Are Capital Inflows Expansionary or Contractionary? Theory, Policy Implications, and Some Evidence

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Two dramatically different views of capital inflows

- The Mundell Fleming view:
  - For a given policy rate, contractionary
  - Focus on appreciation
- The policy makers' view:
  - For a given policy rate, expansionary
  - Focus on financial effects
- Evidence more in favor of policy makers Appreciation, and boom
- How do we reconcile?

A tentative reconciliation

Two channels

- Exchange rate appreciation: Contractionary
- Decrease in borrowing rates, given policy rate

Direct implications

- Flows that do only the first: Contractionary
- Flows that do both: Potentially expansionary

A Simple Model of Capital Flows

- Need imperfect asset substitutability so capital flows respond to return differential but at a finite pace (e.g. Kouri 1976)
- Portfolio model drawing on Branson, Halttunem, and Mason (1977) and Friedman (1978)

I. A 2-country portfolio model

Two countries, domestic and foreign

- Model must have two domestic assets in addition to money

  Domestic bonds, B, with rate R_B. Rate set by central bank.

  Domestic "non-bonds", N, with rate R_N. Imperfect substitutes for bonds.

  Spread of non-bonds over bonds, $R_B - R_N$ depends on relative demand.

- And at least one foreign asset, to have a choice between domestic and foreign assets

  Foreign bonds, B^*, with rate R^*

- Foreigners and domestics choose between the three assets, B, N, B^*.

- Which domestic asset foreigners choose is of the essence.

Write down demand functions and solve for equilibrium. A bit cumbersome, but will simplify to simple formulas

The domestic demands for assets

Separate (for convenience the demand for money for the others)

$$M_D = (\alpha_0 - \alpha_1 R_B)$$

Demand for the three other assets:

$$\begin{aligned} B_D &= (a + \beta(R_B - R_N) + \beta(R_B - R^* E/E^e_{+1}))(W - M_D) \\ N_D &= (b + \beta(R_N - R_B) + \beta(R_N - R^* E/E^e_{+1}))(W - M_D) \\ B^*_D/E &= (c + \beta(R^* E/E^e_{+1} - R_B) + \beta(R^* E/E^e_{+1} - R_N))(W - M_D) \end{aligned}$$

subject to $a + b + c = 1$ and

$$\bar{M_D} + \bar{B_D} + \bar{N_D} + \bar{B^*_D} = \bar{W} = M_D + B_D + N_D + B^*_D$$

The Central Bank

- The domestic cental bank can issue money and buy either domestic or foreign assets
- Conducts OMO by buying/selling domestic bonds B
- Conducts FX intervention by buying/selling foreign currency and then buying/selling foreign bonds, B^*
- Sterilizes by selling/buying domestic bonds B

The foreign demands for domestic assets

$$
\begin{aligned}
M_F &= 0 \\
B_F &= (d + \beta(R_B - R_N) + \beta(R_B - R^* E/E^e_{+1} + s_B))(W^* - M^*_D) \\
N_F &= (f + \beta(R_N - R_B) + \beta(R_N - R^* E/E^e_{+1} + s_N))(W^* - M^*_D)
\end{aligned}
$$

Note the role of s_B and s_N: Shocks to foreign inflows.

For the central bank chooses the money supply, M, and its holdings of domestic bonds B_{CB}, with

$$M - B_{CB} = \bar{M} - \bar{B_{CB}}$$

No FX intervention for the time being.

Equilibrium equations

$$
\begin{aligned}
M &= M_D \\
\bar{B}_D + \bar{B}_F + \bar{B}_C &= B_D + B_F + B_{CB} \\
\bar{N}_D + \bar{N}_F &= N_D + N_F \\
(B_F - \bar{B}_F) + (N_F - \bar{N}_F) &= (B_D^* - \bar{B}_D^*)/E
\end{aligned}
$$

By Walras law, can drop one equation. And if the central bank chooses the policy rateR_B (by appropriately choosing M), we can drop another one.

So, keep equilibrium conditions for non-bonds, and capital account.

Also, for notational simplicity, $R_B = R^* = 1, E^e_{+1} = 1$, so $R^* E/E^e_{+1} = E$

Equilibrium conditions

Equilibrium condition for non-bonds:

$$\underbrace{[(R_N - 1) + (R_N - E)]}_{\text{net domestic demand}} + \underbrace{[(R_N - 1) + (R_N - E + s_N)]}_{\text{net foreign demand}} = 0$$

Capital account balance condition:

$$\underbrace{[(1 - R_N) + (1 - E + s_B]}_{\text{foreign demand for bonds}} + \underbrace{[(R_N - 1) + (R_N - E + s_N)]}_{\text{foreign demand for non-bonds}} = \underbrace{(E - 1) + (E - R_N)}_{\text{domestic demand for foreign bonds}}$$

Interpretation

Equilibrium rates, exchange rate, and gross inflows

Solving for R_N and E gives

$$\begin{aligned} R_N &= 1 + \frac{1}{6}\, s_B - \frac{1}{6}\, s_N \\ E &= 1 + \frac{1}{3}\, s_B + \frac{1}{6}\, s_N \end{aligned}$$

Inflows are in turn given by:

$$(B_F - \bar{B_F} + N_F) - \bar{N_F}) = \frac{1}{2}\, \beta\, s_B + \frac{1}{2}\, \beta\, s_N$$

Interpretation

The effects of gross bond inflows

The effects of a bond inflow: $R_N = \frac{1}{6}s_B$ $E = \frac{1}{3}s_B$ Flows $= \frac{1}{2}s_B$

- An increase in bond inflows leads to an appreciation and an *increase* in the rate on non-bonds.
- Since, by assumption, the central bank sets the policy rate, the increased demand for domestic bonds has no effect on the policy rate.
- The inflow leads to an appreciation, and thus an expected depreciation, which makes holding domestic non-bonds less attractive to both domestics and foreigners.
- This in turn increases the equilibrium rate of return on non-bonds.
- Both the appreciation and the higher rate on non-bonds are likely to be contractionary.

The effects of gross non-bond inflows

The effects of a non-bond inflow: $R_N = -\frac{1}{6}s_N$ $E = \frac{1}{3}s_N$ Flows $= \frac{1}{2}s_N$

- An increase in non-bond inflows leads to an appreciation and to a *decrease* in the rate on non-bonds.
- The inflow leads to an appreciation, and thus to an expected depreciation, thus dampening the demand for domestic assets.
- But the demand for domestic non-bonds still increases, leading to a decrease in the rate on non-bonds.
- Depending on the net effect of the appreciation and the lower rate, non-bond inflows may be contractionary (but less than bond inflows) or expansionary.

II. FX intervention, capital controls, and the policy rate

Governments have three instruments they can use to affect gross flows:

- Capital controls.
- FX intervention
- Policy rate

The effects differ across instruments.

The effects differ depending on the nature of the inflows.

FX intervention

Central bank budget constraint: $M - B_{CB} - B^*_{CB} = \bar{M} - \bar{B_{CB}} - \bar{B^*_{CB}}$

Define $X \equiv (B^*_{CB} - \bar{B^*_{CB}})/\beta$: size of the sterilized intervention, normalized by β. Then:

$$R_N = 1 + \frac{1}{6} s_B - \frac{1}{6} s_N - \frac{1}{6} X \quad (1)$$

$$E = 1 + \frac{1}{3} s_B + \frac{1}{6} s_N - \frac{1}{3} X \quad (2)$$

Inflows are in turn given by the sum of bond and non-bond inflows:

$$B_F - \bar{B_F} + N_F - \bar{N_F} = \frac{\beta}{2}(s_B + s_N + X) \quad (3)$$

If CB stabilizes the exchange rate ($E = 1$), then

- In the face of bond inflows ($s_B > 0, s_N = 0$).

$$X = s_B,\ E = 1,\ R_N = 1,\ \text{Flows} \ = \ X = s_B$$

FX fully cancels the effect of bond inflows. Just a change of ownership of bonds (from CB to foreign investors)

- In the face of non-bond inflows ($s_B = 0, s_N > 0$).

$$X = \frac{1}{2}s_N,\ E = 1,\ R_N = 1 - \frac{1}{4}s_N,\ \text{Flows} \ = \ \frac{3}{2}X = \frac{3}{4}s_N$$

FX amplifies the size and the effects of non-bond inflows.

Capital controls

Capital controls. If eliminate both flows, trivial.

- Capital controls on bonds. Effects of non bond flows on spread and exchange rate?

$$R_N = 1 - \frac{1}{5}\, s_N \qquad E = 1 + \frac{1}{5}\, s_N$$

  Increase the effects on non bonds on both E and R_N (1/5 rather than 1/6)

- Capital controls on non-bonds. Effects on bond inflows on spread and exchange rate?

$$R_N = 1 \qquad E = 1 + \frac{2}{3}\, s_B$$

  Increase the effect of bond flows on E (2/3 rather than 1/3)

Policy rate R_B

$$R_N = R_B + \frac{1}{6}\, s_B - \frac{1}{6}\, s_N \tag{4}$$

$$E = R_B + \frac{1}{3}\, s_B + \frac{1}{6}\, s_N \tag{5}$$

And the inflows are given by:

$$(B_F - \bar{B_F} + N_F - \bar{N_F}) = \frac{\beta}{2}(s_B + s_N)$$

- To keep E constant, it must *decrease* R_B, so $R_B = 1 - 1/6\ s_N$. E remains constant, and $R_N = 1 - 1/3\ s_N$.
- To keep R_N constant, it must *increase* R_B so $R_B = 1 + 1/6\ s_N$. R_B remains constant, and E inceases, to equal $E = 1 + 1/3\ s_N$.

III. Some policy implications

Different effects on E and R_N of the different instruments.

For example, with respect to non bond inflows:

- Controls: Less appreciation, smaller decrease in spreads
- Sterilized FX intervention: Less appreciation, larger decrease in spreads
- Policy rate decrease: Less appreciation, no effect on the spread

Choice of instruments and Objective Function

- Output below/above potential?
- Appreciation: real income effect or Dutch disease?
- Lower spread: Financial deepening or unhealthy credit boom?

In response to non bond flows:

- Appreciation fine, lower R_N fine: Do nothing
- Appreciation bad, lower R_N fine: FX intervention
- Appreciation fine, lower R_N bad: Policy rate increase
- Appreciation bad, lower R_N bad: Capital controls.

IV. Some Empirical evidence

$$X_{it} = \beta_1\ BF_{it} + \beta_2\ NBF_{it} + \beta_3\ X^*_{it} + \beta_4\ \Delta TOT_{it}\ + \beta_5 X_{it-1} + D_i\ + D_t + \epsilon_{it}$$

- X_{it}: GDP growth, or Change in credit, normalized by GDP
- Flows (normalized), Bonds BF_{it}, Non-bonds, NBF_{it} (decomposed between FDI, portfolio equity, and "other")
- Other controls: lagged dependent variable, partner growth, TOT. fixed country/time effects
- Instruments: Bond, non-bond Global flows, interacted with country fixed effects.
- Panel, 19 Emerging market countries, annual, 2000 onwards

Source: BOP (BPM6).

Effects of inflows on GDP, credit

	(1) GDP growth	(2) GDP growth	(3) Change in credit	(4) GDP growth	(5) Change in credit
Bond flows/GDP	-0.002	0.032	0.206	-0.028	0.341
	(0.124)	(0.108)	(0.279)	(0.098)	(0.295)
Non bond flows/GDP	0.312***				
	(0.072)				
FDI flows/GDP		0.242**	-0.718**	0.259***	-0.667***
		(0.103)	(0.291)	(0.089)	(0.248)
Equity flows/GDP		0.467***	1.103	0.376**	1.445
		(0.147)	(0.977)	(0.153)	(0.928)
Other flows/GDP		0.315***	0.642***	0.278***	0.921***
		(0.093)	(0.224)	(0.077)	(0.217)

Time and country fixed effects.
Columns 1 to 5 control for lagged dep variable, partner growth, terms of trade.
Columns 4 and 5 also control for (instrumented) FX intervention and policy rate.

Conclusions

- Essential to distinguish between types of capital flows (beyond FDI) [other relevant dimensions, not in the model. Variability in particular]
- Appreciation versus spreads.
  "Bonds": contractionary.
  "Non-bonds": potentially expansionary
- Instruments (FX intervention, controls, policy rate) have different effects. Can be usefully combined.
- Different combinations for different flows.