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Twin dollarization and exchange rate policy

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ABSTRACT

This paper develops a small open economy general equilibrium model with nominal rigidities to study twin dollarization in East Asian economies, a phenomenon where firms borrow in US dollars and also set export prices in US dollars. In this model, we endogenize both the currency of liability denomination and the currency of export pricing. We show that a key factor that affects firms' dollarization decisions is exchange rate policy. Twin dollarization is an optimal strategy for all firms when exchange rate flexibility is limited, which implies that a fixed exchange rate regime may lead to an equilibrium with twin dollarization. Furthermore, we find that twin dollarization can reduce the welfare loss caused by the fixed exchange rate regime, as it helps to cushion the economy against domestic nominal risk.

1. Introduction

This paper is motivated by a frequently observed phenomenon in East Asian economies. On the one hand, the vast majority of lending to these emerging markets is denominated in foreign currencies, especially US dollars. On the other hand, most export goods in these economies are priced in US dollars as well. For instance, in Thailand, approximately 76 billion dollars was recorded as raised by Thai firms on international debt markets between 1992 and mid-1997, while only 3.2% was denominated in Thai baht. Meanwhile, about 90% of Thai export goods were priced in US dollars.[1] This phenomenon indicates the coexistence of liability dollarization and export pricing dollarization, which we refer to as "twin dollarization".

While considerable attention has been paid to the macroeconomic implications of liability dollarization and of export pricing dollarization, there are few papers that connect them together and investigate if some common cause exists. In this paper, we analyze this "twin dollarization" phenomenon formally and answer the following questions: Why do firms want to borrow in dollars and set export prices in dollars at the same time? Furthermore, if twin dollarization can be rationalized as an optimal strategy for firms, what is the inducement? Finally, what are the welfare implications of twin dollarization?

To address these questions, we first examine a single export firm's currency choices of export pricing and liability denomination in a stochastic environment, taking as given the distribution of exchange rates, interest rates, foreign demand, and the behaviors of other firms. Export firms are assumed to be monopolistically competitive, using intermediates to produce differentiated goods to export to the world market. They can set export prices either in domestic currency (pesos) or in foreign currency (dollars). Whatever currency they choose, firms must set their export prices before the state of the world is realized, and the prices cannot be adjusted immediately. To finance their intermediate goods purchases, firms need to borrow from international lenders. It is also assumed that the firms can choose to borrow either in domestic currency or in foreign currency *ex ante*. In such a setting, there will be four feasible (pure) strategies for every export firm, and each strategy represents a combination of the firm's currency choices for export pricing and debt contracts. We establish simple rules for currency strategies of the firm, which show that its currency choices for export pricing and debt contracts are related to each other.

We then place the export firms in a small open economy stochastic general equilibrium model where the exchange rate is endogenously determined by the central bank's monetary policy. This economy is subject to a foreign demand shock. In the presence of the external shock, we find that exchange rate policy is a key factor in determining firms' currency choices. When the economy is under a regime with low exchange rate flexibility, twin dollarization is an optimal strategy for all firms. In other words, a fixed exchange rate may lead to an equilibrium with twin dollarization. We also find that, as exchange

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[1] See Choi and Cook (2004) and Cook and Devereux (2006).

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rate flexibility increases, the degree of dollarization decreases. That is, few firms choose to borrow in dollars and set export prices in dollars. As a result, a floating exchange rate may lead all firms to borrow in domestic currency and set export prices in domestic currency.[2]

The intuition behind these findings is simple. In a stochastic economy, exchange rate policy determines how the absorption of external shocks is divided into changes in the domestic nominal interest rate and the exchange rate. Therefore, when the exchange rate policy is pre-announced and committed, the export firm can anticipate future nominal risks and their distribution, and then it can choose the currency strategy for export pricing and debt contracts accordingly *ex ante* to reduce these risks and achieve maximized expected profit.

More specifically, endogenous currency choices will help the firm to stabilize both market demand and the marginal cost. When monetary policy allows for higher exchange rate flexibility, the exchange rate is volatile and the domestic interest rate is relatively stable. Thus, the export firm will choose to borrow in domestic currency to avoid exchange rate risk, as it implies a more stable marginal cost. Meanwhile, by setting prices in domestic currency, the firm can stabilize the demand for its export goods, since in this case relative prices of export goods can be adjusted by exchange rates changes in face of demand shocks. Therefore, the optimal strategy for all export firms is to borrow in domestic currency and set export prices in domestic currency when exchange rates are flexible. In the opposite case with low exchange rate flexibility, exchange rate volatility is low and the domestic interest rate volatility is high. Therefore, the export firm can stabilize its marginal cost and avoid the volatile domestic interest rate by borrowing in foreign currency (dollars). Regarding the currency of export pricing, due to the lack of exchange rate flexibility, domestic currency pricing cannot help the firm stabilize the demand for its goods. Meanwhile, when the firm sets export prices in domestic currency, its demand is directly sensitive to exchange rate movements, which may result in an increase in the firm's expected marginal cost, *ceteris paribus*. Hence, given a low exchange rate flexibility, the firm should choose to set export prices in dollars. Therefore, under a fixed exchange rate regime, twin dollarization is an optimal strategy for all firms.

Although twin dollarization is optimal for export firms when exchange rates are fixed, is it a beneficial arrangement for the whole economy in terms of welfare? Following Schmitt-Grohe and Uribe (2004), we use a perturbation method to calculate welfare, which is measured by the representative household's lifetime expected utility. In our model, the equilibrium under a flexible exchange rate regime implies higher welfare than the one under a fixed exchange rate regime, hence there is always a welfare loss associated with a fixed exchange rate regime. Nevertheless, given the fixed exchange rate regime, twin dollarization can deliver higher welfare than other currency strategies by dampening the welfare loss caused by the fixed exchange rate arrangement. This is because the welfare costs of moving to a fixed exchange rate regime are smaller once the endogenous behavior of firms is taken into consideration. Intuitively, under a fixed exchange rate regime, the exchange rate cannot insulate the economy from external shocks, so the economy is subject to both real shocks and nominal risks. But in an equilibrium with twin dollarization, some domestic nominal risks can be avoided and thus social welfare is improved. Quantitatively, for a calibrated East Asian small open economy, the welfare gain is about 0.0723% steady state consumption.

Our paper provides a new angle to study the dollarization phenomenon in East Asian emerging market economies. We relate two aspects of dollarization together and study their common cause, while most of the recent literature focuses solely on the macroeconomic implication of liability dollarization. For example, see Calvo and Reinhart (2002), Aghion, Bachetta, and Bannerjee (2001), Calvo (2000), and Cespedes, Chang, and Velasco (2004). In this paper, we emphasize that the fixed exchange rate regime causes twin dollarization, instead of Calvo and Reinhart's suggestion (2002) that liability dollarization leads to “fear of floating”. In this sense, we show a new linkage between exchange rate policy and dollarization.[3] We also show that there exists a welfare gain from twin dollarization under a fixed exchange rate regime, which is different from the welfare implications of liability dollarization in most financial crisis literature.

This paper is also closely related to two other lines of literatures. With respect to the endogenous currency of pricing, we follow the approach used by Devereux, Engel, and Storgaard (2004). They endogenize the currency of export pricing and show that exporters wish to set prices in the currency of the country with a relatively stable monetary policy.[4] Our paper differs from theirs in two key dimensions. First, we focus on a small open economy and study how exchange rate flexibility affects firms' currency of export pricing. Second, we illustrate a channel through which the currency of debt denomination can affect the firm's marginal cost and the currency choice of export pricing.

Another line of research that is related to this paper is the literature on endogenous liability denomination.[5] Our work differs in several aspects. First, most papers in this literature argue that foreign currency debt exists because of market or institutional failure in emerging market economies; see, for example, Jeanne (2000, 2005), and Caballero and Krishnamuthy (2003). Instead, we show that dollarization can be the result of firms' optimization behavior and that exchange rate policy is a key factor affecting firms' decisions. Second, our general equilibrium model setting has a natural advantage over papers based on partial equilibrium or reduced form models, since it allows for welfare analysis.[6] Finally, we investigate the common cause of two aspects of dollarization, instead of analyzing liability dollarization in isolation.

This paper is organized as follows. Section 2 describes some stylized facts of twin dollarization in East Asian economies. Section 3 sets out the decision problem of a single export firm in a stochastic environment and establishes the rules for the determination of the currency of export pricing and liability denomination. Section 4 presents the general equilibrium model. Section 5 solves the model and shows how the firm's dollarization decisions can be affected by exchange rate policy. Section 6 discusses the welfare implications. Section 7 concludes the paper.

2. Stylized facts

A frequently observed fact in East Asian economies is that firms borrow externally in foreign currency and set their export goods prices in foreign currency as well. Since the US dollar is the dominant foreign currency, we refer to this phenomenon as “twin dollarization”. It reflects the fact that, in contrast to the practice of firms in developed countries, firms in emerging market economies seldom use their own

[2] We also discuss firms' optimal currency strategies and the property of equilibria under intermediate exchange rate regimes in Section 5.

[3] Other papers have also found that fixed exchange rates can be conductive to liability dollarization. For example, Chang and Velasco (2006) present a model in which causality runs both ways. However, they focus on liability dollarization while we emphasize twin dollarization.

[4] Engel (2006) discusses the parallels between the choice of invoicing when prices are sticky and the optimal degree of exchange rate pass-through when prices are flexible.

[5] There is also a presumption in the literature that developing countries cannot borrow in local currency. Some call it the “original sin”. Here, we make a different point: there are well-defined economic reasons for why firms in developing countries may not want to borrow in local currency even if they could.

[6] Chamon and Hausmann (2005) also argue that the central bank's preference may affect a firm's choice of liability denomination in a reduced form model.