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The bilateral real exchange rates and trade between China and the U.S. ☆

SaangJoon BAAK *

School of International Liberal Studies, Waseda University, Nishi-Waseda Bldg 1F, 1-21-1 Nishi-Waseda, Shinjuku-ku, Tokyo 169-0051 Japan

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ABSTRACT

This paper examines the impacts of the real exchange rates between the renminbi and the US dollar on the trade between the two countries. Because various tests with the quarterly data from 1986Q1 to 2006Q2 imply a structural break around 1994Q1, the export equations are estimated using the quarterly data from 1995Q1 to 2006Q2. According to the estimation of cointegrating vectors, 1% depreciation of the renminbi raises the Chinese exports to the US by 1.7%, while 1% depreciation of the US dollar raises the US exports to China by around 0.4%.

1. Introduction

As is well known, China has maintained a de-facto fixed exchange rate of the Chinese renminbi against the U.S. dollar since 1994. Because the value of the renminbi against the US dollar has been fixed despite the remarkable economic growth and accumulating trade and current account surplus of China for the last decade, the US and other trading partners of China, firmly believing the renminbi was substantially undervalued, urged the Chinese government to revalue the renminbi or to shift to a more flexible exchange rate regime (Chang and Parker, 2004; Funke and Rahn, 2005). Entering 2005, the US government more strongly demanded a revaluation of the renminbi, and the Chinese government finally announced that it would appreciate the value of the renminbi by 2.1% on July 21st, 2005. In addition, the Chinese government announced that it would move to a managed float of the renminbi to a basket of currencies (*the New York Times*, 2005 July 22nd; *the Economist*, 2005 July 28th). This change was immediately welcomed by Western officials. However, the 2.1% change was smaller than they had expected (*the New York Times*, 2005 July 27th). Since then, the Chinese renminbi has appreciated further from 8.277 before the revaluation to 7.864 at the end of 2006. However, the western economists and policy makers still argue that the renminbi should appreciate more. For example, the New York Times reported on May 11th 2007 that Alan Greenspan, the former U.S. Federal Reserve Chairman, referred to the renminbi as an "artificially weak currency." Therefore, the tension surrounding the value of the renminbi is still far from resolved.

While this economic issue has been harshly debated in the political and diplomatic arena, economists have also produced a substantial number of papers on the issue. Mostly, they are interested in the optimal exchange rate of the Chinese currency and examine whether the renminbi is undervalued and, if so, by how much (Chou and Shih, 1998; Chang and Shao, 2004; Yang, 2004;

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* Tel.: +81 3 5286 1716; fax: +81 3 3208 8401.
E-mail address: baak@waseda.jp.

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Zhang and Pan, 2004; Funke and Rahn, 2005). Another group of papers discuss optimal adjustment of the renminbi (Tung and Baker, 2004), or possible strategies of the Chinese government to mitigate the appreciation pressure (Lu, 2004; Sun and Ma, 2005).

However, even though the appreciation pressure is mainly based on the trade imbalance between China and its trading partners, a relatively small number of papers have investigated the impact of the exchange rates of the Chinese currency on the Chinese trade.

Among these few papers, Zhang (1999) and Zhang (2001) assess China's foreign exchange reform and examine its effects on the Chinese trade balance or the Chinese exports. Zhang (1999) analyzes the monthly data for the period from January 1986 to January 1997 and concludes that the reform had the exchange rate moderately influence the trade balance in the long-run. Zhang (2001), based on the empirical tests with the quarterly data covering the period from the first quarter of 1981 to the fourth quarter of 1993, argues that exchange reforms of China affording realistic exchange rates have contributed to China's export expansion significantly.

Chou (2000) analyzing the quarterly data for the period from the first quarter of 1981 to the fourth quarter of 1996, shows exchange rate variability has a long-run negative impact on the Chinese exports. Tang (2003) estimates China's aggregate import demand function using the annual time series data from 1970 to 1999 and reports the volume of imports have a long-run equilibrium relationship with domestic economic activity and relative prices.[1]

Even though the papers listed above contributed to deepening our understanding of some issues related to exchange rates and the Chinese trade, it is surprising that the impacts of the value of the renminbi on the bilateral trade between China and its trading partners have rarely been studied, considering recent appreciation pressure aims to reduce the trade deficit of partner countries.

Against this background, this present paper aims to determine the extent to which the bilateral real exchange rates between the Chinese renminbi and the US dollar affect the bilateral trade between the two countries.

In fact, the US is the most important trading partner of China, and China is one of the major trading partners of the US. As of 2004,[2] the share of the US market in the Chinese exports was 22.8%, far exceeding that of the Hong Kong market (16.2%) or the Japanese market (12.4%). It was bigger than even the share of the European Union market (18.1%). The share of the US products in the Chinese imports is the third biggest (7.73%), following the Japanese (16.12%) and the Korean products (10.35%).

In the same year, the share of the Chinese market (4.31%) in the US exports was the fifth biggest, following those of Canada (22.98%), Mexico (13.60%), Japan (6.74%), and the UK (4.42%). The share of Chinese products in the US imports was 13.67%, behind only that of the Canadian products (17.09%).

To determine the impacts of the exchange rates of the renminbi on the bilateral trade between China and the US, this paper analyzes the quarterly trade data between the two countries for the period from 1986Q2 to 2006Q2 for the Chinese exports and for the period from 1991Q1 to 2006Q2 for the US exports.[3] Following the work of Arize, Osang, and Slottje (2000); Baak, Al-Mahmood, and Vixathep (2007); Baum, Caglayan, and Ozkan (2001); Chou (2000); Chowdhury (1993) and Hassan and Tufte (1998) among others, this study examines the long-run relationship between the exports from one country to the other and other economic factors, including the real exchange rate of the Chinese renminbi, by performing cointegration tests.

In particular, the volume of the real exports from one country to the other is a function of the bilateral real exchange rates between the two countries and other economic variables, such as the GDP of the importing country, the bilateral real exchange rates between the importing country and another exporting country (say Korea as a competitor to China in the US market and Germany as a competitor to the US in the Chinese market) and exchange rate volatility. Because this paper deals with two countries, two export functions (exports from China to US and exports from US to China) are tested and estimated. Accordingly, appropriate explanatory variables are employed for the two functions.[4]

Considering the possibility of structural breaks in the long-run relationships, this paper performs the cointegration test (S–L cointegration test, hereafter) suggested by Saikkonen and Lutkepohl (2000a,b,c), which allows a structural break in a cointegrating vector. The test results indicate one cointegrated relationship among the variables in each export function.

Based on the results, the cointegrating vectors (or the export functions) are estimated by the fully modified OLS of Phillips and Hansen (1990) for the whole period. However, because the Hansen (1992a,b) stability test strongly indicates the instability in the estimated parameter values and because unit root tests with structural break (S–L unit root test, hereafter) suggested by Saikkonen and Lutkepohl (2002) detect 1994 as a structural break for the exchange rate data,[5] this paper finally estimates the coefficients of the Chinese and the US export functions only using the data for the period from 1995Q1 to 2006Q2. For this shorter and recent period, the Hansen (1992a,b) stability test accepts the null hypothesis of stable parameter values even at the 10% significance level. Following the estimation of the cointegrating vectors, the short-run impacts of the real exchange rates are examined by estimating error correction models.

The estimation results show that the currency value of China has long-run negative impacts on the export volume of China. Similarly, the currency value of the US turns out to have long-run negative impacts on the export volume of the US. Therefore, the recent revaluation of the Chinese renminbi is expected to have positive impacts on the US exports to China, but negative impacts

[1] Other papers examining the Chinese exports, imports or balance of trade with older data are Moazzami and Wong (1988); Brada, Kutan, and Zhou (1993) and Wang (1993). In the meantime, Liu, Burridge and Sinclair (2002); Chuang and Hsu (2004); Fu (2005); Mah (2005) among others investigated the contribution of exports (or trade) to the economic growth of China.

[2] The following numbers were calculated by the author from the data obtained from the *Direction of Trade Statistics (DOTS)* of the IMF.

[3] The different time periods are due to data availability. More detailed explanations on data and data availability will be given in Section 2.3.

[4] More detailed explanation will be provided in the following sections.

[5] In fact, there was a drastic change in the Chinese exchange rate regime in 1994. The renminbi depreciated from 5.796 per dollar in 1993Q4 to 8.702 per dollar in 1994Q4.