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DEPARTMENT OF ECONOMICS

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Replicates of paper: An Equilibrium Model of the International Price System

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1 Introduction

In Mukhin (2022), he came up with very interesting questions: Will US Dollars still be future world dominant currency? What caused US Dollars' Status Quo? Is it possible that Chinese Renminbi can replace US Dollars to become dominant currency? And then he tried to answer these questions under the framework of New Keynesian's equilibrium and sticky price (Galí (2015)).

The models in his papers are relatively complex but the components are classical. Households provide labor and intake the risk of exchange rate on financial assets, and they want to maximize their utility given ex ante budget constraint. Firms produce tradable goods and export these to rest of the world, but they also need to import from foreign countries. Firms should set ex ante price without knowing shocks in which their goal is to maximize profits and mitigate risks. Government in his model is to use monetary policies either in interest-rate rule or money-supply rule.

He concluded that higher inflation and volatility in emerging countries is the source why vehicle currency (currently it's US dollars) is of huge demand. Global pegging system also makes US Dollars become a leading role of global currency. Chinese Renminbi can't become dominant currency if considering it may convert to float exchange rate.

2 Selected Model Description

Households plays a basic role in the environment. They have log-linear preference over consumption and labor and face **ex ante budget constraint**:

$$\sum_h Q^h B_i^h = 0$$

If writing down the whole total price budget constraint, it becomes:

$$P_i C_i = W_i L_i + \pi_i + e^{\Psi_i} \epsilon_{i0} B_i + \Omega_i \quad (1)$$

Nothing special but need to mention that Ψ_i is the asset return in which stochastic country-specific wedges is allowed. Ω_i is reimbursed lump sum to local households.

Firms produce tradable goods in Cobb-Douglas Production Function. However, One innovation is he added a Kimball aggregator to the function to allow for the complementarities in price

setting. The Kimball aggregator is as follows:

$$\Phi(\{\frac{Y_{ji}(\omega)}{X_i}\}, \gamma) = 1 \quad (2)$$

In the meantime, firms maximized their profits function with price \tilde{p}_{ji} . However, in the framework of new keynesian model, price is sticky, and firms have to set the price in advance. Therefore,

$$\bar{p}_{ji}^k = \arg \max_p E\pi_{ji}(p + e_{ik}) \quad (3)$$

One interesting thing is his lemma 1(currency choice) where he converts objection function to a optimal price and make them equivalent.

$$\max_{k \in [0,1]} E\pi_{ji}(\bar{p}_{ji}^k + e_{ik}) \Leftrightarrow \min_{k \in [0,1]} E[\bar{p}_{ji}^k + e_{jk} - \tilde{p}_{ji}]^2 \Leftrightarrow \min_{k \in [0,1]} var[\tilde{p}_{ji} + e_{ki}] \quad (4)$$

In equilibrium, he decomposed the price into MC and p_i :

$$\tilde{p}_{ji} = (1 - \alpha)(mc_j + e_{ij}) + \alpha p_i \quad (5)$$

$$mc_i = (1 - \phi)w_i + \phi p_i$$

$$p_i = (1 - \gamma)p_{ii} + \gamma p_i^I$$

Because firms are heterogenous, which means only part of them can set up the price to a new level while observing shock, other still stick to their preset price.

$$p_{ji} = (1 - \lambda)\tilde{p}_{ji} + \lambda(\bar{p}_{ji}^k + e_{jk}) \quad (6)$$

MC is determined by wages, intermediate price P_j , and price of competitors p_i . However, p_j can be decomposed into domestic intermediate price and imported intermediate price. And Competitors price is divided into other importers and local producers. Therefore:

$$\tilde{p}_{ji} = PCP + DCP + LCP \quad (7)$$

Equation(7) is a smart decomposition in the model.

One model I can't understand is proposition 4(Calvo Pricing) in which he solved optimal

currency choice k to maximize welfare. I will try to figure it out during the rest of the summer by read more online lecture notes.

3 Data replication

Please see the matlab files in the email. However, when i tried to replicate the files, there are some problems in the matlab files he provided. There are 23 matlab files in the folder he provided, 5 of them have exact (case sensitive) match problem, and I tried to look up the data file and changed the variable into different case sensitive ones, it still doesn't work. So I will replicate these 23 m.files again during the summer and try to reach out to Prof. Muhkin about this. In the meanwhile, there is a stata do.file, but my stata permission expired unfortunately.

4 Final comment

All in all, this paper is a very smart paper to analyze the role of US dollars in new keynesian framework. Many questions are still unclear at least for me, like what if there is financial integration in the future (Devereux and Yu (2020)), will it help booster or weaken the role of US Dollars. As for government part, whether sudden stop (Devereux et al. (2019)) changed the analysis of this article under different degrees of capital control?

References

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