Journal of Research in Economics and International Finance (JREIF) Vol. 1(1) pp. 31-38, July 2012
Available online http://www.interesjournals.org/JREIF

Full Length Research Paper

Capital flow, asset prices and macroeconomic performance in an emerging market economy: models and policy perspectives

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Abstract

The goal of the paper is to understand mechanisms through which an external financial shock produces macroeconomic outcomes in an emerging market economy. We examine the transmission mechanisms from two perspectives. One is the equity-finance and the other one is the bank- loan. The basic mechanism is simple. Stock market and financial intermediaries supply liquid assets to foreigners who are not committed to any long-term investment. If, for exogenous reasons, foreign investors withdraw their funds, there is a run on currency which can reduce effective demand, supply of credit and output.

Keywords: Capital flow, asset prices, output, inflation.

INTRODUCTION

Concerns about the implications of international capital flows to developing economies have grown with the sharp increase in the volume of these flows. On the one hand, capital flows can produce favorable macroeconomic outcome through their impact on the stock market and financial intermediaries. On the other hand, these flows also raise issues regarding the management of risk associated with financial liberalization. One issue of major concern is the high sensitivity of these funds to differences in interest rates, expectations of future economic growth and expected return from financial assets in emerging market economies. In such a situation, even a small external shock to the economy can lead to reversal in capital flows, which exacerbates adverse effects of the initial shock.

The surge in capital inflows to developing countries in the late 1970s and early 1980s was dominated by commercial bank lending. However, capital inflows in the last two decades have been associated with a sharp rise in bond and equity portfolio flows which have been routed through the equity market. There is a large body of empirical literature on the relation between capital flow and macroeconomic performance. However, the different studies failed to arrive at any specific consensus. A possible reason for this ambiguity arises from the difficulty in identifying and quantifying capital account liberalization in a consistent manner across countries. Differences in empirical results also occur from choices of different sample periods investigated, dataset employed and the different estimation techniques applied. Though there is a large body of empirical literature, the issue is empirically unsettled. Moreover, there is hardly any theoretical analysis linking short term output adjustment and movement in asset prices in presence of multitude of contemporaneous changes in the policy regime, namely current account convertibility, capital account liberalization, stock market liberalization and interest rate deregulation. From an academic perspective, the value added of this paper is to construct a set of simple macroeconomic models to analyze implications of contagion with specific focus on the relation between capital flow and output. There is no gainsaying that financial integration, stock market liberalization and import of capital goods are concomitant aspects of the current process of globalization. In developing countries, investment goods typically carry high import content and liberalization episodes lead to more imports of capital

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goods. In spite of this evidence, capital goods imports are often ignored in aggregative open economy models. In this paper, we incorporate imports of both capital and consumption goods to provide a complete assessment of the macroeconomic effects of external shocks. However, it needs to be noted that the models we present are highly stylized. The aims of these models are not to be either particularly realistic or rigorous but rather to simply illustrate the logic behind the loss of output and employment through contagion.

The underlying logic of the short-run models constructed in the paper is simple. The domestic firms can finance investments by raising funds from the capital market or borrowing from the financial intermediaries. Large firms can raise funds from stock market while medium and small enterprises depend on bank credit. Thus, contagion led depreciation can work through either the stock market channel or the channel of bank credit.

This paper can be related to an emerging literature in the field of financial economics namely the 'market-based view' and the 'bank-based view'. The market-based view (See Dailami and Atkin (1990), Rousseau and Wachtel (2000), Beck and Levine (2003), Bekaert et al., (2005)), emphasizes how well-functioning equity markets can contribute to macro economic development by boosting investment. On the other hand, the bank-based (See King and Levine (1993), Rajan and Zingales (1998), Arestis et al., (2001)), view stresses the effectiveness with which banks provide external finance and fund new firms. The market-based view and the bank-based view can be formalized by extending the Blanchard (1981) model and the Blinder (1987) model respectively with specific focus on changing capital flow to emerging market economies. The open economy extension of the Blanchard model (1981) will consider only one source of funds for firms, namely equity finance. However, the adaptation of the Blinder (1987) model is based on the assumption that the only source of funds for financing working capital is bank loan.

Despite the difference between the models in terms of the underlying analytical structures, the basic result of the paper is that contagion-driven withdrawal of capital flow leads to loss of employment through many alternative transmission mechanisms operating through a rise in exchange rate, a fall in Tobin's q, and a rise in lending rate.

The outline of the paper is as follows. In sections 2 and 3 we formalize the links between capital outflow and output level. In section 2, we will extend Tobin-Blanchard framework (See Tobin (1969), Blanchard (1981)) to examine how capital outflow affects stock market and reduce private investment. In section 3, we will extend Blinder-Rakshit (See Blinder (1987)) framework under flexible interest rate to account for stagflation through the bank-lending channel. Section 4 concludes the paper with summary of results of models in section 2 and 3 alongside a clear accent on policies that need to be chosen with prudence for a shock-sensitive emerging market economy.

Model 1

Stock Market Valuation and Output: An Effective Demand Model

The model in this section is based on the interaction between the real sector and the financial sector through the channel of stock market. The forcing variable in this model is Tobin's q which can be used as a proxy for investment opportunities (Kaplan and Zingales (1997) and Lamont, Polk and Saa Requejo (2001) use firms' market to book ratios as proxies for Tobin's q. However, it is clearly difficult if not impossible to measure q accurately (Ericson and Whited, 2000)). Capital inflows into equity market are primarily governed by speculations. We take these flows to be exogenous (See Rakshit (2003)). First, we present the consolidated balance sheet of the economy in Table 1.

It follows from the consolidated balance sheet that once the money market clears, the equity market also clears. The following symbols will be used in the formal representation of our models:

Y: Domestic output
C: Consumption
I: Investment
q: Tobin's q
G: Government expenditure
e: Exchange rate
P: Domestic price
M: Currency
Q: Consumer's Price Index
r_e: the rate of return on capital equity required by stock holders
F: Net capital inflows
K: Physical capital stock
DC: Domestic Credit
NFA^{CB}: Net foreign asset holding by Central bank
W: Wealth
E: Equity
H: High Powered Money
R: Marginal product of Physical Capital which is fixed in a short run model
γ: Proportion of investment expenditure on domestic capital
1-γ: Share of investment expenditure on imported capital
α: Share of consumption expenditure on domestically produced goods
1- α: Share of consumption expenditure on imported goods

Consumer's Price Index or CPI (Q) depends on both domestic price level and nominal exchange rate i.e.

$$Q = \underset{+}{Q}(\underset{+}{e}, \underset{+}{P})$$

Table 1. Consolidated Balance Sheet of the Economy

Asset	Liabilities
Central Bank	
Domestic Credit(DC)	High Power Money
Net Foreign Asset(NFA^{CB})	
Firms	
Value of Physical Capital (qK)	Equity (E)
Households	
Currency (M)	Wealth (W)
Equity (E)	

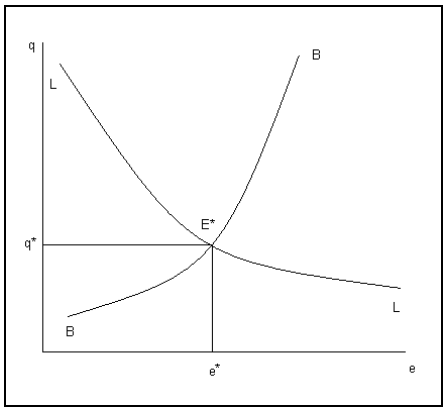

Figure 1. Equilibrium in the effective demand model

The model is represented by the following equations:

$$Y = \alpha C(Y-T) + \gamma I(q) + G + X(\frac{e}{P}) \quad (1)$$

$$\frac{M}{Q(e,P)} = L(r_e, Y) \quad (2)$$

$$r_e = \frac{R}{q} \quad (3)$$

$$X(\frac{e}{P}) - \frac{e}{P}\left[(1-\alpha)C(Y-T) + (1-\gamma)I(q)\right] + \frac{e}{P}F = 0 \quad (4)$$

Equation (1) represents the commodity market equilibrium. Aggregate demand is composed of consumption, investment expenditure on domestically produced capital goods, government expenditure and exports. Consumption of domestic goods depends on real disposable income. Domestic investment depends on Tobin's q. The investment function is I = I(q), $I_q = \frac{\partial I}{\partial q} > 0$ and I(1) = 0. Exports (X) varies directly with real exchange rate. Equation (2) gives money market equilibrium. An important point to be noted is that money supply is deflated by the consumer price index. Equation (3) represents the arbitrage condition which amounts to the equality between marginal cost of equity finance and marginal gain of investing in physical capital. This follows from maximization of the value of firm when investment in physical capital is purely equity financed (See Yoshikawa (1980)). BOP equilibrium under flexible exchange rate is represented by (4).

The working of the model is as follows. Output adjustment takes place in commodity market. Return on equity is determined from money market equilibrium and thus, equation (3) solves for Tobin's q. Exchange rate is determined from BOP equilibrium.

The diagrammatic representation of the model is shown in figure 1.In the (e, q) plane, the LL curve is derived from the money market for any given Y. Exchange rate depreciation reduces real balance and thus, from the money market return on equity raises, causing q to fall. Hence, LL schedule is downward sloping. BB curve is obtained from balance of payment equilibrium for any given Y. A rise in q, for any given exchange rate has two effects. On one hand, investment rises and hence, import of capital goods rise. To maintain BOP equilibrium exchange rate depreciates. So BB curve is upward sloping.

Next, we consider how reversal in capital flow can precipitate recession. With capital outflow, exchange rate depreciates, real balance falls and Tobin's q declines. This leads to fall in private investment. However, current account balance improves as exports increase along with

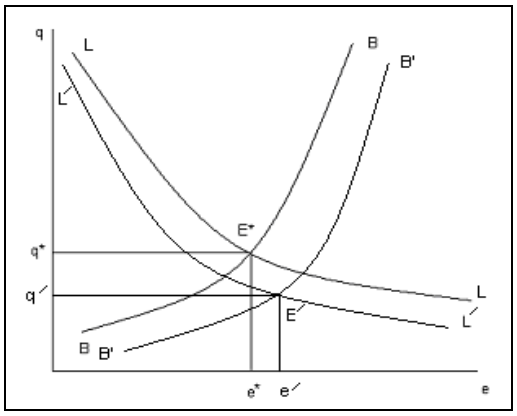

Figure 2. Effect of Reversal in Capital Flow on asset prices

a fall in import of capital and consumption goods following a decline in output. If we assume that the price effect on export is dominated by the stock valuation effect on investment, contraction ensues as a result of withdrawal of capital flows. This is shown in figure 2.The preceding discussion can be summed up in the following proposition:

Proposition 1: *Withdrawal of capital flow reduces stock market valuation and precipitates recession by reducing private investment.*

Model 2: Credit Crunch and Stagflation: A Model with Classical Unemployment

The transition to the market based economy involves a 'catching up' process, characterized by rapid financial liberalization and development. This 'catching up' process aims at creating viable and efficient banking systems in these countries which involves, among other things, the liberalization of interest rates and the establishment of the legal and supervisory framework. One of the major objectives of financial sector reform is to augment the flow of credit to the business sector. In this section we will show that an increase in the world rate of interest causes currency depreciation which in turn leads to a contraction in liquidity through the bank lending channel. Contagion here is not caused by contractual or informational links between banks but because credit crunch leads to rise in lending rate and generates stagflation. In this particular model, our focus is on small and medium enterprises which need credit for financing both working capital and fixed capital (These firms cannot raise funds from the equity market.). They must pay their factors of production before revenue is earned from sales. Hence, firms need to borrow from banks. In particular, there is no substitute for bank loans. However, banks hold excess reserves which depend on both the lending rate and corporate performance (We do not explicitly model optimizing behavior of banks in presence of risky loans. However, we conjecture that corporate performance has an effect on the supply of bank credit.). The simplest possible measure of corporate performance is profit rate i.e. profit per unit of capital. The reason why corporate performance influences supply of bank loan is this. The greater the rate of profit, the less the probability of default and hence, less is the incentive of banks to hold excess reserves. Though the flow of deposits is determined by the high power money under flexible exchange rate, the excess reserve holding of commercial banks makes loan supply endogenous. The deposit rate is a positive function of loan rate of interest. Expected inflation and expected exchange rate are assumed to be fixed. The consolidated balance sheet of the economy is presented in table 2.

In this model we introduce some new symbols:

W: Nominal wage

w: Real Wage

wL :Working Capital

$\overline{K}$: Fixed Capital

ρ : Loan rate of interest

r* : Foreign rate of return

p : Domestic rate of inflation

p^e: Expected rate of inflation

e^e: Expected exchange rate

r_d: rate of interest on deposits

β: Ratio of reserves to deposits

β_1 : Required Reserve ratio

$f(\frac{\pi^*}{\bar{K}}, \bar{\rho})$: Excess Reserves Function

$\frac{\pi^*}{K}$: Profit rate

Table 2. Consolidated Balance Sheet of the Economy

Assets	Liabilities
Central Bank	
Domestic Credit	Reserves
Net Foreign Asset	
Commercial Banks	
Excess Reserves (ER)	Deposits(D)
Required Reserves (RR)	
Loans	
Firms	
Working Capital	Loans
Fixed Capital	
Households	
Deposits (D)	Wealth

The model is represented by the following equations:

$Y=Y(L,\overline{K}),\ Y_L>0, Y_{LL}<0$ (1)

$$w=\frac{W}{P}=\frac{P^{\alpha}e^{1-\alpha}}{P}=(\frac{e}{P})^{1-\alpha} \quad (2)$$

$$MP_L=\frac{W(1+\rho-p^e)}{P}=w(1+\rho-p^e)=(\frac{e}{P})^{1-\alpha}(1+\rho-p^e)$$

(3)

$$wL+\overline{K}=\frac{1-\beta}{\beta}(DC+NFA^{CB}), \text{ where } \beta=\beta_1+f(\frac{\pi^*}{\underset{-}{K}},\underset{-}{\rho})$$

(4)

$$X(\frac{e}{P})-\frac{e}{P}\left[(1-\alpha)C(Y-T)+(1-\upsilon)I(\rho-p^e)\right]+\frac{e}{P}F\left[r_d(\rho)-(r^*+\frac{e^e}{e}-1)\right]=0 \quad (5)$$

$$p=\lambda\left[\alpha C(Y-T)+\upsilon I(\rho-p^e)+G+X(\frac{e}{P})-Y\right] \quad (6)$$

Equation (1) represents the production function. Equation (2) shows that money wage is indexed to CPI. Equation (3) represents the profit maximizing condition (Profit is given by: $\pi=Y(L,\overline{K})-ZL$, where $Z=w(1+\rho-p^e)$. Firms maximize profit by choosing labour by equating MP_L to Z. The profit function is: $\pi^*=\pi^*(Z)$ and using Hotelling's Lemma, we get $\frac{\partial\pi^*}{\partial Z}=-L^*$.). Unemployment is attributable to wage indexation and thus, it is classical unemployment (The case of Keynesian unemployment has been treated in section 2). Equation (4) gives the loan market equilibrium i.e. equality between loan demand and loan supply. Firms are exante identical and require credit to finance their working capital and fixed capital requirement prior to production and sale. With an increase in real wage cost of employment, the firms require more credit and hence, demand for loan rises. The right hand side of the equation gives the loan supply. Banks use a fraction of surplus funds to supply credit. Loan supply depends on not only the lending rate but also corporate performance, the proxy of which is $\frac{\pi^*}{K}$. If profit of firms' increases, banks hold less excess reserves. Again for any given rate of profit, an increase in lending rate has two effects on loan supply. The direct effect is the opportunity cost effect i.e. a rise in lending rate leads to a fall in excess reserves. However, there is an indirect effect operating through the channel of corporate performance. A rise in loan rate reduces profit which follows from Hotelling's Lemma and hence, excess reserves go up i.e. loan supply falls. However, stability of loan market equilibrium requires that a rise in lending rate reduces excess demand for loan (See Appendix for alternative cases of loan supply curve). BOP equilibrium is represented by equation (5). We endogenise capital flow (See Kollamparambil and Banerjee (2008)) in the sense that it is a function of interest rate differential. Equation (6) represents the inflation mechanism. We assume that the price level is sticky and relative prices change only gradually over time. Since price cannot jump, there is obviously no guarantee that the demand for domestic goods will equal the supply. If firms noticing the excess demand for their products react by trying to adjust their relative prices, aggregation over firms leads to a price inflation equation (See Barro (1972), Fischer (1972)).

The working of the model is as follows. The loan market equilibrium and BOP equilibrium solve for the loan rate of interest and nominal exchange rate. Thus, we get the cost of working capital. From equation (3) and equation (1) we get employment and output. Equation (6) determines the inflation rate. The model is diagrammatically represented in figure 3. For diagrammatic representation, we draw the LL schedule and the BB schedule obtained from the loan market

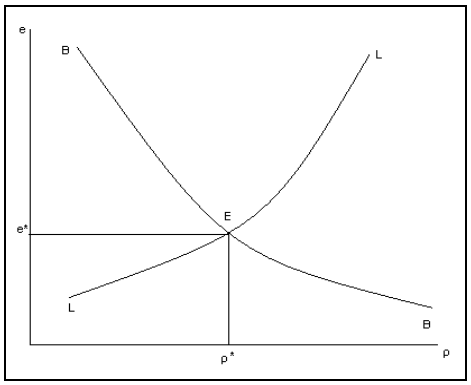

Figure3. Equilibrium in the supply side model

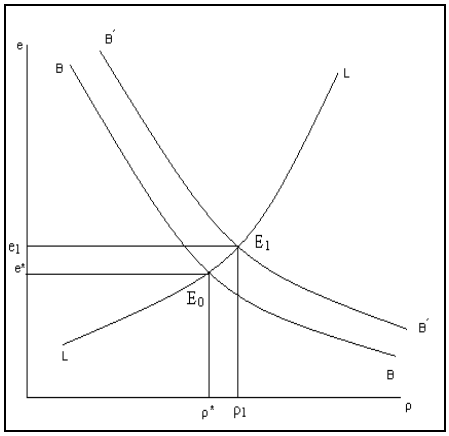

Figure 4. Effect of Capital Flow Reversal on asset prices

equilibrium and BOP equilibrium respectively in the ρ-e plane. Both curves are drawn for given level of output and inflation rate. The LL schedule is upward sloping. The intuition is this, Exchange rate depreciation leads to a rise in demand for loan for low value of elasticity of employment. On the other hand, it reduces π^* which follows from the Hotelling's Lemma and thus, loan supply falls. The resulting excess demand in the loan market is eliminated by rise in the lending rate. The BB curve is obtained from the BOP equilibrium. A rise in the lending rate leads to an increase in the deposit rate and hence, capital flow increases. Moreover, private investment falls and hence, capital goods import declines. The resulting BOP surplus is eliminated by exchange rate appreciation. Hence BB schedule is downward sloping.

Next we consider a rise in the foreign interest rate. This reduces capital flow and hence, exchange rate goes up. On the one hand, demand for loan rises for reasonably low elasticity of employment. On the other hand, profit per unit of capital falls leading to fall in supply of loan. Hence, the excess demand in loan market pushes up the lending rate. The real wage and the interest cost go up. The result is fall in employment, output and a rise in inflation rate. Thus, once we open the channel of bank credit, we get a story of stagflation due to capital outflow. This is shown in figure 4.

The preceding discussion leads to the following proposition:

Proposition 2: Capital *outflow causes exchange rate depreciation along with rise in domestic lending rate and entails stagflation.*

CONCLUSION

The consequences and desirability of capital account liberalization among developing countries still continues to be a controversial issue. This paper theoretically reexamines this issue in terms of some useful short-run models which can apply to a large class of emerging market economies. In particular, the paper focuses on illiquidity through which financial crisis and output loss is connected. This connection is examined from two pers-

pectives. One is the equity finance and the other one is through financial intermediation.

In section 2, the paper addresses the macroeconomic implications of reversal in capital flow through changes in asset prices namely exchange rate and Tobin's q in an effective demand model. Section 3 analyses how capital outflow can produce stagflationary outcomes through the bank lending channel in a supply side model. The basic result of the paper is that contagion-driven sudden stop in capital flow hampers macroeconomic performance through variety of transmission mechanisms operating involving the capital market or financial intermediation.

The prevalence of contagion increases the vulnerability of the fundamentals of the economy and the behaviour of the investors. Capital outflows generate significant turbulence in emerging market economies, affecting among others things, asset prices, and scale of economic activity. Hence, it is necessary to design supervision policies and surveillance mechanisms that can improve management of risks associated with capital account liberalization.

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Appendix

Loan Market Equilibrium and Stability: A Partial Equilibrium Framework

The loan supply function is given by: $L^S = \frac{1-\beta}{\beta}(DC + NFA^{CB})$. Now, $\beta = \beta_1 + f(\frac{\pi^*}{\bar{K}}, \rho)$. Let us examine the effect of ρ on L^S.

$$\frac{\partial L^S}{\partial \rho} = \frac{\left(\frac{f_1}{K}\frac{\partial \pi^*}{\partial Z}\frac{\partial Z}{\partial \rho} + f_2\right)(1-2\beta)}{\beta^2}\left(DC + NFA^{CB}\right)$$

Where $f_1 = \frac{\partial f}{\partial(\frac{\pi^*}{K})} < 0, f_2 = \frac{\partial f}{\partial \rho} < 0, \frac{\partial Z}{\partial \rho} = \frac{\partial\left[w(1+\rho-p^e)\right]}{\partial \rho} = w > 0, \frac{\partial \pi^*}{\partial Z} < 0, \frac{\partial \beta}{\partial \rho} = \frac{f_1}{K}\frac{\partial \pi^*}{\partial Z}\frac{\partial Z}{\partial \rho} + f_2$

The relation between L^S and ρ is ambiguous as claimed in the text. So Loan supply can be positively or inversely related to the lending rate.

Now, Excess demand for loan is given by $ED_L = (wL + \bar{K}) - \frac{1-\beta}{\beta}(DC + NFA^{CB})$.

$\frac{\partial ED_L}{\partial \rho} = w\frac{\partial L}{\partial Z}\frac{\partial Z}{\partial \rho} - \frac{\partial L^S}{\partial \rho}$. Stability requires $\frac{\partial ED_L}{\partial \rho} < 0$.

The two cases are shown in figure A.1and A.2

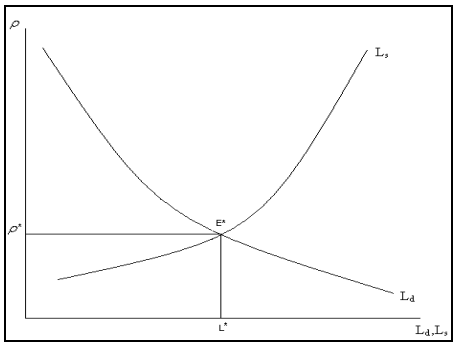

Figure A.1 . Equilibrium in the loan market with upward sloping loan supply

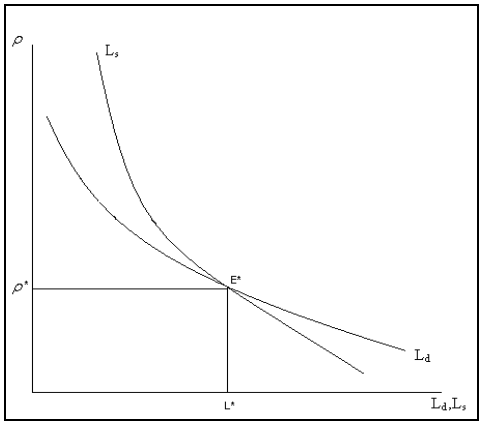

Figure A.2 Loan Market Equilibrium with downward sloping loan supply curve