Journal of Monetary Economics 69 (2015) 1–15

Contents lists available at ScienceDirect

Journal of Monetary Economics

journal homepage: www.elsevier.com/locate/jme

Macroeconomic volatility and external imbalances

Alessandra Fogli [a,b], Fabrizio Perri [a,b,c,*]

[a] Federal Reserve Bank of Minneapolis, United States
[b] CEPR, United States
[c] NBER, United States

ARTICLE INFO

Article history:
Received 2 August 2014
Received in revised form
9 December 2014
Accepted 9 December 2014
Available online 17 December 2014

Keywords:
Business cycles
Current account
Global imbalances
Precautionary saving
Uncertainty

ABSTRACT

Does macroeconomic volatility/uncertainty affects accumulation of net foreign assets? In OECD economies over the period 1970–2012, changes in country specific aggregate volatility are, after controlling for a wide array of factors, significantly positively associated with net foreign asset position. A standard open economy model with time varying macroeconomic uncertainty can quantitatively account for this relationship. The key mechanism is precautionary motive: more uncertainty induces residents to save more, and higher savings are in part channeled into foreign assets. Data and theory suggest that volatility is an important determinant of the medium/long run evolution of external imbalances in developed countries.

1. Introduction

The main contribution of this paper is to show that time-varying uncertainty about macroeconomic conditions (which throughout the paper we will measure as realized macro volatility) is a quantitatively important determinant of domestic consumption and saving decisions and, through these channels, of the medium and long run evolution of the net foreign asset positions of countries.

The paper first shows that when countries become more volatile than their partners, they tend to run current account surpluses. In particular, for OECD countries over the last 40 years, changes in relative macroeconomic volatility (measured as the standard deviation of GDP growth of a country over a 10 year window, relative to the same measure in other OECD countries) are significantly positively associated with changes in the net foreign asset position. Quantitatively, an increase in relative volatility of 0.5% over a 10 years period (a change experienced by many countries in our sample) is associated with a change in net foreign asset position of about 8% of GDP. This relation is robust to the inclusion of a wide array of controls, such as growth, various measures of macroeconomic policy, and demographic conditions.

We then introduce time-varying macroeconomic uncertainty in a standard open economy model, and show that a calibrated version of the model can account for this relationship well, both in the medium and in the long run. The intuition is simple: in response to increases in domestic uncertainty, agents increase their precautionary saving balances. Decreasing returns in domestic capital, increasing risk of domestic capital (due to the increase in uncertainty) and the assumption of open economy imply that the bulk of the additional precautionary saving will go into foreign assets. If changes in uncertainty are persistent, the accumulation of foreign assets continues through time and can lead to sizeable changes in medium/long run net foreign asset positions, thus generating persistent "global imbalances".

* Corresponding author.

http://dx.doi.org/10.1016/j.jmoneco.2014.12.003
0304-3932/

Our findings suggest that time-varying uncertainty, which many authors have recently put at the center stage of macroeconomic analysis, is an especially important factor in the context of open economies. To give a more concrete example, consider two countries that have experienced large external imbalances of opposite signs: the United States and Japan. During the period 1980–2010, the United States has experienced a reduction in its foreign position of about 25% of its GDP and at the same time its aggregate volatility (relative to those of other OECD countries) has declined by roughly 40 basis points. Over the same period, Japan witnessed an increase in net foreign asset (henceforth NFA) of about 50%, along with an increase in relative volatility of about 100 basis points. According to our framework the changes in relative volatility in the two countries can account for between one-quarter and one-third of the respective imbalances. The model is also useful for precisely understanding and quantifying the channels through which uncertainty affects agents' decisions, and for understanding how the effects of uncertainty depend on structural aspects of the economy, such as preferences, persistence of shocks, and the development of international financial markets.

This paper is related to various strands of the literature. The first studies the issue of "global imbalances" and searches for causes of the growing dispersion of external imbalances in various countries.[1] Our study is the first to show empirically and theoretically that macroeconomic volatility is a major systematic factor in explaining the evolution of external imbalances in a large cross section of countries. The second is the rapidly growing literature that studies the effect of changes in macroeconomic uncertainty on aggregate outcomes.[2] Most of this literature focuses on the importance of shocks to uncertainty in generating business cycle fluctuations, whereas our work focuses on external positions. We show that even in cases in which shocks to uncertainty have modest business cycle impact, they can have a sizeable impact on external positions of countries over the medium/long run. A recent paper that studies the impact of volatility in open economies is the work of Gourio et al. (2014), which mostly focuses on the impact of volatility on gross external positions. Finally, our work is also connected to the literature that studies how the optimal level of the external reserves of a country is determined by precautionary motives in an environment with aggregate risk.[3]

The paper is organized as follows. Section 2 provides empirical evidence on the relationship between volatility of output growth and external imbalances. Section 3 presents the model, and Section 4 discusses the results. Section 5 concludes.

2. Empirical evidence

This section first establishes that for developed countries, changes in (relative) macroeconomic volatility are positively associated with changes in NFA. This relationship constitutes our key piece of evidence about the role of precautionary motives in determining inter-temporal trade patterns across countries.

Our sample consists of the set of all OECD countries for which we could obtain comparable (across time and countries) macroeconomic data starting at least in the early 1980s. The final dataset is an unbalanced panel which includes 20 countries and spans from the first quarter of 1970 to the last quarter of 2012.[4]

Our benchmark measure of relative macroeconomic volatility for a country in a given time interval is the standard deviation of quarterly real GDP growth over the interval minus the average (across the other countries) standard deviation of quarterly real GDP growth over the interval.[5] Our benchmark measure of net foreign asset position is total gross foreign assets minus total gross foreign liabilities over GDP, averaged over the same interval. Fig. 1 provides a comprehensive summary of our dataset, plotting trends of net foreign asset position and relative volatility of GDP growth in each year for all countries in our sample. Both measures are computed in each year using 10 years rolling windows (always using quarterly

[1] See, among others, Fogli and Perri (2006), Backus et al. (2009), Blanchard (2007), Caballero et al. (2008), Mendoza et al. (2009), Broer (2012), Chang et al. (2013) and Prades and Rabitsch (2012).

[2] See, among others, Barlevy (2004), Basu and Bundick (2012), Justiniano and Primiceri (2008), Bloom (2009), Fernández-Villaverde et al. (2011), Bloom et al. (2012), Arellano et al. (2012) and Schaal (2013).

[3] See, for example, Bianchi et al. (2012), Durdu et al. (2007), Hur and Kondo (2013), and Jeanne and Ranciáre (2011).

[4] All the national accounts data are from the OECD Quarterly National Accounts. The foreign asset position data up to 2007 is from Lane and Milesi-Ferretti (2007), while figures in post-2007 years are derived from the IMF international investment position statistics. The set of countries in our dataset, with country acronyms and sample span in parenthesis, is as follows: Australia (AUS, 1970.1–2012.4), Austria (AUT, 1976.1–2012.4), Belgium (BEL, 1980.1–2012.4), Canada (CAN, 1970.1–2012.4), Switzerland (CHE, 1980.1–2012.4), Germany (DEU, 1970.1–2012.4), Denmark (DNK, 1977.1 2012.4), Spain (ESP, 1970.1–2012.4), Finland (FIN, 1975.1–2012.4), France (FRA, 1970.1–2012.4), United Kingdom (GBR, 1970.1–2012.4), Greece (GRC, 1970.1–2011.1), Italy (ITA, 1970.1–2012.4), Japan (JAP, 1970.1–2012.4), Korea (KOR, 1970.1–2012.4), Mexico (MEX, 1980.1 -2012.4), Netherlands (NED, 1977.1–2012.4), Norway (NOR, 1978.1–2012.4), Sweden (SWE, 1980.1–2012.4), and United States (USA, 1970.1–2012.4).

[5] More precisely $\sigma_{i,t}$, i.e. macroeconomic volatility in country i and year t is measured as follows. Let $s(t)$ be the first quarter of year t and let $g_{i,s}$ be the log difference of real GDP of country i between quarter s and quarter $s-1$. Volatility is

$$\sigma_{i,t}=\left(\sum_{j=-20}^{+20} g_{i,s(t)+j}^2-\overline{g}_{i,s(t)}\right)^{1/2}$$

where $\overline{g}_{i,s(t)}=\frac{1}{41}\sum_{j=-20}^{+20} g_{i,s(t)+j}$. Note that volatility is computed only for years/countries that have at least 21 quarterly observations for growth $g_{i,s(t)+j}$. Relative volatility $\sigma_{i,t}^R$ is then measured as

$$\sigma_{i,t}^R=\sigma_{it}-\frac{1}{N(t)}\sum_{j\neq i}\sigma_{j,t}$$

where $N(t)$ indicates the number of countries that have an observation for volatility in year t.