Macroprudential policy regulation: some continuing challenges[1]

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Introduction

The unprecedented monetary policy stances in advanced economies (AEs) have had considerable implications on the global economy and, in particular, on most emerging market economies (EMEs). One such implication has been the significant bond flows that have entered and exited EMEs.

A byproduct of the global financial crisis has been the financial stability policy discussion on the degree of leverage in financial institutions. In effect, financial leverage has been underscored as a fundamental factor leading to the global financial crisis. Accordingly, many financial sector reforms have been designed with the goal, *inter alia*, of providing better incentives for financial institutions to attain levels of leverage that are closer to a social optimal.

Nonetheless, it has been argued that, given the bond flows' magnitude involved, and the incentives faced by many asset management companies, a low degree of leverage in the financial institutions concerned will not necessarily ensure a smooth financial ride through the US policy rate tightening.

In this context, based on Feroli et al (2014), we seek evidence on the existence of run-like dynamics in bond flows in a set of EMEs. We also explore some of the implications changes in US monetary policy could have on the bond flows. Such dynamics can be explained by the presence of delegated investment between capital owners and fund investors, and a concern for relative performance between investors. Evidently, other mechanisms could be contributing to this type of dynamics, but we do not explore them here.

Of course, AEs' monetary authorities are pursuing their legal mandates. Yet, given the monetary policy stances' unprecedented characteristics, their implications are not necessarily fully understood. Thus, we are interested in understanding some of their economic repercussions for EMEs. More generally, our concern is about the run-like dynamics that could potentially take place in the near future. We hypothesis that hitherto we have only seen a handful of episodes of run-like dynamics, and the possibility that we observe more is latent.

[1] This note contains the main ideas and results of our working paper "Is trouble brewing for EMEs?" on which the presentation "Macroprudential policy regulation: some continuing challenges" was based. The referred presentation was delivered at the conference, "Macroprudential Policy: Effectiveness and Implementation Challenges" jointly organised by the CBRT, the BIS and the IMF on 26–27 October 2015 in Istanbul, Turkey. The opinions in this note and the associated presentation are those of the authors, and do not necessarily reflect those of Banco de México.

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Preliminary analysis

To set the stage, we summarise some of the characteristics EMEs' bond flows and their associated indices have presented in recent periods (January 2009–August 2014). From the cumulative bond flows to EMEs in our database, we document first that they maintain noticeable correlations. Second, it seems that the longer inflows have been accruing in an economy, the greater the outflow tends to be, once such an episode takes place. In effect, the pace of inflows is more likely to be slower than that of outflows. Third, some changes in the flows' direction are associated with key announcements of US monetary policy.

In particular, we find the following regarding correlations. First, aggregated bond flows associated with EMEs and the JPMorgan EMBI Global spread tend to co-move negatively, ie bond flows and their prices co-move positively. Second, the correlation of the EMBI Global spread with changes in bond flows seems to have increased after 3Q 2011; that is, variations in the EMBI spread have led to greater changes in bond flows after 3Q 2011. Third, the bond flows' variance has increased since around 3Q 2011.

Overall, high correlations among bond flows, their negative co-movement with the EMBI Global spread, and sharp bond outflows are, jointly, evidence suggesting the presence of run-like dynamics in this type of flows. This stands in contrast with the classic case in which an increase in the risk premium (ie a lower price) eventually prompts an upsurge in capital inflows, as some investors jump in to seize the opportunity.

Main features of the model

We use the model posited in Feroli et al (2014) as a framework to analyse our data, and to organise part of our discussion. Next, we explain some of its most salient features. It has two types of investors:

1. *Passive investors* are risk-averse. Each one chooses between holding one unit of the risky asset and having her resources in a money market account, which offers a floating rate. This rate is associated with the monetary policy rate. Everything else being constant, the floating rate is the safest return.
2. *Active investors* are risk-neutral. Similarly, each one selects between holding a risky asset and having her capital in the money market account. However, they are *delegated* investors. Thus, although they care about long-term fundamentals, they are also concerned about their *relative performance* vis-à-vis their peers. One can rationalise such a concern in several ways.

Each of the active investors keeps an eye on their peers' performance. In practice, investors measure their performance against a benchmark index. Thus, active investors play a game in which the effort one exerts will affect the effort of others.[4]

[4] As pointed out by Feroli et al (2014), the delegated relationship is typically a sizeable chain of relationships. Thus, although one can think of a principal and an agent, in practice it would probably

Next, we describe the model´s intuition. We omit many of the details to keep technicalities to a minimum, and refer the interested reader Feroli et al (2014) for further details.

Active investors care about the risky asset's fundamental value. Yet, they have a relative ranking concern in the short run, materialised by a penalty taken by the active investor that ranks last. Each one decides where to invest her capital depending on the expected return of the risky asset, the money market account return, and the penalty for being last. Importantly, the risky asset market's size is small so that changes in the active investors' positions affect prices.[5]

Accordingly, their portfolio allocation decisions can lead to unexpected changes in active investors' positions, exacerbated by the relative ranking concern. As a few active investors change their portfolio's allocation towards the money market account, those active investors who have not done so, based on their short-run ranking concern, sell their positions in the risky assets, possibly bringing about a run-like episode.

In our estimations, active investors' positions in the risky assets are captured by the bond flows. The risky asset's price is captured by the EMBI spreads. In the model, prices and spreads have a negative correlation. In addition, we use the Wu and Xia (2016) rate to measure the US monetary policy stance, which captures monetary accommodation beyond the zero lower bound.

Overall, the main predictions of the model on the relationship between bond flows, risk premiums and the monetary policy rate are as follows.

- Because of the interaction of the two types of investor, and the relative performance concern, there is a positive feedback between bond flows and prices (ie a negative feedback between bond flows and risk premiums).
- Sharp bond outflows are more likely than smooth ones since the relative performance concern is heightened in such cases, increasing the risk premium (ie reducing bond prices).
- A rise in the policy rate of the core country is likely to set off bond outflow episodes. In short, a rise in the policy rate leads to active investors' demand for risky assets to fall. (As its price falls, its risk premium increases).[6]

After briefly describing the data, we empirically explore these predictions.

Data

Our database has the respective time series for Brazil, Chile, China, Colombia, Hungary, Indonesia, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South

involve several principal agent relationships in a series, positioning the initial principal from the last agent farther apart. In this context, relative ranking could be interpreted as an effective monitoring device.

[5] This is particularly relevant given the size of capital outflows and inflows that some EMEs have faced, in particular, compared to the size of their financial (especially bond) markets.

[6] The risk-taking channel of monetary policy operates in the context of a global monetary policy game.

Africa and Turkey. We use the JPMorgan EMBI spreads as proxies to the risk premiums in the model. The EMBI spread measures the risk premium of EMEs bonds denominated in US dollars, which satisfy minimum liquidity requirements.[7]

We use EPFR bond flows data to measure changes in the active investors' position in the risky asset in the model. EPFR Global tracks both traditional and alternative funds domiciled globally. One could have some concerns about the characteristics of the EPFR bond flows database. We contend that none of these should be a significant concern for our aims.

In addition, bond flows might have some measuring issues. As pointed out in Feroli et al (2014), funds can merge, be liquidated, or be created. To mitigate this issue, in most estimations, we have taken a weighted average of the bond flows of the past four weeks.

It is also important to consider the asset gathering capabilities of investment management companies. They have comparative advantages in information gathering and analysis. Operationally, these companies tend to use similar risk management tools. Moreover, a few investment institutions take the lions' share of the assets under management. We believe that these elements increase the likelihood of observing co-movements in bond portfolio allocations.

Bond flows and risk premiums

We estimate a bivariate VAR having as variables the EPFR bond flows and the EMBI spreads, using a weekly frequency over the period of the week including 1 July 2009 to the week including 9 March 2014. Using a higher frequency is more favourable to a causality hypothesis.[8,9]

First, we present evidence on a possible negative feedback between bond flows and risk premiums. Consider the cumulative responses of bond flows to shocks to the EMBI spreads (Figure 1). Only three out of 14 economies in our sample do not present a statistically significant response: China, Hungary and Malaysia.[10]

Individual responses vary across EMEs. For instance, in terms of its duration, Brazil, Colombia, Indonesia, Mexico and South Africa all have statistically significant cumulative responses for 20+ weeks. For the 11 EMEs that have statistically significant responses, their signs are in line with what is predicted by the model: a positive shock to the risk premium (ie the EMBI spread) reverses the bond flows. A rise in the risk premium is indicative of active investors leaving their position in the risky asset. An

[7] The index's denomination is appropriate, since investors do the comparison against the US policy rate.

[8] Using time series with a lower frequency would probably entail other effects.

[9] The identification procedure for the impulse-response functions is based on the Cholesky decomposition of the VAR's variance-covariance matrix. In addition, a lag of two periods is used in the VAR, broadly in line with the tests used to determine an optimal lag (FPE, AIC, HQIC, and SBIC), and emphasising comparison among the EMEs. We always estimate the optimal lag based on the full samples.

[10] The Philippines and Russia present marginally significant responses.

unexpected significant increment in the EMBI spread will likely make active investors join a potential run-like episode, captured by the bond outflows' rise.

Cumulative impulse-response functions Figure 1

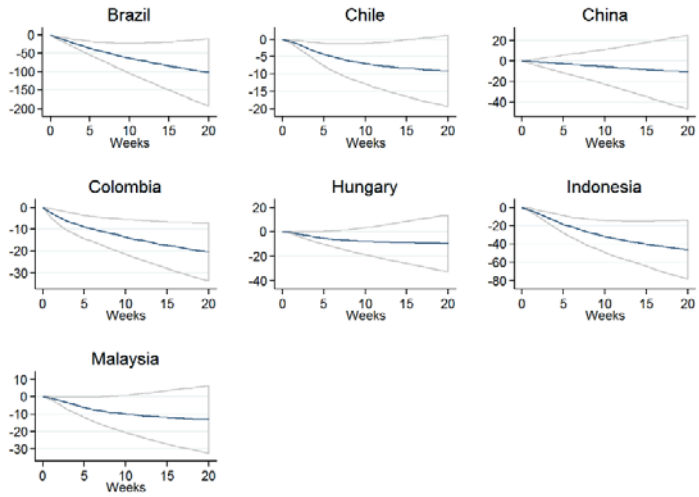

Exhibit A: EMBI spreads → bond flows

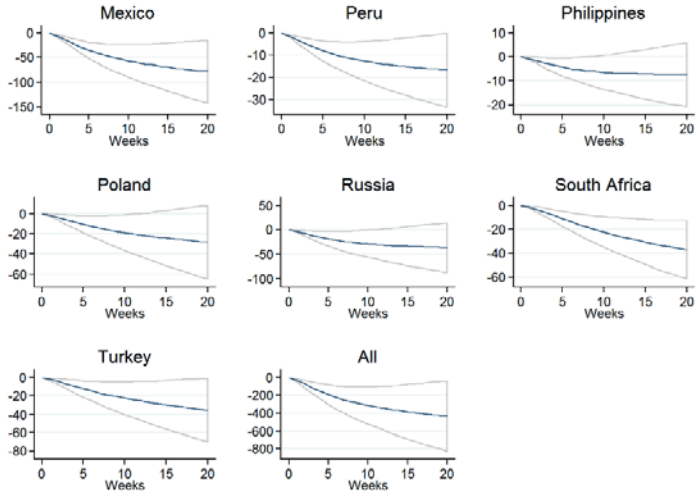

Exhibit B: EMBI spreads → bond flows

Notes: Cumulative impulse-response functions (CIRFs) are based on the bivariate VARs. The aggregated time series are obtained by adding the bond flows, and by taking the average of the EMBI spreads of all the EMEs in our database. The confidence level is 90%. The sample period for estimation is from the week including 1 July 2009 to the week including 9 March 2014.

Consider the cumulative responses of the EMBI spreads to bond flows' shocks (Figure 2). Only two economies do not present significant responses. In terms of size, Indonesia and Turkey have notable responses. Moreover, Hungary, Indonesia, Peru, Poland, Russia, South Africa and Turkey have responses that last for 20+ weeks.

Cumulative Impulse Response Functions Figure 2

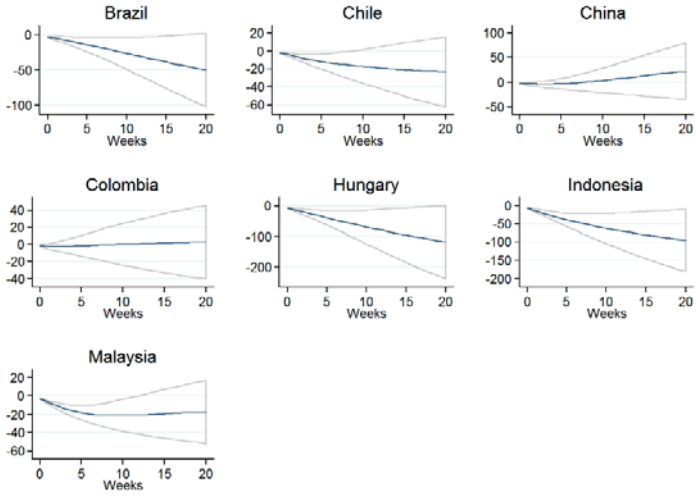

Exhibit A: Bond flows → EMBI spreads

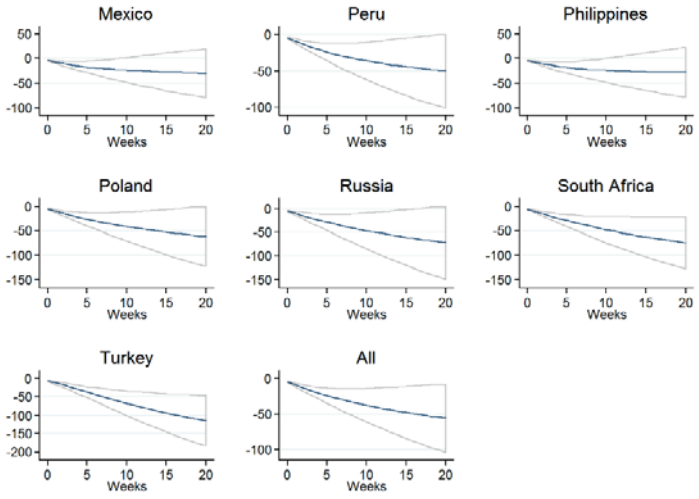

Exhibit B: Bond flows → EMBI spreads

Notes: Cumulative impulse-response functions (CIRFs) are based on the bivariate VARs. The aggregated time series are obtained by adding the bond flows and taking the average of the EMBI spreads of all EMEs in our database. The confidence level is 90%. The sample period for estimation is from the week including 1 July 2009 to the week including 9 March 2014.

In all 12 cases in which the responses are statistically significant, as predicted by the model, a positive shock to bond flows is associated with a reduction in the risk premium.[11] In effect, as more active investors take their position in the risky asset (ie inflows increase), they do so with the expectation that the risk premium will be greater than the floating rate. So, as the number of active investors with a position in the risky asset increases, the risk premium decreases (ie the price increases). Conversely, as more active investors leave their position in the risky asset, the risk premium increases (ie the price decreases), and the concern for relative ranking

[11] This result holds for the aggregated time series as well.

heightens. As it does, those active investors who still have a position in the risky asset have a greater incentive to leave it. Thus, given Given the agency friction at the heart of the model, one should then observe evidence of run-like dynamics. Overall, we find evidence favourable to the first and second predictions of the model in most of these EMEs.[12]

Bond flows, risk premiums and US monetary policy

Here we explore the third implication of the model. First, we estimate a tri-variate VAR.[13] The variables included in this model are the first principal component (PC) of the EPFR bond flows, the first PC of EMBI spreads and the Wu-Xia rate. The sample period is from January 2009 to August 2014, and the data are with a monthly frequency.

We obtain from all bond flows and, separately, from all EMBI spreads, their first principal component.[14] Based on the results above, we have excluded China from our data set for this exercise, as it lacks significant responses in its associated CIRFs.[15]

The main predictions are the following. First, a positive shock to the policy rate is associated with an increase in bond outflows. As the active investors' threshold is surpassed, they seek to invest in the safe asset, ie the money market account. Second, in tandem a positive shock to the bond flows is associated with a decrease in the risk premium, as more active investors gain a position in the risky asset.

We find that both predictions hold: in effect, the PC of bond flows' response to a Wu-Xia rate's shock and the PC of EMBI spreads' response to a PC of bond flows' shock are both statistically significant. Interestingly, if we estimate the same VAR model but for the subperiod of January 2013 to August 2014, the PC of bond flows' response to a shock in the Wu-Xia rate increases.

In sum, we conclude that there is evidence that as a group, EMEs are vulnerable to changes in the US monetary policy rate through channels akin to the one we are exploring, and that there is evidence of the existence of mechanisms in which financial stability might be jeopardised.

A natural set of exercises that serves as a control is to estimate these same models but with the equivalent data from AEs. In contrast with the EMEs' results, we find little evidence favouring the presence of run-like dynamics in AEs. While there is

[12] In a VAR, by assumption, the response' magnitude to a shock is symmetrical regardless of its direction. Yet, the model predicts that outflows would tend to move at a swifter speed, as the run-like mechanism can be set off. In short, and as we have documented in the initial analysis, bond outflows tend to be acute. Thus, as an extension to the model, we introduce a regime-switching model into the variance-covariance matrix of a bivariate VAR model with aggregated time series. For the most part, these are broadly in line with the model, in particular the second implication.

[13] To make the bivariate VAR using the EPFR data with a weekly frequency and the tri-variate VAR comparable, we transform the EPFR data with a weekly frequency to a monthly frequency and estimate the tri-variate VAR.

[14] The first principal component summarises in one variable the most information possible from the original time series set.

[15] The shock identification is based on the Cholesky decomposition. We assume that the Wu-Xia rate is the slowest moving variable, followed by the bond flows, and the EMBI spread being the fastest. In effect, the quantities are faster than the rate, but slower than the prices.

some heterogeneity among the AEs we consider, such results can be explained by the depth of their financial markets, macroeconomic policies and generally higher economic development. The referred estimations as well as an extensive battery of complementary exercises are included in Ramos-Francia and García-Verdú (2015).

Policy implications and concluding remarks

The degree of leverage in financial institutions is a characteristic that has brought attention regarding its implications for financial stability. Yet, other mechanisms, unrelated to the degree of leverage, could play a significant role for financial stability. The type of mechanisms we have explored could be associated with the ability EMEs have to deal with the tightening of the US policy rate.

As the data we have analysed strongly suggest, the possible effects of run-like behaviour in the bond market are latent. However, some EMEs should be more concerned than others in terms of its implications.

The externality is two-fold; it affects AEs and EMEs alike. In the short term, there might be little policy-makers could do about this. This is so because the current economic policy tools cannot necessarily effectively target much of the run-like dynamics. As a result of the global financial reform efforts in the last few years, this type of mechanism would be particularly relevant to the extent to which they are generated by non-banking institutions.

Yet, Stein (2014) has emphasised that this depends on the level on which the run behaviour might take place: at the ultimate investors' or at the fund managers' level. If it is at the ultimate investors' level, financial authorities might be able to impose a fee on those investors that decide to withdraw their funds in order to internalise the externality they would impose on those left behind.

If, however, it is at the fund managers' level, it is not obvious what financial authorities could do. Evidently, in practice the previous measure could be difficult to implement and could lead to an increase in policy uncertainty.

In sum, we have explored an economic phenomenon that underscores that there are continuing challenges for macroprudential policy regulation, and some of its possible responses could probably entail to an important extent some level of international cooperation.[16]

[16] In a general context, the FSB (2016) has recently published a consultative document in which it puts forwards policy recommendations to address structural vulnerabilities from asset management activities. It, for example, highlights the importance of recognizing structural issues of asset managers such as the fact that they usually act as *agents*, as we have assumed active investors do in this paper. On a related note, it mentions that the criteria to classify an asset management company as a global systemically important financial institution (G-SIFI) have been under discussion. If an asset management company were determined to be a G-SIFI, it would be subject to significantly different regulations and oversight.

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