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## Capital inflow-terms of trade ‘nexus’: Does it lead to financial crisis?☆

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## ABSTRACT

The paper models the nexus of foreign capital inflow and dynamic terms of trade to explain financial crisis in the form of sudden stop or reversal of capital inflow. Crisis in this structure is rooted in the role played by dynamic terms of trade rather than informational imperfections as generally found in the existing literature. In spite of satisfying the regularity conditions for model consistency episodes of sudden crises get magnified due to the non-linearity of the equilibrium relations. This is the novelty of this paper and differentiates it from the standard theoretical literature, and well captures empirical evidence documented in the literature. Non-linearity plays a very important role in the model. Expectation of the exchange rate depreciation has higher potential to generate a financial crisis than shift in the risk perception of foreign lenders or supply shock in the borrowing country.

## 1. Introduction

Foreign capital inflow is ascribed its quintessential role for raising the rate of growth in the developing countries via higher capital formation. Developing countries borrow foreign capital to supplement their domestic investment over and above domestic saving and the developed countries lend to the developing countries for higher return. The former group comprises of countries that are typically capital scarce while the developed countries are capital rich so that rate of return to capital in the former is higher than in the later. The developing countries are also characterized by perennial current account deficit. This together with a higher marginal productivity of capital (and hence a higher interest rate) creates a natural condition for flow of capital from the developed to the developing countries. In the process both set of the countries gain leading to a higher global welfare.

The process of capital inflow to the developing countries is not, however an unmixed blessing. The foreign borrowing is generally pegged in hard currency, such as US Dollar or Euro. The inflow to

the borrowing country helps appreciate the domestic currency followed by rise in asset prices and local goods prices. Increased asset price leads to improved fiscal conditions encouraging domestic credit creation. Reinhart and Reinhart (2010) have called this capital flow bonanza. But the inflow is also associated with an outflow for repayment of loans. So long as inflow outweighs outflow the borrowing country does not face any problem. If however, the capital inflow reaches a plateau or the global investors find a different country with a higher return, outflow outweighs inflow resulting into depreciation of exchange rate. The depreciation can even make debt servicing extremely difficult and the economy experiences a sudden stop or a reversal of current account (Calvo, 1998; Edwards, 2007). Reinhart and Rogoff (2009) on the basis of a study spanning for the last 200 years have observed that every capital flow bonanza is almost invariably followed by a crisis particularly if the capital importing country is a developing country. The evidence is so compelling that Martin Wolf has commented that it is an iron rule that if a country run sustained current account deficit of 5% of GDP or more then they end up in financial crisis (Wolf, 2008). Gu and

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Huang (2011) show in a theoretical model supported by cross-country evidence that capital inflow can be utilized for high growth but at the cost of financial instability if the financial system is weak.

The empirical literature has provided many episodes of financial or banking crisis emanating from the problem of debt servicing arising from depreciation of domestic currency because of repayment of foreign currency loans (see Bordo and Meissner (2006) for evidence in two phases of history from 1880 to 1913 and 1972 to 1997; Allen and Gale (2007) and Kindleberger (1978) for a theoretical understanding of the issue). The fact that foreign borrowing is pegged in hard currency has often been described as the root cause of the problem (see Bussière et al. (2004), Eichengreen and Hausmann (1999), Eichengreen et al. (2005))<sup>1</sup>. It may also be noted that even if the crisis emerges because of information problem it is further accentuated by depreciation of domestic currency. In many Latin American countries in the recent past, such as Argentina in the early 1990s, Brazil and Chile in the 1980s had experienced financial crises because of inappropriate management of macroeconomic fundamentals (see for example, Dominguez and Tesar (2007) for Argentina; Goldfajn and Minella (2007) for Brazil; Cowan and De Gregorio (2007) for Chile)<sup>2</sup>. Holtemöller and Mallick (2013) in an empirical study report that flexibility of currency regime is an important determinant of the misalignment of real effective exchange rate from its equilibrium level that can usefully be employed for forecasting the probability of currency crisis in the next period.

The theoretical literature has often highlighted the role of imperfect information - moral hazard to explain the financial crises as in Flandreau (2003), Krugman (1999) among others. The present paper instead aims to examine the potential of financial crisis in a dynamic model of capital inflow where the nexus operates through terms of trade effect for generating crisis arising out of a reversal of capital inflow or in the extreme case a sudden stop. The argument is based on the simple textbook explanation of terms of trade effect on exchange rate as in Caves et al. (1993), Helpman and Krugman (1989). Financial crisis in the present context operates via an unfavourable exchange rate and a very high interest rate in the international loan market. When capital inflow to a capital scarce developing country falls due to some shock, it generates not only the problem of repayment of existing foreign debt for them but also hampers the current economic activities because of a reduction in the availability of finance to the productive sector and crisis hits the economy. The repayment problem triggers secondary rounds of fall in capital inflow driven by the interaction of the international loan market and the foreign exchange market. Along similar line Costinot et al. (2014) argue the case for capital control. Kehoe and Ruhl (2008) come up with an explanation of shock to exchange rate originating as shock to productivity in a model of trade in goods.

Basak et al. (2012) and Marjit et al. (2007) address the issue of capital inflow and occurrence of financial crisis via terms of trade effect in essentially a static framework. The present study extends the model in a dynamic framework in order to capture the non-linearities of equilibrium relations for the propagation of shock which cannot be captured in a static framework. The non-linearities in equilibrium relations have a very significant role in generating a magnified effect on the extent of crisis in this paper. The paper investigates the relative strengths of different factors (in particular change in the risk perception of the lending country banks, expected depreciation of next period's exchange rate and the supply side shock in the borrowing country) in generating crisis. Of the three factors considered, expected depreciation of the next period exchange rate vis-à-vis current ex-

change rate has higher potential for generating crisis compared to the others. In the existing literature the role of expected depreciation of exchange rate receives less attention as the source of financial crisis compared to a sudden shift in risk perception of lenders.

Section 2 describes the model of capital inflow in a two country setup, a borrowing country and a lending country and characterize the nature of equilibrium and derive the baseline equilibrium trajectories of the endogenous variables. Section 3 discusses cases of financial crises in this model that can occur due to changes in parametric values – comparative dynamic exercises. The final section concludes.

## 2. The model economy and baseline solution

The structure of the model is drawn from our earlier work Basak et al. (2016) which is a theoretical construct to address the mechanism of foreign capital inflow and its interaction with dynamic terms of trade operating through the foreign exchange market and is devoted to the characterization of the nature of equilibria. The present paper is heavily built on the structure of the model but suitably amended for analyzing financial crisis in international loan. We consider an intertemporal model of foreign capital inflow between two groups of countries – a borrowing group and a lending group. The borrowing group typically consists of the developing countries and the lending group developed countries. The former being capital scarce compared to the latter has a higher rate of return on domestic capital which creates a natural condition for capital inflow from the developed to the developing countries.

All borrowing and lending are assumed to take place through banks or financial intermediaries. Though it is not uncommon for many emerging economy firms<sup>3</sup> to directly raise finance from the international market, the major part of international borrowing takes place via banks or consortium of banks. A typical bank in the developing country borrows from both the domestic and international markets and lends to domestic production sector while a typical bank in the developed country borrows from the domestic sector and lends to both the domestic and international markets. We assume that banks in both the country groups are homogeneous and operate in perfectly competitive (henceforth competitive for short) markets both in the domestic as well as international loan markets so that interest rates are given to an individual bank. They have no market power to affect interest rates. It is also assumed that there is no collateral for borrowing. This is not unrealistic in view of the fact a large part of domestic and international borrowing take place without collateral. The presence of collateral makes the analysis complicated without any change in the basic results and it is not relevant in the present context as we are not focusing on the issues pertaining to imperfect information, rather our focus is on the nexus operating through dynamic terms of trade.<sup>4</sup>

As we are interested to focus our analysis only the international borrowing between the two groups of the countries, rest of the macroeconomy of the two groups of countries are assumed exogenous to the model. This helps us to concentrate on the impact of foreign capital inflow only. Thus the interest rates in the domestic sectors of both the developed and the developing countries are exogenously given in this model. It is only the interest rate on foreign borrowing/lending and the exchange rate that are determined in this model. Each bank in both the developed and the developing countries is risk averse and thus maximizes discounted expected utility over infinite horizon, specifically

<sup>3</sup> External Commercial Borrowing, American Depository Receipts are two prominent examples of such direct borrowing by Indian firms in the international market. It may also be noted that intermediated finance has certain advantages in mitigating the cost of information leading to reduction in the cost of fund and improving the supply.

<sup>4</sup> Stiglitz and Weiss (1981) have shown that collateral does not help as a screening device to circumvent the problem of loan quality arising out of information asymmetry – adverse selection or moral hazard – if lenders are risk averse. Wette (1983) has further shown that the same result holds even when the lenders are risk neutral.

<sup>1</sup> Bratsiotis and Robinson (2005) show that the proportion of international debt pegged in domestic currency (won) fell significantly prior to 1997 financial crisis in South Korea.

<sup>2</sup> A general discussion on Asian Crisis of 1997 can be found in Rakshit (2002) and in particular for South Korea in Noland (2007).

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