Reach for Yield and Fickle Capital Flows

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Reach for yield has a bad connotation. It is often associated to investments perceived to be motivated not by the investor's deep conviction or knowledge of the receiving market but by the depressed returns in the investor's natural market. The main concern with investment flows supported by this motivation is that they tend to be fickle and exit at the first sight of trouble in local markets. Nowhere is this concern more prevalent than with the capital inflows experienced by Emerging Markets (EM) in response to very accommodative monetary policy in Developed Markets (DM).

In Caballero and Simsek (2017) we develop a model of fickle capital flows and show that as long as countries are sufficiently similar, gross capital flows create global liquidity despite their fickleness, but that local policymakers underestimate the value of this global liquidity. However we also show that when returns are sufficiently higher in an (infinitesimal) EM country than in DM, then fickle inflows can be excessively destabilizing. In this paper we follow on the latter lead and analyze the situation of a block of EM economies facing fickle foreign investors.

1 The EM Block

Consider a model with three periods, $t \in \{0, 1, 2\}$, with a single consumption good (all countries produce the same good). Each country is associated with a new investment technology—a risky asset that is supplied elastically in period 0. This asset always pays R units of the consumption good, but the timing of the payoff depends on the local state $\omega^j \in \{g, b\}$ that is realized in period 1. State $\omega^j = g$ represents the case without a liquidity shock in which

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the project pays off early in period 1. State $\omega^j = b$ represents the case with a liquidity shock in which the project payoff is delayed to period 2. In the latter case, the asset is traded in period 1 at a price p^j that will be endogenously determined. The liquidity shocks are i.i.d. across countries with $\Pr(\omega^j = b) = \pi$, where $\pi \in (0,1)$ denotes the probability of the shock.

In each country j, there are two types of agents, entrepreneurs and investors. There is a mass e of entrepreneurs. They are born in period 1, with preferences given by $E[\tilde{c}_2]$. Each entrepreneur is endowed with 1 unit of the (local) risky asset in period 1, and has access to an infinitely profitable project that delivers (nonpledgeable) payoffs in period 2. Thus, each entrepreneur sells all of her endowment in period 1 to invest in the project. These entrepreneurs are largely passive: their main role is to capture asset sales driven by liquidity needs.

The main agents are investors (with mass one), which are denoted by the superscript j of their locality. They are endowed with 1 unit of the consumption good in period 0. They have preferences given by $E[c_1 + c_2]$. In period 0, investors in each country j choose how much to invest in the local risky asset, $x^{loc,j}$, and how much to invest in foreign risky assets, $\left[x^{j',j}\right]_{j'}$ for $j' \neq j$. When they invest in foreign assets, these (foreign) investors are fickle as in Caballero and Simsek (2017): If the foreign country $j' \neq j$ is hit by a liquidity shock in period 1, then these investors sell all of their risky asset holdings in this country regardless of the price. In contrast, local investors in country j' are willing to increase their position in local risky assets.

We focus on a symmetric equilibrium in which all the risky assets trade at the same price in period 1 (conditional on a liquidity shock taking place), $p^j \equiv p$ for each j. In view of linear utility, the equilibrium price in period 1 cannot exceed the risky asset payoff in period 2, $p \leq R$. However, the price can fall below this level, $p < R$, which we refer to as *fire sales.* This situation is brought about by liquidity-driven sales by local entrepreneurs and fickleness-driven sales by foreigners, and a shortage of liquidity in the hands of local investors that could arbitrage these fire sales. We assume $e > 1$, which will ensure that there will be fire sales in equilibrium, $p < R$, in all the scenarios we will consider.

We also assume that all EMs invest the same amount in other EMs, $x^{j',j} = x$ for each j and $j' \neq j$ (this is without loss of generality). In a symmetric equilibrium with $p < R$ local investors' problem can then be written as,

$$\max_{\tilde{x}^{loc},x} \tilde{x}^{loc} R + x\overline{R}M, \tag{1}$$
$$\overline{R} = (1-\pi)\, R + \pi p$$
$$M = 1 - \pi + \frac{R}{p}\pi$$
$$1 = \tilde{x}^{loc} + x$$

If she invests in a local asset, she holds it until maturity, which leads to return R regardless of the local shock. If instead she invests in a foreign asset, she obtains consumption goods in period 1, either because there is no shock in the foreign market, or there is a shock and the investor sells in view of fickleness. The variable, $\overline{R}$, denotes the (certain) payoff in period 1 from investing abroad in a fully diversified manner. The final return from foreign investment also depends on whether there is a local shock, as the domestic shock generates a reinvestment opportunity to purchase local assets at fire-sale prices, $p < R$. The variable, M, denotes the investor's expected marginal utility from reinvestment, which combines a marginal utility of 1 in case there is no domestic shock and a marginal utility of R/p in case there is a shock. Note that the return from foreign investment, $\overline{R}$, is multiplied with the expected marginal utility from reinvestment, M, since the local and foreign shocks are uncorrelated.

It is straightforward to verify that $\overline{R}M > R$ whenever $p < R$ (which is the case we consider) and hence $\tilde{x}^{loc} = 0$ and $x = 1$. Thus, in period 0, investors prefer to invest in foreign risky assets as opposed to the local asset. In period 1, the market clearing condition for the risky asset in a country experiencing a liquidity shock can be written as,

$$p = \frac{\overline{R}x}{e+x} = \frac{\overline{R}}{e+1} < R \tag{2}$$

The numerator captures the total amount of cash in the market, which comes from the local investors' foreign asset positions that are determined by the past outflows. During a liquidity shock, these outflows are retrenched back into the country and used to arbitrage domestic fire sales. The denominator captures the (fire) sales from entrepreneurs and fickle foreign investors. Eq. (2) shows that fickleness is indeed destabilizing (p drops as x rises in the denominator). However, despite their fickleness, capital flows are on net stabilizing as p rises with x since the numerator (retrenchment) effect dominates the denominator (fickleness) effect as shown by Caballero and Simsek (2017).

Substituting $\overline{R} = (1-\pi)\,R + \pi p$ into Eq. (2) and solving for the equilibrium price, we obtain:

$$p^{EM} \equiv p = \frac{1-\pi}{e+1-\pi} R. \tag{3}$$

It is useful to contrast this with the autarky equilibrium in which investors are not allowed to invest in foreign risky assets. In this case, we would have $x^{loc} = 1, x = 0$ and the equilibrium price would be given by, $p^{autarky} = 0$. This is because local risky assets do not provide any liquidity to arbitrage fire sales during a domestic liquidity shock (as their price also falls to the fire-sale level). Hence, relative to autarky, equilibrium with capital flows features greater liquidity and higher fire-sale prices. This raises local investment by entrepreneurs in countries that experience liquidity shocks.

Finally, we find the EM block equilibrium payoff from investing abroad, which will serve as an important reference for the next section:

$$\overline{R}^{EM} \equiv (1-\pi)\,R + \pi p^{EM} = \frac{(e+1)\,(1-\pi)}{e+1-\pi} R. \tag{4}$$

2 Reach for Yield

Suppose now that we add a large DM block to the model. This block features a similar structure with two differences. First, the countries in this block do not experience a liquidity shock. Second, the payoff from the assets is lower and given by $R^f < R$. Specifically, investing one unit in DM countries' assets in period 0 delivers R^f units of the consumption good in period 1 with certainty.

Like EM investors, DM investors have preferences $E\left[c_1 + c_2\right]$. In period 0, they choose to invest locally (in DM assets) or in EM risky assets. As before, DM investors are fickle with respect to EM investments: that is, in period 1 they sell their risky asset holdings in countries that experience liquidity shocks. To simplify the analysis, we also assume that DM investors have infinite wealth.

In this setting, we need to consider the possibility of additional (fickle) inflows into EM economies from DM, as well as the possibility of outflows from EM to DM. We assume that DM investors invest an equal amount in each EM country denoted by $x^{D\to E} \geq 0$. We also assume that each EM country invests an equal amount into DM assets denoted by $x^{E\to D}$. As before, we use $x \geq 0$ to denote the symmetric inflows and outflows within the EM block. We also use $x^{in} = x + x^{D\to E}$ and $x^{out} = x + x^{E\to D}$ to denote, respectively, the total amount of inflows into and outflows from an EM country.

EM investors solve a version of problem (1) with the difference that they can also invest in DM assets. At an optimum, they invest their one unit of endowment in the assets that yield the highest one-period payoff. Likewise, DM investors optimally invest their wealth in the assets with the highest return. Combining the two optimality conditions, we obtain,

$$\begin{cases} x = 0, x^{E\to D} = 1 \text{ and } & x^{D\to E} = 0 & \text{if } R^f > \overline{R} \\ x, x^{E\to D} \in [0,1] \text{ and } & x^{D\to E} \in [0,\infty) & \text{if } R^f = \overline{R} \\ x = 1, x^{E\to D} = 0 \text{ and } & x^{D\to E} = \infty & \text{if } R^f < \overline{R} \end{cases} . \tag{5}$$

We also have the following market clearing condition for an EM country that experiences a liquidity shock,

$$p = \frac{\overline{R}x + R^f x^{E\to D}}{e + x + x^{D\to E}} = \frac{\max\left(\overline{R}, R^f\right)}{e + x^{in}}. \tag{6}$$

The second equality substitutes the definition of inflows, $x^{in} = x + x^{D\to E}$. It also uses the observation that outflows are equal to one, $x^{out} = x + x^{E\to D} = 1$, and they are invested in the asset with the highest return. The equilibrium flows and prices are characterized by jointly solving equations $(5-6)$. Depending on the return on DM assets, R^f, one of four different types of equilibria can obtain.

Region I. First consider a scenario where the return in DM is relatively high, with

$$R^f > \frac{1-\pi}{1-\pi/e} R \tag{7}$$

In this region, we conjecture an equilibrium in which there is no investment in the EM, $x = 0, x^{E\to D} = 1$ and $x^{D\to E} = 0$ (which also implies $x^{in} = 0$). Given this conjecture, Eq. (6) implies the price level, $p^I = R^f/e$. Given this price level, the expected return on EM assets satisfies $\overline{R}^I \equiv (1-\pi) R + \pi p^I < R^f$ in view of condition (7). Combining this with the optimality conditions (5) verifies that the conjectured allocation is an equilibrium.

In this region, EM to EM flows stop and all the liquidity hoarding by EM investors is done in DM assets. This reduces period 0 investment in EM (as highlighted by Caballero and Krishnamurthy 2006) but significantly reduces the severity of fire sales. Specifically, we have:

$$\begin{aligned} p^I &= \frac{R^f}{e} \\ &> \frac{1-\pi}{e-\pi} R \\ &> \frac{1-\pi}{e+(1-\pi)} R = p^{EM}, \end{aligned}$$

where the second line follows from Eq. (7) and the last line uses Eq. (3).

Naturally, in this region fire-sale prices drop as R^f falls, however the reason is not fickleness but a decline in the return on the local arbitrageurs' savings abroad.

Region II. Next suppose R^f continues to fall and enters the region [cf. Eq. (4)]:

$$\overline{R}^{EM} \leq R^f < \frac{1-\pi}{1-\pi/e} R. \tag{8}$$

In this region, we conjecture an equilibrium where there is some investment into the EM, $x^{in} > 0$, and the returns from investing in a diversified EM portfolio are equated to R^f,

$$\overline{R}^{II} = (1-\pi) R + \pi p^{II} = R^f. \tag{9}$$

Note that this equation implicitly defines p^{II}. From the market clearing condition (6), we also have

$$p^{II} = \frac{R^f}{e + x^{in}}. \tag{10}$$

Combining the last two equations with condition (8), we solve for the inflows as,

$$x^{in} = \pi \frac{R^f}{R^f - (1-\pi) R} - e. \tag{11}$$

Using condition (8), we verify that $x^{in} > 0$. Combining this with the optimality conditions (5) verifies that the conjectured allocation is an equilibrium. In this equilibrium, $x, x^{D \to E}, x^{E \to D}$ are not uniquely determined (although the total inflows and outflows, x^{in}, x^{out}, are determined) since investors are indifferent between EM and DM assets.

In this region, fickleness reemerges as captured by x^{in} in the denominator of the fire sale price in (10). Moreover, fire sales worsen at a faster pace as R^f declines, since in addition to the direct effect of the decline in the return on local arbitrageurs' savings, as captured by Eq. (10), there is an increase in fickle capital inflows into the country. Specifically, Eq. (11)

implies that $dx^{in}/dR^f < 0$. The flip side of the increasingly severe fire sales is the rise in date 0 investment (which raises one to one with x^{in}).

Nonetheless, in this region, the fire-sale prices are still higher than in the isolated EM environment of the previous section. Specifically, combining the lower bound on R^f in (8) with Eq. (9), we have $p^{II} \geq p^{EM}$.

Region III. This benign conclusion changes once R^f continues to drop and enters the region,

$$(1-\pi)\,R \leq R^f < \overline{R}^{EM}.$$

Here, the equilibrium is the same as in the previous case with the difference that the resulting fire-sale price satisfies, $p^{III} < p^E$. Intuitively, inflows from DM are large enough that they begin to drag the price below that of the EM block in isolation. In fact, Eqs. (11) and (9) now imply that $x^{in} > 1$ and $\overline{R}^{III} = R^f < \overline{R}^{EM}$. Hence, the presence of DM flows increase the fickle inflows into the EM (which used to be one), which in turn exacerbates the fire sales in EMs, and reduces the expected return the EMs could obtain in isolation.

Region IV. Finally, suppose R^f falls further so that,

$$R^f < (1-\pi)\,R.$$

In this region, we have $\overline{R}^{IV} > R^f$ for any $p^{IV} \geq 0$. Optimality conditions (5) then imply that all investors prefer to invest in the EM, that is, $x = 1, x^{E\to D} = 0$, and $x^{D\to E} = \infty$ (which also implies $x^{in} = \infty$). Combining this with Eq. (6), we further obtain $p^{IV} = 0$.

In this case, the inflows from DM into EM are so massive that the price is the same as the autarky price. Put differently, the reach for yield completely neutralizes the liquidity-insurance benefits of EM to EM flows. Figure 1 portrays all of these regions.

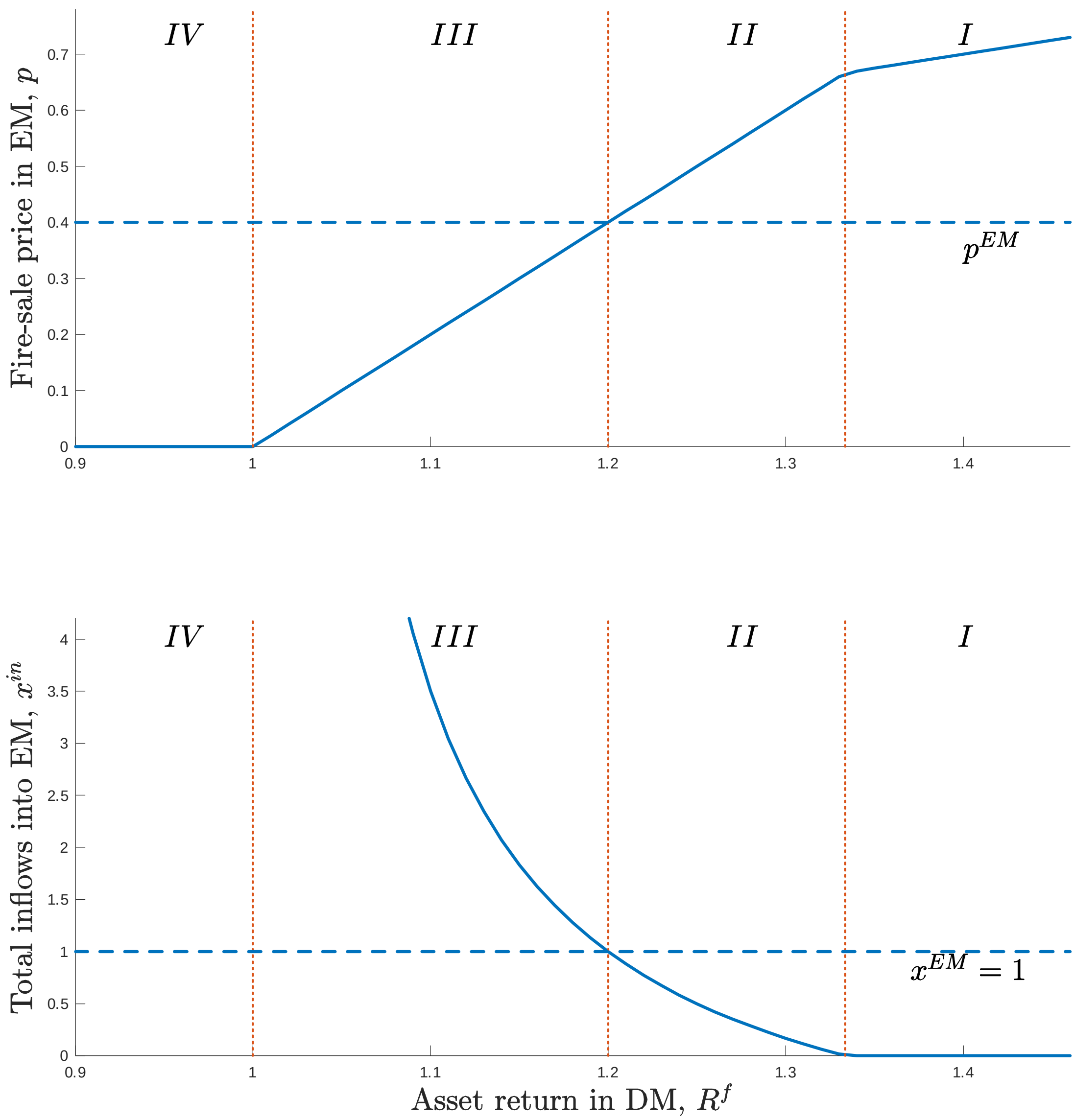

Figure 1: The solid lines plot the equilibrium fire-sale price and inflows in the EM, (p, x^{in}), as a function of the return in the DM, R^f. The dashed lines illustrate the price and inflows that would obtain in the EM block isolation (without any DM-EM flows).

3 Taxing Capital Inflows

Since it is hard for the authorities to determine ex-ante whether capital inflows will be steady or fickle, in practice barriers to capital flows often take the form of a tax on capital outflows if these happen too soon or suddenly. We capture the core element of this policy by imposing a tax τ on outflows during a liquidity shock. We assume the revenues from taxes are spent on unmodeled government projects (in particular, they do not contribute to liquidity in the risky asset markets). The tension is that while taxation discourages destabilizing reach-for-yield flows, in symmetric equilibrium it also discourages liquidity-creation flows.

In this context the expected return from investing in a foreign EM country for a fickle investor is:

$$\overline{R}^{\tau} = (1 - \pi) R + \pi p (1 - \tau). \tag{12}$$

First consider the case where all flows are for liquidity purposes (i.e., no DM) and taxes are low enough that EM investors still prefer to invest in foreign assets. Then, following similar steps as in Section 1, the fire-sale price can be calculated as:

$$p^{EM,\tau} = \frac{1 - \pi}{e + 1 - \pi(1 - \tau)} R < p^{EM}.$$

Hence, absent any interaction with the DM, taxing capital inflows is counterproductive for the EM block as a whole. On the other hand, as we show in Caballero and Simsek (2017), a single EM country with the objective of raising its fire-sale prices might still find it useful to tax capital inflows. The reason for this discrepancy is that inflows into a country are part of global liquidity that provides financial stability benefits in other countries. A local policymaker fully internalizes the negative fickleness effect of inflows but does not internalize the positive effects on global liquidity.

Next consider the case with DM so that there is also reach for yield. Consider regions II or III in which the returns in EM and DM are equated. With positive but sufficiently small taxes τ, the equilibrium features the indifference condition [cf. Eq. (9)]:

$$\overline{R}^{II,\tau} = (1-\pi)\,R + \pi(1-\tau)p^{II,\tau} = R^f.$$

This in turn implies [cf. Eqs. (10) and (11)],

$$\begin{aligned} p^{II,\tau} &= \frac{R^f - (1-\pi)\,R}{\pi(1-\tau)} > p^{II}, \\ x^{in,\tau} &= \pi(1-\tau)\frac{R^f}{R^f-(1-\pi)\,R} - e < x^{in}. \end{aligned}$$

Hence, unlike the EM-only case, taxes are potentially beneficial for the EM block as a whole as they discourage fickle inflows that are in part driven by reach for yield, $x^{in,\tau} < x^{in}$. This reduces asset sales during a liquidity shock without having a large negative impact on the liquidity available to local arbitrageurs. In our model with DM, the latter (liquidity) effect is in fact zero due to the extreme feature that there is an infinitely elastic supply of liquid assets at return R^f. Consequently, taxing capital flows increases the fire-sale prices, $p^{II,\tau} > p^{II}$. This suggests that taxing capital flows can be effective in equilibrium when the reach for yield is strong, and the global liquidity supply is relatively elastic so that the loss of liquidity from capital taxation is relatively small.

4 References

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