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Discussion

Discussion of "Macroeconomic volatility and external imbalances" by Alessandra Fogli and Fabrizio Perri

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1. Overview

This paper by Fogli and Perri investigates both theoretically and empirically the effects of volatility on net foreign asset accumulation. There are two key contributions. On the empirical side, the paper shows that countries that experienced higher volatility relative to other OECD countries accumulated on average more net foreign assets. On the theoretical side, the paper shows that a two country incomplete market model with time-varying volatility can account for this empirical relationship.

The authors are addressing an important topic related to earlier discussions on global imbalances, which have become even more relevant in the context of the global financial crisis. In this comment, I review some of the main empirical and theoretical findings and provide some further thoughts about the broader implications of this paper for international macro.

2. Empirical Findings

The paper tests empirically the association between volatility and the net foreign asset position by running the following regression:

$$NFA_{it} = \delta VOL_{it} + \gamma \mathbf{X}_{it} + \alpha_t + \phi_i + \epsilon_{it} \tag{1}$$

where NFA_{it} denotes the net foreign asset position (NFA) for country i in year t, VOL_{it} denotes a measure of relative volatility of country i in year t, $\mathbf{X}_{it}$ is a vector of controls, α_t and ϕ_i are respectively time and country fixed effects. The main result is that $\hat{\delta} > 0$ and that volatility has large economic significance. The authors use various controls that could be potentially be driving both volatility and NFA, and the estimated coefficients remain similar.

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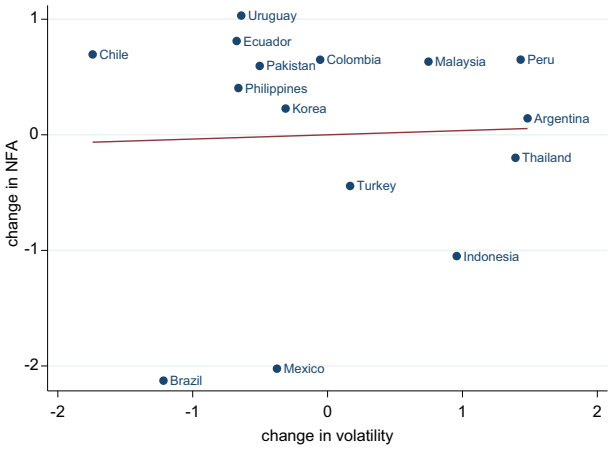

Fig. 1. Correlation between volatility and NFA in emerging markets.

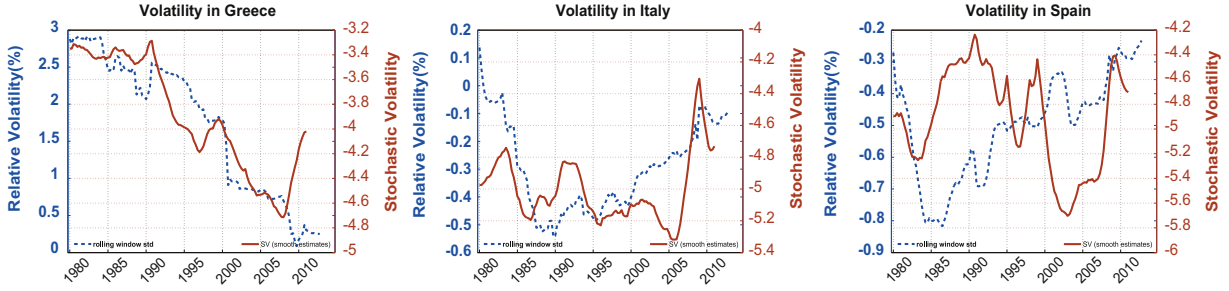

Fig. 2. Measure of volatility: rolling window standard deviation of GDP vs. stochastic volatility.

The paper focuses on OECD countries. A natural question that emerges is: How well does the documented empirical relationship stand for emerging markets? It turns out that this empirical relationship is fairly weak in emerging markets as Fig. 1 shows.[1] While the relationship still appears positive in the figure, this seems to be driven by outliers. For example, removing Brazil out of the sample would switch the sign of the correlation from 0.03 to -0.23.

Why could the relationship between volatility and NFA may have the opposite sign in the data? One possibility could be a problem of reverse causality: Those countries that accumulate more NFA become less vulnerable to adverse shocks—for example because governments are less inclined to default or to expropriate—and this leads to a moderation of economic activity that brings lower volatility.[2] This problem could be particularly strong in emerging markets reverting the sign of the correlation documented in the paper for OECD countries.

In terms of volatility measures, the measure used by the authors is the 10 years rolling windows standard deviation of GDP. While the results could potentially be sensitive to the particular measure of volatility, it turns out that using stochastic volatility as in Kim et al. (1998) would deliver very similar results. As Fig. 2 shows the measure of volatility used by the authors tracks the stochastic volatility measure relatively well.[3]

3. Theoretical findings

Let me review the mechanism in the paper to address some of the key ingredients. I will start with a simplified version of the model and add alternative/additional frictions. Consider a two country endowment economy model where agents trade a single non-state contingent asset. The problem of a representative in the Home Country consists of maximizing

$$\mathbb{E}_t \sum_{t=0}^{\infty} \beta^t \frac{c_t^{1-\gamma}}{1-\gamma},$$

[1] The change in the NFA corresponds to the difference between the average of the NFA between 1986 and 2005 and the average NFA between 1970 and 1985. The change in volatility is constructed analogously for the standard deviation of GDP over the same periods.

[2] See Aguiar and Amador (2011) for a neoclassical model with expropriation risk.

[3] Thanks to Hernan Seoane for sharing the data and Javier Garcia Cicco for sharing his code to compute the SV model.

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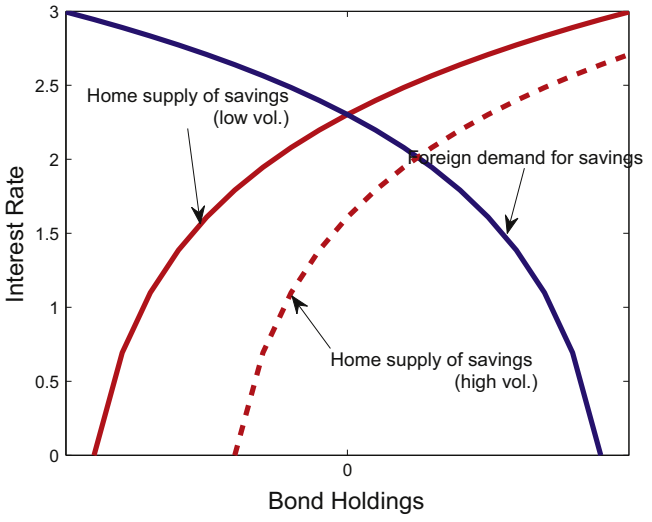

Fig. 3. Equilibrium in global asset markets.

subject to

$$b_{t+1}+c_t = b_t(1+r)+y_t,$$

and a No-Ponzi game condition. The endowment process follows:

$$\log(y_t) = \rho \log(y_{t-1}) + \exp\{\sigma_t\}\epsilon_t,$$

and

$$\sigma_t = (1-\rho_\sigma)\overline{\sigma}+\rho_\sigma\sigma_{t-1}+\eta\epsilon_{\sigma_t},$$

and the innovations follow Normal distributions.

In this standard Bewley–Aiyagari type economy, as illustrated in Fig. 3, we have that an increase in σ_t shifts the supply of savings to the right: For every interest rate, agents in the home country supply more savings, which in equilibrium leads to an increase in the NFA in the home country and a decline in the world interest rate.

The case with production, as modelled in the paper, is more subtle. The precautionary effect mentioned above is of course still there, but at the same time higher volatility means that due to the convexity of profits, volatility is good news for wealth. In turn, because agents anticipate higher output and higher expected marginal product of capital in the future, agents would actually borrow more leading to a decline in the NFA. Interestingly, the paper finds that the precautionary motive still dominates and the NFA always increase in response to a positive volatility shock.[4]

So far I have abstracted, as in the paper, from financial frictions other than the lack of state contingent debt. Here I would argue that the effects of uncertainty may depend on the exact form of the financial frictions. First, consider an economy where default is punished with autarchy and assume that debt contracts rule out equilibrium default. In this case, agents would be able to borrow subject to $b_{t+1} \geq -\overline{B_\sigma}$ where $\overline{B_\sigma} = \min_b\{b: V(b,y) \geq V^d(y)\ \forall y\}$. Consider again an increase σ. There is now an opposing force that leads agents to decrease the NFA. As volatility increases, autarchy becomes more costly, reducing incentives to default and loosening the borrowing constraint. As a result, this effect might actually imply that as volatility increases, agents borrow more and the NFA decreases.[5]

Second, consider an economy where default is punished with the seizure of assets, rather than autarchy, as in standard collateral constraint economies. In particular, consider an endogenous borrowing constraint where agents pledge assets k_t at market price q_t as collateral $b_{t+1} \geq -\kappa q_t k_{t+1}$. In this case, an increase in volatility reduces the demand for risky assets, leading to a reduction in asset prices and a tightening of the collateral constraint. Hence, these effects reinforce the precautionary motive leading to stronger effects on NFA.

3.1. Broader implications and future research avenues

"External imbalances" are often cited as an important explanation behind the global financial crises.[6] Hence, this paper provides a rationale for the view that the Great Moderation could have sowed the seeds of the financial crisis. However, it is

[4] Notice that there are no fixed costs of investment, although there are convex adjustment costs that strengthen the precautionary motive. Segal et al. (2013) is a recent paper that seeks to identify "good" and "bad" uncertainty according to the effects on output.

[5] Broer (2010) provides a detailed study of this mechanism. Seoane (2013) studies the effects of time-varying volatility in a model with equilibrium default.

[6] In particular, the demand for safe assets by central banks in emerging markets has played center stage in total flows. See Bianchi et al. (2012) for a model of reserve accumulation to hedge against rollover risk.

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worth noting that in this paper interfering with capital flows would be welfare detrimental, as the economy is constrained efficient. Given the powerful effects of volatility for capital flows shown in this paper, a relevant direction for future research would be to study how changes in volatility might affect the need and the design of interventions in credit markets when the economy is constrained-inefficient (e.g. Bianchi, 2011, 2012). In addition, it would be interesting to consider a model with richer trade in financial assets to study whether volatility shocks contribute to explain the cyclical pattern of gross capital inflows and outflows, as documented by Broner et al. (2013).[7]

Finally, it would be interesting to consider models that are able to generate time-varying volatility endogenously as a result of homoscedastic shocks to establish whether direct shocks to volatility remain an important driving force of capital flows. For example, Bianchi and Mendoza (2013) show how fire sales can lead to time-varying systemic risk depending on the leverage position. If the economy is highly leveraged, it is more exposed to adverse shocks which leads to higher risk premium and volatility. Bocola (2013) estimates a non-linear model with a banking sector and decomposes the increase in the equity premium during the European debt crises. He finds that risk premium has played a significant role.

4. Conclusions

Fogli and Perri have provided a highly valuable contribution by showing that time-varying volatility plays a quantitatively important role in international capital flows. Capital flows serve a unique role by reallocating capital across countries and understanding the driving forces behind capital flows is of first order importance. Going forward, their work also points to several promising research avenues.

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[7] This is however significantly challenging from a computational point of view. The current approach uses a third order local approximation around the deterministic steady state. Without risk, the deterministic portfolio solution would not be well defined. While it is feasible to approximate around some specified portfolio solution, the accuracy of these methods in the presence of volatility shocks, especially permanent volatility shocks, remains an open question. In particular, the key challenge is that the economy may spend a significant amount of time far away from that portfolio solution. See Tsyrennikov et al. (2013) and De Groot et al. (2012) for recent work evaluating the accuracy of this approach.

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