Carbon Tax Policy under Renminbi Appreciation: a Financial CGE Model Analysis

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Author: Jingyu LIU

In the 20th century, Chinese economy faced problems coming along with double favorable balance. Cases of trade frictions are growing. So does the international pressure on Chinese government to allow RMB appreciation. On the other hand, the monetary authority had to give up part of the independence and flexibility of monetary policies, limited to the dollar peg, to respond to the rapid increasing of exchange reserves. There had been growing pressure on exchange rate policy reform and RMB appreciation. Chinese government has promoted RMB exchange rate reform since 2005. RMB has appreciated over 30% since then. The appreciation of RMB increases the prices of exports and decreases the prices of imports. Since energy intensive exports accounts for a large proportion of the total exports, Trade structure is changing too. RMB appreciation might have positive effects on carbon emission reduction. Meanwhile, a carbon tax policy is under consideration to achieve environmental targets in China. Carbon tax charged in tradable goods industries would have impacts on trade surplus. Thus, carbon tax policy might help to reduce the pressure of RMB appreciation. In the existing literature, there have been studies on carbon tax policy. But few of them are discussing carbon tax policy under exchange rate fluctuation. This paper tries to fill this gap and to study the difference of carbon tax policy when exchange rate is stable or appreciating using a financial CGE model.

This is a static single-country CGE model with a financial sector. This model traces the interaction between various financial markets and real markets. The model should be able to simulate effects of changes in the interest rates, credits, and other financial variables on the real economy, as well as effects of investment decisions, product pricings, and other real economic behaviours on the financial markets. The database of the financial CGE model is the Financial Social Accounting Matrix (FSAM) with extended financial sectors. Accounts in our FSAM are: 42 production sectors , current accounts of institutions (household, energy enterprise, energy-intensive enterprise, other enterprise, government, rest of world), financial accounts of the same institutions, bank systems (commercial bank and central bank), and financial asset accounts (deposit, loan, enterprise bond, government bond, foreign asset, FDI, foreign lending and so on). The benchmark data of the financial CGE model are obtained from a Chinese social accounting matrix of 2007 for the real side, and the flow of fund tables, balance sheets, and balance of payment tables of 2006 and 2007 for the financial side. The data of the enterprises are calculated from the annual reports of the listed companies. For more detailed model description, please refer to Liu et al.(2015).

From the results, we find that RMB appreciation helps to reduce CO2 emission. And carbon tax policy would help to reduce trade surplus of China as well. When we are calculating the optimal carbon tax rate, we should not ignore the exchange rate fluctuation and its impact on the trade structure, industrial structure and the emission reduction amount. If we consider RMB appreciation, the optimal carbon tax rate should be lower than that when RMB exchange rate is stable. If RMB exchange rate keeps rising in the future, the carbon tax rate should be adjusted gradually as well.