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Openness and interest rates: An analysis using the MIUF model and transaction cost model of money

Satoko Takamatsu *

Faculty of Political Science and Economics, Waseda University, 1-6-1 Nishi-Wasweda, Shinjyuku-ku, Tokyo 169-8050 Japan

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ABSTRACT

This paper discusses the manner in which the difference in the specification, which generates a demand for money by agents, alters the optimal interest rate in open economies by taking into account that the prices reflect the producers' optimization. In acanonical money-in-the-utility function (MIUF) model, the Friedman rule is optimal. On the other hand, in the transaction cost model, the optimal interest rate is positive and increases, in terms of the share of imports in consumption.

1. Introduction

Over the last two decades, trade liberalization has significantly integrated the world's economies, and citizens are now able to have increased access to imported goods. In light of globalization, recent movements in prices of imported foods and raw materials have aggravated worldwide concerns and now threaten to weaken governments' control over general consumer prices. Does such an exposure to the overseas market alter the costs and benefits of changing the domestic policy?

Since Romer (1993) documented the empirical evidence and theoretical framework that support the negative correlation between the openness to trade and monetary expansion, the merits and demerits of his study have been widely discussed. Among affirmative opinions, the theoretical background primarily depends on the sticky-price argument where monetary policies face the time-inconsistency problem. However, such a defense sometimes suffers the empirically almost zero correlation between the openness and the slope of Phillips curve (Temple (2002)), resulting in the puzzle.

This motivates us to explore the alternative explanation of the association between the openness of economy[1] and the optimal interest rate in a flexible-price framework, which does not rely on the time-inconsistency hypothesis. Since the specification of money can affect the optimality of the Friedman rule,[2] we examine two types of monetary models: money-in-the-utility function

* Tel.: +81 3 3202 4240.

[1] We refer to the openness of economy as the share of imported goods in the country's consumption. This definition of openness differs from the ratio of import (or import plus export) to output. As documented by Erceg et al. (2006), the import share is far lower in consumption than in investment, and thus the trade volume itself does not immediately leads to the large share of imports in final consumption goods. Since a smaller economy has limitations in its production capacity to fulfill all the domestic demand, it tends to consume more imported goods. Corsetti and Müller (2006) estimates that a smaller, more open economy has a smaller home bias in consumption.

[2] For instance, see Phelps (1973), Kimbrough (1986) and Guidotti and Végh (1993b).

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(MIUF) model and transaction cost model of money. As is usually assumed in the literature, only domestic currency facilitates the transaction in both the models.[3]

We find that, in an open economy, the optimal interest rate is zero in the MIUF model, while it is positive in the transaction cost model. This difference in optimal interest rates stems from the existence of the channel through which the real balance can affect the labor supplies and product prices. In both models, the real balance is assumed to facilitate the consumer's transaction. In the MIUF model, money does not affect the economy further, and thus, the zero interest rate is optimal regardless of the economy's openness, in order not to raise the opportunity cost of holding money. On the other hand, in our transaction model, the decrease in the interest rate additionally increases the value of domestic producer's income, which encourages its labor supply and decreases the price of home goods. Since the overall consumption increases only by the share of home goods, the home country is less motivated to exploit the expansionary policy. The optimal transaction cost is positive and is supported by the positive nominal interest rate.

Another finding of this paper is that our version of the transaction cost model of money can produce a bliss point in the overall utility from money with a finite level of the real balance. This contrasts with the MIUF model with CRRA formula, in which the zero interest rate is optimal in the limit.

Our result in the transaction cost model that the country's openness, that is, the import share in consumption, is negatively associated with the optimal real balance is also documented in the previous studies by using other frameworks. Romer (1993) illustrated the inverse association between inflation and openness to trade using cross-country data. He argued that the monetary authority in a more open economy is less motivated to an expansionary policy because the Phillips curve is steeper. Since, Lane (1997) and Rogoff (2003) among others have developed sticky-price models in which the gain from a surprise monetary expansion is smaller in a more open economy. Rogoff (2003) also argues that globalization and deregulation might make the economy more competitive and the Phillips curve steeper, which reduces the potential benefit of surprise monetary expansion. Terra (1998) propounds an alternative view that openness is an empirically important determinant of inflation only for severely indebted countries. Temple (2002) further argues that the costs of monetary expansion are greater in open economies because it generates unwelcome variability in real exchange rates. Hau (2002) demonstrates this negative relationship between volatility and openness in a model with nominal rigidities. In contrast, this paper predicts that the openness of economy leads to the monetary contraction even in a flexible price model.

As is usually assumed in the recent literature of open macroeconomics, for instance, by Chari, Kehoe, and McGrattan (2002) and Devereux, Lane, and Xu (2006), this paper assumes that only the consumer's currency facilitates transactions in both models. This is in contrast to the models of currency substitution discussed in Calvo and Rodriguez (1977), Kareken and Wallace (1981), and recently in Heimonen (2008). Therefore, the positive interest rate in the transaction cost model does not stem from the currency substitution, whose mechanism is extensively discussed by, for instance, Végh (1989) and Guidotti and Végh (1993a).

In order to model the demand for money, many techniques have been proposed in the literature. A direct technique is to assume that money produces positive utility and to incorporate money in the utility (Sidrauski (1967)). Another technique includes assuming a certain transaction cost in purchasing goods, in which money has a role as a medium of exchange facilitating transactions.[4] This transaction cost can be modeled by considering the "shopping time" or by assuming that real resources are used in the process of exchange. Feenstra (1986) prefers the latter approach and considers consumption but not leisure. Our transaction cost model belongs to the last classification of the transaction cost model, but the utility considered includes leisure as well as consumption.

By employing the transaction cost model, we demonstrate that consumption, leisure, or transaction cost are not satiated from money, but the net utility from money yields a bliss point.[5] The implementation of the optimal monetary policy has been a potential concern in the literature. To ensure the monetary equilibrium, economists have tactfully imposed some restrictions on the level of money. One direct technique is to assume that the utility of money is satiated at a finite level of money. Some models have a bliss point, while others just assume that money does not yield the utility when it exceeds the level of satiation. The satiation can be imposed on the money in the utility function as well as over the transaction cost technology. Examples can be found in Friedman (1969), Phelps (1973), Brock (1975), Correia and Teles (1996), Eggertsson and Woodford (2003), and Alvarez, Kehoe, and Neumeyer (2004) among others. We provide one validation for assuming a satiation in the MIUF model by analyzing the transaction cost model, in which the sum of the terms related to the transaction cost in the utility has a bliss point.

The remainder of this paper is organized as follows. Section 2 presents a formal description of the MIUF model. Section 3 introduces the transaction cost model of money. Section 4 concludes the paper.

2. The MIUF model

In this section, we outline a two-country economy by employing the MIUF model and derive the optimal interest rate. It is shown that the Friedman rule is optimal in this model.

[3] Throughout the paper, we implicitly assume that the imports of foreign goods are intermediated by merchants. Merchants, who are not cash-in-advance constrained, buy foreign goods in producer's currency and sell them to domestic consumers in consumer's currency using the spot exchange rate. This results in a situation where no consumers' demand for foreign currency exists.

[4] The celebrated cash-in-advance model (Clower (1967) and Lucas and Stokey (1983)) can be considered as a variant of the transaction cost model in which the penalty of cash short fall is infinity.

[5] It is important to note that this satiation does not correspond to the non-binding constraint in a cash-in-advance model, where the liquidity service is satiated because the real balance exceeds the amount needed for the transaction. In our model, holding more money reduces the transaction cost, unless the real balance attains infinity.