaining households lead hand-to-mouth lives, can generate realistic exchange rate and external balance volatility. In that framework, a rise in the volatility of a country’s endowment or in the risk appetite of local investors is predicted to deteriorate the country’s trade balance, and to appreciate its real exchange rate. A rise in global volatility and risk aversion improves a country’s current account if that country has lower steady state risk aversion than the rest of the world. These predictions seem consistent with the fact that fluctuations in the VIX are positively correlated with the US current account. Gnimmassoun (2015) investigates whether the choice of a country’s exchange rate regime may affect current account imbalances for sub-Saharan African economies. To this end, he first uses Bayesian model averaging (BMA) supplemented by the General-to-Specific (GETS) method to address concerns about model uncertainty and identify the key determinants (fundamentals) of external balances. Then, estimating current account imbalances over the period 1980–2012, he shows that flexible exchange rate regimes are more effective in preventing such disequilibria. Consequently, candidates for membership of monetary unions should discuss widely the possible adjustment mechanisms before forming such unions; one potential measure is the sharing of external risks at the regional level. Arouri, Dar, Bhanja, Tiwari and Teulon (2015) analyze the dynamic interlinkage between India’s real effective exchange rate and real current account deficit using standard VAR and structural VAR (SVAR). The empirical analysis suggests that a real currency appreciation leads to an improvement in the current account deficit, thereby highlighting the occurrence of permanent shocks such as technical innovations, productivity shocks, and changes in tastes and preferences. A positive shock to the current account deficit leads to an appreciation in the real exchange rate. Moreover, both current account and real exchange rates are found to be affected by the changes in these variables themselves rather than changes in the other variables in the system. Romelli, Terra and Vasconcelos (2015) investigate the relationship between openness to trade, real exchange rate depreciations, and changes in current account and trade balances during these events. They find that, controlling for real exchange rate changes, more open economies experience a larger increase in current account and trade balances. In other words, our results indicate that improvements in current account and trade balances are accompanied by smaller real exchange rate depreciation in more open economies.

Pancaro and Saborowski (2016) study current account reversals in industrial countries across different exchange rate regimes. There are two major findings which have important implications for industrial economies with external imbalances: first, triggers of current account reversals differ between exchange rate regimes. While the
current account deficit and the output gap are significant predictors of reversals across all regimes, reserve coverage, credit booms, openness to trade and the US short term interest rate determine the likelihood of reversals only under more rigid regimes. Conversely, the real exchange rate affects the probability of experiencing a reversal only under flexible arrangements. Second, current account reversals in advanced economies do not have an independent effect on growth. This result holds not only for industrial economies in general but also for countries with fixed exchange rate regimes in particular. Martin (2016) analyse the relation systematically using a panel of 180 countries over the 1960–2007 period. He finds robust evidence that flexible exchange rate arrangements deliver a faster current account adjustment among non-industrial countries. Additionally, he tries to identify channels through which this effect could be taking place. The results suggest that exports respond to expenditure-switching behaviour by consumers when faced with changes in international relative prices, configuring a potential channel.

III. THEORETICAL FRAMEWORK

3.1 Harberger, Laursen and Metzler Effect

Laursen and Metzler point out that when the currency appreciates, the terms of trade will be deteriorated. Meanwhile, it will generate two effects. One is income effect; another is substitution effect. The deterioration of terms of trade will lower national income level, so it can reduce the absorption relevant with income, which is called income effect. The currency depreciation will make the domestic products cheaper than that of foreign countries, which will result in increasing the amount of export. Due to domestic products cheaper, the absorption will be increased, which will be called substitution effect. If the positive substitution effect is greater than that of negative, the deterioration of terms of trade will result in the growth of direct absorption.

For simplicity, the Harberger-Laursen-Metler effect gives:

\[ Y = d(Y, e) + Ex(e) \]  

(1)

Where \( Y \) is the national income; \( d \) is the domestic demand; \( Ex \) is the export; \( e \) is the nominal exchange rate; \( 0 < d_Y < 1; d_e > 0; \) \( Ex > 0 \).

\[ Ex(e) = e \text{Im}(Y, e) \]  

(2)

Where \( \text{Im} \) is the import; \( 0 < \text{Im}_Y < 1; \text{Im}_e > 0 \).

Equation (1) represents the determinants of national income in the open economy; equation (2) indicates the balance of international payment. Namely, Export is equal to import.

The slope of \( e \) and \( Y \) in equation (1) gives:

\[ \frac{dY}{de} = \frac{d_Y + Ex_e}{1 - d_Y} \]  

(3)

Where \( \frac{dY}{de} > 0 \).

The slope of \( e \) and \( Y \) under the balance of international payment gives:

\[ \frac{dY}{de} = \frac{Ex_e - e\text{Im}_e}{e \text{Im}_e} \]  

(4)

By transferring, equation (4) gives:

\[ \frac{dY}{de} = \frac{m(\eta_m + \frac{Ex}{\text{Im}_r} - 1)}{e \text{Im}_Y} \]  

(5)
Where $\eta_{Es} = \frac{E}{E_x}$ is the export exchange rate elasticity; $\eta_{Im} = -\frac{I_n}{I_m}$ is the import exchange rate elasticity.

Equation (5) indicates that $\eta_{Im} + \frac{E_x}{I_m} \eta_{Es} - 1 > 0$; 

$$\frac{dY}{de} > 0.$$

Point $E$ indicates the real balance and the balance of international payment arrive at the same. In order to study the dynamic stability of equilibrium position, some features of dynamic performance should be satisfied. There is a correlation between excess demand for commodity and change of national income. Namely, if the total demand is less than the output supply, the national income will decrease immediately. Conversely, it will increase. Furthermore, if the positive excess foreign exchange exists in the foreign exchange market, the exchange rate will increase. On the contrary, it will decrease.

Differential equation system gives:

$$\frac{dY}{dt} = f_1[e(Y,e) + E_x(e) - Y]$$  \hspace{1cm} (6)$$

$$\frac{de}{dt} = f_2[e Im(Y,e) - E_x(e)]$$  \hspace{1cm} (7)$$

Where $f_1[0] = k_1 > 0$; $f_2[0] = k_2 > 0$. The study of local stability is to analyze that the linearity in the systemic equilibrium gives:

$$\frac{d\bar{Y}}{dt} = k_1[(d_Y - 1)\bar{Y} + (d_e + E_x)\bar{e}]$$  \hspace{1cm} (8)$$
\[ \frac{dY}{dt} = k_2[e \text{Im}_y \bar{Y} - (Ex_e - \text{Im} - e \text{Im}_x)\tilde{e}] \quad (9) \]

Where the broken line upper variables indicates the derivative of equilibrium. The systemic dynamic path is determined by the root of characteristic equation:

\[ \lambda^2 + [k_1(1-d_y) + k_2(Ex_e - Im - e Im_e)]\lambda + k_1k_2[(1-d_y)(Ex_e - Im - e Im_e) - e Im_y(d_e + Ex_e)] = 0 \quad (10) \]

Necessary and sufficient condition of stability gives:

\[ k_1(1-d_y) + k_2(Ex_e - Im - e Im_e) > 0 \quad (11) \]

\[ (1-d_y)(Ex_e - Im - e Im_e) - e Im_y(d_y + Ex_e) > 0 \quad (12) \]

Equation (11) and equation (12) indicate that

\[ 1 - d_y > 0 \]

Transferring equation (12) gives:

\[ \eta_{im} + \eta_{es} > 1 + \frac{e Im_y(d_e + Ex_e)}{Im(1-d_y)} \quad (13) \]

Where \( Im_y \) is the marginal propensity to import; \( d_y \) is the marginal propensity to domestic demand; \( d_e \) is the response of change of exchange rate to domestic demand; \( Im_e \) is the response of change of exchange rate to export.

Assuming that the trade surplus exists and the traditional critical condition holds, if domestic currency appreciates, the export will decrease, which will lead to trade surplus increasing. However, the domestic currency appreciation reduces the domestic commodity demand, which will result in national income decreasing. Then the import will also decrease. But a decrease in the import will weaken the domestic currency appreciation, which has an effect on international trade. In summary, the H-L-M effect can be concluded that taking the national income into consideration, the condition that the domestic currency appreciation makes a country’s trade balance deterioration is that the magnitude of a decrease in import due to the national income decrease is less than the domestic currency appreciation, which will result in a country’s trade balance deterioration.

3.2 Current Account in an Open Economy

This model is mainly based on the research which has been performed by Hafedh Bouakez and Takashi Kano (2008). The advantage is that this model is established in an open economy and the terms of trade and exchange rate are introduced into it. If we try to study the intertemporal consumption in China, this model approaches china’s reality more. The two- period-model under certainty will be analyzed. Taking a small economic entity into account, a representative household consumes two kinds of commodities (trade goods and non-tradable goods). The purpose is the discount value of maximization utility function. The utility function gives:

\[ U = \frac{C_t^{\frac{1}{\sigma}}}{1 - \frac{1}{\sigma}} + \beta \frac{C_{t+1}^{\frac{1}{\sigma}}}{1 - \frac{1}{\sigma}} \quad (14) \]

Where \( \beta(0 < \beta < 1) \) is the discount value; \( \sigma(\sigma > 0) \) is the intertemporal elasticity of substitution; \( C_t \) is consumption index at \( t \) period.

Assume that consumption function is the form of Cobb-Douglas production function:
\[ C^*_t = \omega_1 (C^T_t)^\omega (C^{NT}_{t})^{1-\omega} \quad (15) \]

Where \( C^T_t \) is the consumption on trade goods; \( C^{NT}_t \) is the consumption on non-trade goods; \( \omega(0 < \omega < 1) \) is ratio of trade goods consumption to total goods consumption; \( \omega_1 = \varepsilon^{-t} (1-\varepsilon)^{r-1} \) is positive; the price of trade goods is regarded as 1; \( Q_t \) is the price of non-trade goods; \( P^c_t \) is price index of total consumption.

Therefore:

\[ P^c_t = Q_t^{1-\varepsilon} \quad (16) \]

Setting the conclusion from Obstfeld and Rogoff (1996) as a reference, the price, itself, also satisfies the form of Cobb-Douglas production function:

\[ C^T_t = \omega_2 \cdot E^x_t \cdot I^m_t^{1-r} \quad (17) \]

Where \( E^x_t \) is the export goods consumption; \( I^m_t \) is the import goods consumption; \( \omega_2 = r^r (1-r)^{r-1} \) is positive; \( 0 < r < 1 \).

Let \( P^e_{t+1} \) is the export price; \( P^i_{t+1} \) is the import price.

They satisfy:

\[ 1 = (P^e_{t+1})^r (P^i_{t+1})^{1-r} \quad (18) \]

\[ P^e_t = \frac{P^e_{t+1}}{P^i_{t+1}} = (P^e_t)^{1-r} \quad (19) \]

Assume that the only asset can be trade is one year international bond without risks. The market is perfect. Namely, the representative household can borrow and lend with real interest rate \( R_{t+1} \) in the international market.

Meanwhile, the small open economy can not affect the real interest rate and change of terms of trade.

Assume that the representative household has an initial endowment (output of export \( NY^E_{t+1} \) and output of non-trade goods \( NP^E_{t+1} \)) at \( t \) period, these output will be used as the expenditure of trade goods, non-trade goods and purchasing of international bond. The representative household will receive the interest rate of international bond at \( t+1 \) period. Of course, these extra incomes will be consumed at \( t+1 \) period. Due to \( P^e_{t+1} + P^i_{t+1} M_t + Q_t C^E_{t+1} = P^e_t C_t \), the intertemporal budget equation of representative household gives:

\[ P^e_t C_t + \frac{1}{1+R_{t+1}} P^e_t C_{t+1} = P^e_{t+1} NY^E_{t+1} + Q_t NY^{NT}_{t+1} \]

\[ + \frac{1}{1+R_{t+1}} (P^e_{t+1} NY^E_{t+1} + Q_{t+1} NY^{NT}_{t+1}) \quad (20) \]

Combining equation (14) and equation (20) gives:

\[ 1 = \beta(1+R_{t+1}) \left( \frac{P^e_t}{P^i_{t+1}} \right) \left( \frac{C_t}{C_{t+1}} \right)^{1-r} \quad (21) \]

Therefore, the current account gives:

\[ Ca_t = B_{t+1} = P^e_t NY^E_{t+1} - C^T_t \quad (22) \]

Putting equation (21) into equation (20) , using equation (16) and market clear (\( C^E_{t+1} = NY^E_{t+1} \)). non-trade goods cannot be exchanged in the international market. So, the output of non-trade goods is equal to the consumption of that in general equilibrium.
The current account can be derived:

\[
Ca_i = \frac{P_{i-1}^{-} NY_{i}^{E} - 1}{1 + \beta^\sigma (1 + R_{r+1})^{\sigma - 1} \left( \frac{Q}{Q_{r+1}} \right)^{\sigma - 1}} \left( P_{i-1}^{+} NY_{i}^{E} + \frac{1}{1 + R_{r+1}} P_{i-1}^{-} NY_{i}^{E} \right)
\]

(23)

Equation (23) indicates impact of real interest rate, real exchange rate and terms of trade on current account. The real interest rate, \( R_{r+1} \), is going up, it will pose three influence on current account. The first one is that the going-up of interest rate will make household consumption trend to future, which will lower the consumption motivation on the current period. This substitution effect will lead to household’s current saving decreasing. The second is that lowering the future consumption price, the real interest rate will increase based on consumption, which will enlarge the feasible consumption set under a given value for the whole life. This kind of income effect will lead to increase household’s current saving decreasing. The third is that the increase of interest rate will lower the discount factor. Therefore, this will bring about the current value of whole life reducing. This negative wealth effect will reduce the current consumption and increase the amount of current account.

When the real exchange rate, \( Q \), is going up, the real interest rate will also go up based on consumption. Therefore, just as described above, intertemporal

\[
ca_i = (1 - \gamma) P_i + ny_i^{E} + (r_{r+1} - g_i) \left[ cons + \sigma r_{r+1} + (1 - \sigma)(1 - \varepsilon)D q_{r+1} \right]
\]

(25)

Where the small case represents the absolute value of variable. \( D q_{r+1} \) represents the first difference of logarithmic term. \( cons \) represents the constant. Because substitution or income effect will reduce or increase the consumption of current trade products. Additionally, the total current consumption will also induce or increase. Finally, the current account will be increased or deteriorated.

Finally, the increase of \( P \) will improve terms of trade, which will boost the current value of whole life and the household’s current consumption. Due to marginal propensity to consume is less than one. The increase in current consumption is less than current income and increase in current account. This is called H-L-M effect. On the other hand, since the terms of trade has no effect on the real interest rate based on consumption, it will have no effect on consumption.

Equation is still very complicated. Therefore, it will be in process of logarithm and taylor expansion with three parameters, \( \gamma, \sigma, \beta \):

\[
CA_i [1 + \beta^\sigma (1 + R_{r+1})^{\sigma - 1} \left( \frac{Q}{Q_{r+1}} \right)^{\sigma - 1}] = \beta^\sigma (1 + R_{r+1})^{\sigma - 1} \left( \frac{Q}{Q_{r+1}} \right)^{\sigma - 1} P_{i-1}^{i-1} NY_{i}^{E} - \frac{P_{i-1}^{i-1} NY_{i}^{E}}{1 + R_{r+1}}
\]

(24)

Where \( \frac{P_{i-1}^{i-1} NY_{i}^{E}}{P_{i-1}^{i-1} NY_{i}^{E}} = 1 + g_i \), \( g_i \) is treated as the weighted growth rate of export goods. Putting it into equation (24) with logarithm and second order taylor expansion:

\[
E(P_{r+1}) = P_i, \; E(NY_{r+1}^{E}) = NY_{i}^{E} \; \text{and} \; E(g_i) = 0 \; . \; \text{Putting them into equation (25) gives:}
\]
\[ ca_t = (1 - \gamma)p_t + ny_t^{\rho_0} + cons \cdot r_{t-1} + (1 - \alpha)(1 - \epsilon)D_q q_{t-1} \cdot \epsilon_r q_{t-1} \]

Where the left is logarithmic value of current account; In the right side, the first term is logarithmic value of terms of trade; the second term is logarithmic value of output, the third term is logarithmic value of interest rate, the fourth term is cross-impact of interest rate and exchange rate. Equation (26) is the theoretical framework of this paper.

IV. EMPIRICAL ANALYSIS

4.1 Data Description

This paper applies fives variables to construct a vector auto regression model. There are current account, terms of trade, real GDP, real exchange rate and interest rate. All of them are quarterly datum and sourced from the CELnet Statistical Database. In order to make the results of empirical analysis more convinced, the raw datum are processed with some ways. The current account is the ratio of itself to real GDP; the rest variables are taken the logarithm so to reduce the heteroscedasticity. All of them will be shown in <Table-1>.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Form</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current account</td>
<td>Ratio of itself to real GDP</td>
<td>Ca</td>
<td>CELnet Statistical Database</td>
</tr>
<tr>
<td>Terms of trade</td>
<td>Ratio of export price index to export price index</td>
<td>logTOT</td>
<td>CELnet Statistical Database</td>
</tr>
<tr>
<td>Real GDP</td>
<td>Deflated by GDP deflator</td>
<td>logGDP</td>
<td>CELnet Statistical Database</td>
</tr>
<tr>
<td>Real exchange rate</td>
<td>Deflated by CPI</td>
<td>logRER</td>
<td>CELnet Statistical Database</td>
</tr>
<tr>
<td>Interest rate</td>
<td>One year deposit</td>
<td>logIR</td>
<td>CELnet Statistical Database</td>
</tr>
</tbody>
</table>

4.2 Unit Root Test

In order to make the empirical analysis efficiency and avoid spurious regression, the Augment Dickey-Full (ADF) test is used to testify the stationarity of all variables. The results of unit root test show in Table and Table 3.
<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF statistic</th>
<th>Test critical values</th>
<th>Prob.*</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>0.338</td>
<td>-1.948</td>
<td>0.779</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log GDP</td>
<td>2.116</td>
<td>-2.931</td>
<td>0.995</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log IR</td>
<td>-1.011</td>
<td>-2.927</td>
<td>0.742</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log RER</td>
<td>-1.054</td>
<td>-2.931</td>
<td>0.725</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log TOT</td>
<td>0.016</td>
<td>-1.950</td>
<td>0.683</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>DCA</td>
<td>-8.413</td>
<td>-2.930</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log GDP</td>
<td>-2.075</td>
<td>-1.949</td>
<td>0.038</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log IR</td>
<td>-8.890</td>
<td>-2.927</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log RER</td>
<td>-6.402</td>
<td>-2.931</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log TOT</td>
<td>-9.021</td>
<td>-2.927</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
</tbody>
</table>


Table 2 tests the stationarity of all variables under pegged exchange rate regime. The results indicate that all variables are non-stationary under their own levels. However, after first difference, all of them become stationary.
Table 3 Results of unit root test

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF statistic</th>
<th>Test critical values</th>
<th>Prob.*</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>-0.442</td>
<td>-1.949</td>
<td>0.517</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log GDP</td>
<td>-2.064</td>
<td>-2.941</td>
<td>0.260</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log IR</td>
<td>-2.291</td>
<td>-2.931</td>
<td>0.179</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log RER</td>
<td>-2.284</td>
<td>-2.931</td>
<td>0.182</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>log TOT</td>
<td>-0.212</td>
<td>-1.949</td>
<td>0.604</td>
<td>Non-stationary</td>
</tr>
<tr>
<td>DCA</td>
<td>-6.743</td>
<td>-2.937</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log GDP</td>
<td>-4.015</td>
<td>-2.941</td>
<td>0.028</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log IR</td>
<td>-6.777</td>
<td>-2.933</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log RER</td>
<td>-5.498</td>
<td>-2.933</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
<tr>
<td>D log TOT</td>
<td>-6.189</td>
<td>-2.933</td>
<td>0.000</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

Note: *MacKinnon (1996) one-sided p-values. \( D \) represents the first difference.

Table 3 tests the stationarity of all variables under floating exchange rate regime. The results indicate that all variables are non-stationary under their own levels. However, after first difference, all of them become stationary.

4.3 Johansen Cointegration Test

For the cointegration analysis of the nonstationary time series, there are two methods; one is the E-G two stage method which can only recognize one cointegration among many variables (more than one). The other is the Johansen cointegration test which can recognize more than cointegrations. Therefore, the Johansen cointegration test will be used to verify whether there is the cointegrated relationship among all variables. The cointegration test results are shown in Table 4.
Table 4 Results of cointegration test

<table>
<thead>
<tr>
<th>Pegged exchange rate regime</th>
<th>Floating exchange rate regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trace Test</td>
<td>2 cointegrations</td>
</tr>
<tr>
<td>Max-eigenvalue</td>
<td>2 cointegrations</td>
</tr>
<tr>
<td>Long-run coingrating equation</td>
<td>( CA = 6.426 \log + 3.702 \log IR + 0.534 \log RER - 5.936 \log TOT )</td>
</tr>
<tr>
<td></td>
<td>Trace Test 3 cointegrations</td>
</tr>
<tr>
<td>Max-eigenvalue</td>
<td>2 cointegrations</td>
</tr>
<tr>
<td>Long-run coingrating equation</td>
<td>( CA = 5.157 \log - 3.645 \log IR - 7.202 \log RER + 1.163 \log TOT )</td>
</tr>
</tbody>
</table>

Table 4 indicates that there are two cointegrations (trace test and Max-eigenvalue test) under pegged exchange rate regime. There are three cointegrations (trace test) and two cointegrations (Max-eigenvalue test) under floating exchange rate regime. Therefore, it is can be concluded that long-run relationship among them whatever the pegged and floating exchange rate regime. Under pegged exchange rate regime, the terms of trade has a negative effect on current account. The real exchange rate has a positive effect on current account. On the contrary, under floating exchange rate regime, the terms of trade has a positive effect on current account. It satisfies the H-L-M effect. The real exchange rate has a negative effect on current account.

4.4 Vector Auto regression Model

A VAR model describes the evolution of a set of k variables (called endogenous variables) over the same sample period \( (t = 1, \ldots, T) \) as a linear function of only their past values. The variables are collected in a \( k \times 1 \) vector \( y_t \), which has as the \( i^{th} \) element, \( y_{i,t} \), the observation at time \( t \) of the \( i^{th} \) variable. For example, if the \( i^{th} \) variable is GDP, then \( y_{i,t} \) is the value of GDP at time \( t \).

\[
y_t = C + A_1 y_{t-1} + A_2 y_{t-2} + A_3 y_{t-3} + \ldots + A_p y_{t-p} + B x_t + \epsilon_t
\]

(24)

where the \( i \)-periods back observation \( y_{i,t-i} \) is called the \( i^{th} \) lag of \( y \), \( C \) is a \( k \times 1 \) vector of constants (intercepts), \( A_i \) is a time-invariant \( k \times k \) matrix and \( \epsilon_t \) is a \( k \times 1 \) vector of error terms satisfying.
4.6 Choice of Optimal Lag

Table 5 VAR Lag Order Selection Criteria (Pegged exchange rate regime)

<table>
<thead>
<tr>
<th>lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>202.395</td>
<td>NA</td>
<td>1.290</td>
<td>-8.582</td>
<td>-8.384</td>
<td>-8.508</td>
</tr>
<tr>
<td>1</td>
<td>299.621</td>
<td>169.088*</td>
<td>5.620*</td>
<td>-11.723*</td>
<td>-10.530*</td>
<td>-11.276*</td>
</tr>
<tr>
<td>2</td>
<td>316.397</td>
<td>25.528</td>
<td>8.360</td>
<td>-11.365</td>
<td>-9.179</td>
<td>-10.546</td>
</tr>
</tbody>
</table>

Note: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 5 indicates that the optimal lag of vector autoregression is the 2-lag under the pegged exchange rate regime.

Table 6 VAR Lag Order Selection Criteria (Floating exchange rate regime)

<table>
<thead>
<tr>
<th>lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>185.541</td>
<td>NA</td>
<td>1.270</td>
<td>-8.597</td>
<td>-8.390</td>
<td>-8.521</td>
</tr>
<tr>
<td>1</td>
<td>284.749</td>
<td>170.068*</td>
<td>3.750*</td>
<td>-12.131*</td>
<td>-10.890*</td>
<td>-11.676*</td>
</tr>
</tbody>
</table>

Note: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion.

Table 6 indicates that the optimal lag of vector autoregression is the 2-lag under the floating exchange rate regime.

Combined Table 5 and Table 6, whatever the pegged exchange rate regime and the floating exchange rate regime, AIC and SC indicate that the 2-lag is optimal. The VAR(2) gives:
Table 7 VAR(2)

<table>
<thead>
<tr>
<th>Pegged exchange rate regime</th>
<th>Floating exchange rate regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAR(2) model</td>
<td>VAR(2) model</td>
</tr>
<tr>
<td>(CA=0.244CA(-1)+0.774\log GDR(-1))</td>
<td>(CA=0.156CA(-1)-0.548\log GDR(-1))</td>
</tr>
<tr>
<td>(-0.142\log IR(-1)+3.236\log RER(-1))</td>
<td>(-0.51\log IR(-1)-8.00\log RER(-1))</td>
</tr>
<tr>
<td>(+3.065\log TOT+0.146CA(-2))</td>
<td>(+1.72\log TOT+0.004CA(-2))</td>
</tr>
<tr>
<td>(-0.576\log GDR(-2)+0.255\log IR(-2))</td>
<td>(-0.376\log GDR(-2)+1.133\log IR(-2))</td>
</tr>
<tr>
<td>(-4.753\log RER(-2))</td>
<td>(+7.186\log RER(-2))</td>
</tr>
<tr>
<td>(+0.372\log TOT(-2)-7.987)</td>
<td>(-0.16\log TOT(-2)+3.106)</td>
</tr>
</tbody>
</table>

In order to confirm the model steady, the reciprocal of all roots should be inside one unit circle. The testing results show in Figure 3.

4.6 Impulse Response Function

The impulse response function depicts how the impact of a change of a variable overall changes process of another variable. The coefficients can only reflect the local dynamic relationships. However, the impulse response function can demonstrate more complicated and comprehensive dynamic relationship among all variables. Based on the vector auto regression analysis above, the impulse response function will be shown in Figure 4.
① Pegged exchange rate regime: As for Response of CA to $\log TOT$, one standard deviation shock to terms of trade has a positive effect on current account. Its impact only takes effect in the short run. From period 1 to period 3 (0.06%), its impact keeps increasing. From period 3 (0.06%) to period 7 (0.01%), its impact starts to decrease. But its impact still remains positive. After period 8, its impact absolutely disappears (0.00%). It just like a inverted U shape. As for Response of CA to $\log RER$, one standard deviation shock to real exchange rate has a positive effect on current account. From period 1 to period 2 (0.04%). Then, its impact will decrease from period 2 (0.04%) to period 3 (-0.01%), and from period 3 to period 9, its impact always keeps unchanged (-0.01%). After period 10, its impact absolutely disappears (0.00%).

② Floating exchange rate regime: As for Response of CA to $\log TOT$, one standard deviation shock to terms of trade has a fluctuating effect on current account. From period 1 to period 2 (0.04%), its impact keeps increasing. From period (0.04%) to period 5 (-0.02%), its impact starts to decrease. From period 5 (-0.02%) to period 11 (0.01%),
its impact starts to increase again. From period 11 (0.01%) to period 15 (0.01%), its impact keeps unchanged. But after period 16 (0.00%), its impact absolutely disappears. As for Response of CA to log RER, one standard deviation shock to real exchange rate also has a fluctuating effect on current account. From period 1 to period 5 (0.037%), its impact keeps increasing. From period 5(0.037%) to period 12 (-0.007%), its impact starts to decrease. From period 12 (-0.007%) to period 18 (0.003%), its impact starts to increase again, after that, its impact is always keeping unchanged (0.002%).

4.7 Variance Decomposition

Variance decomposition measures the contribution of each type of shock to the forecast error variance.

<table>
<thead>
<tr>
<th>Pegged exchange rate regime</th>
<th>Floating exchange rate regime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent CA Variance due to log TOT</td>
<td>Percent CA Variance due to log TOT</td>
</tr>
<tr>
<td><img src="chart1.png" alt="" /></td>
<td><img src="chart2.png" alt="" /></td>
</tr>
<tr>
<td>Percent CA Variance due to log RER</td>
<td>Percent CA Variance due to log RER</td>
</tr>
<tr>
<td><img src="chart3.png" alt="" /></td>
<td><img src="chart4.png" alt="" /></td>
</tr>
</tbody>
</table>

Fig.5. Variance decomposition

Fig.5 indicates that variance decomposition of current account. ① pegged exchange rate regime: As for the contribution degree from terms of trade, its contribution is only 2%; As for the contribution degree from real exchange
rate is also only 1%.② floating exchange rate regime: As for the contribution degree from terms of trade, its contribution is up to 15%; As for the contribution degree from real exchange rate is 9%.

V. CONCLUSION

This paper aims to explore the operating mechanism among current account, real exchange rate, real GDP and interest rate under pegged exchange rate regime and floating exchange rate regime. The quarterly data from the first quarter of 1994 to the fourth quarter of 2016, the vector auto regression model is used to conduct an empirical analysis. The results of cointegration test show that there is a long-run relationship among them whatever the pegged exchange rate regime and floating exchange rate regime. Under the pegged exchange rate regime, 1% increase in real exchange rate will result in 0.534% increase in current account. 1% increase in terms of trade will lead to 5.936% decrease in current account. Under floating exchange rate regime and floating exchange rate regime. Under the pegged exchange rate regime, 1% increase in real exchange rate will result in 7.202% decrease in current account. 1% increase in terms of trade will lead to 1.163% increase in current account. As for impulse response function, under the pegged exchange rate regime, the terms of trade and real exchange rate behaves very slightly. However, under the floating exchange rate regime, the terms of trade and real exchange rate behaves relative greater than that of pegged exchange rate regime.

REFERENCES


