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The Renminbi Exchange Rate Regime after the Reform in 2005

2005年為替改革後の人民元為替制度に関する実証研究

(要旨)

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Abstract

During the last decade when the Chinese economy rapidly developed, China has implemented multiple reforms on the renminbi exchange rate regime to make it more market-based and more suitable to the domestic economic development. The beginning of China's exchange rate reforms is 21 July 2005 when People's Bank of China announced to implement a reform of the exchange rate regime switching from the dollar-peg regime to a managed floating regime with reference to a currency basket and the supply-demand conditions. Since 2010, China has implemented the Renminbi Internationalization to make the renminbi become a global currency, including many reforms such as the renminbi-denominated trade settlements and the setup of offshore renminbi markets. Since the renminbi offshore exchange rate market was established in 2011, the offshore renminbi markets have rapidly developed in many global financial centers, mainly in Hong Kong. The global use of renminbi has increased to the 5th largest, following with the US dollar, Euro, British pound and Japanese yen until the end of 2015. Accomplished with China's large economic size and the increasing renminbi global use, the renminbi was included into the Special Drawing Right (SDR) basket of International Monetary Fund (IMF) in 2016. Many scholars believed that the Chinese renminbi will play an important role in adjusting the global trade imbalance and diversifying global reserve currencies in the international monetary system in future. Due to the renminbi exchange rate regime during 2005–2016 mentioned above, this study has three research objects as follows.

First, this study tried to clarify whether the well-known “*de facto vs. de jure*” problem existed in the renminbi regime during 2005–2016. Some scholars proposed the “*de facto vs. de jure*” problem, which is defined as that the monetary authorities always implement different foreign exchange policies from what they officially claim to follow, particularly in emerging countries such as China. In the early period of the renminbi managed floating regime, many scholars revealed that the renminbi exchange rate was very similar to a dollar-peg rather than a free-floating, due to the high cointegration between the renminbi and the US dollar. The renminbi reforms in recent years again raised the question of what is the *de facto* exchange rate regime of

the renminbi, especially considering the recent renminbi depreciation and reforms in August 2015 which was designed to make the currency more market-based. Although China did not publish the components of the official reference currency basket, the China Foreign Exchange Trade System (CFETS) renminbi index published in 2016 provided new evidence about the possible components of the official reference currency basket. This study clarified the “*de facto vs. de jure*” from two perspectives: first, the components of the implicit currency basket was examined by employing the well-known Frankel-Wei model (see Frankel and Wei, 1994, 2008), basing on daily exchange rate data during 2005–2016. Possible structural changes were put into consideration. Second, the renminbi regime was evaluated through the exchange rate flexibility, which provides another perspective to observe the regime switches beside the implicit currency basket, as supposed by Calvo and Reinhart (2002) and Levy-Yeyati and Sturzenegger (2005). Moreover, Dixon, Zhang, and Dai (2016) developed an autoregressive model with Markov switching process to identify the exchange rate regime switches, and this model was employed in this study.

The empirical results of the Frankel-Wei model show that in the implicit currency basket of the renminbi, the US Dollar had a dominant weight (more than 0.9), especially during the Global Financial crisis (GFC) when China actually pegged the renminbi to the US dollar again to lower down the crisis shock. However, the weight of the US dollar decreased significantly after the renminbi reform in 2015. On the other hand, the weights of the other possible components, e.g. Euro, British pound and Japanese yen, varied in different periods and increased after the 2015 reform in general. Moreover, due to the results of the exchange rate flexibility model with a Markov Switching process, it is obvious that the renminbi exchange rate flexibility sharply decreased after 2014, when the monetary authority used a large amount of official foreign reserves to cope with the big renminbi depreciation pressure. Combining with the implicit currency basket and the flexibility of renminbi, the existence of the “*de facto vs. de jure*” problem in the renminbi exchange regime during 2005–2016 has been confirmed.

Second, the linkage between the onshore and the offshore renminbi exchange rates was intensively focused on by policymakers and scholars, because the setup of the offshore renminbi markets could provide valuable experience for the regulatory reforms in Mainland China. Different with the heavily regulated onshore renminbi market, the offshore renminbi exchange rates could float freely and sensitively reflect the supply-demand conditions of the market participants. Deregulations in the cross-border capital flows lead to a tighter interaction between the onshore and the offshore renminbi rates. Previous literature proposed that the cross-market spillover effect between the onshore and offshore rates was very large in the early period since the offshore market established, and these two renminbi exchange rates had a very similar trend.

This study focused on the effect of the renminbi reform in 2005 on the onshore-offshore linkage, because the reform shocks on the two renminbi seemed very large, and the pricing differential between the two RMB rates sharply increased, showing a possible structural change. Therefore, this study examined the onshore-offshore linkage from two perspectives: first, the cross-market spillover effect was analyzed by employing a DCC-GARCH model; second, this study also analyzed the different adjustment mechanisms of the onshore-offshore pricing differential by employing a self-excited threshold autoregressive (SETAR) model.

The empirical results are as follows. Referring to the estimated results of the DCC-GARCH model, the mean spillover effect from offshore to onshore was much larger than the vice versa in the total period, revealing that the offshore renminbi market had a stronger power in pricing determination than the onshore market. Moreover, the official renminbi exchange rate (or the so-called central parity rate) was the most determinant factor for both two renminbi rates, showing the strong policy power for the renminbi. The dynamic conditional correlations (DCC) between the forecast errors of the two renminbi rates decreased and became more volatile in the post-reform sub-period. Furthermore, the results of the SETAR model show that the onshore-offshore pricing differential became larger and less convergent after the reform. These results reveal that the reform shock in 2005 weakened the onshore-offshore linkage.

Third, China's trade imbalance (surplus) sharply deteriorated in the 2000s and returned to an acceptable level in recent years. The classical theories of the international finance, e.g. Friedman (1953) and Obstfeld and Rogoff (1996), proposed that a more flexible exchange rate is key to one country's trade rebalance. However, the recent literature, e.g. Chinn and Wei (2013), revealed that more exchange rate flexibility may not lead to the reversion of the trade imbalance, due to that the nominal exchange rate needs time to affect the real exchange rate, which matters for the trade rebalance. This study tried to solve whether the renminbi exchange rate effectively helped to rebalance China's large trade imbalance since 2005 when China switched renminbi regime from dollar-peg to the managed floating regime. By employing structural vector autoregressive (SVAR) model including five variables (foreign GDP, real interest rate, domestic GDP, trade and real effective exchange rate) proposed by Ogawa and Iwatsubo (2009), this study examined the period during 1998–2016 basing on quarterly data. Also, to examine the time-varying effect of the trade rebalance, this study employed a time-varying parameter vector autoregressive (TVP-VAR) model proposed by Primiceri (2005) and Nakajima (2011). Moreover, referring to the widely-known exchange rate pass-through argument, exchange rate affects one country's trade through adjusting the domestic price level. Hence, this study used the SVAR model including four variables (nominal effective exchange rate, import price index, producer

price index and export price index) proposed by Ito and Sato (2008) to examine China's exchange rate pass-through. A TVP-VAR model was also employed to examine the time-varying effect.

The results show that the impulse response of trade to REER was negative in the total period by the SVAR model, showing that the appreciation of REER could generally help reduce China's large trade surplus in the total period. Moreover, the time-varying impulse response of trade to REER by the TVP-VAR model shows that the trade rebalance effect of exchange rate was less effective in the 2000s when the "saving glut" dominated the rapid increase of China's trade imbalance; but it is more effective during 2010–2016 when China's trade surplus returned to a normal level. Furthermore, it is revealed that the increased exchange rate pass-through effectively explained the increased trade rebalance effect after the global financial crisis, but it is less effective for the 2000s. Last, this study found the time-lag of both the trade rebalance effect and the pass-through effect, which take nearly one year to reflect the exchange rate change.

This paper is organized as follows. Chapter 1 provided an outline of the paper as a whole. Chapter 2 identifies the *de facto* renminbi exchange rate regime during 2005–2016 for two perspectives: the implicit currency basket model proposed by Frankel and Wei (2008) and the exchange rate flexibility model with a Markov switching process proposed by Dixon *et al.* (2016). This study proved the existence of the well-known "*de facto vs. de jure*" in the renminbi exchange rate regime. Chapter 3 examined the linkage between the onshore and offshore renminbi exchange rates from two perspectives: the cross-market spillover effect by using a DCC-GARCH model and the adjustment dynamics of the onshore-offshore pricing differential by using a SETAR model. This study proved that the reform shock in 2015 weakened the onshore-offshore linkage. Chapter 4 examined the effect of the exchange rate on rebalancing China's trade imbalance and the exchange rate pass-through effect during 2008–2015. Chapter 5 concluded.