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The impact of real exchange rates adjustments on global imbalances: A multilateral approach ☆

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ABSTRACT

An extensive literature stresses that currency misalignments are costly in terms of growth performance. However, these studies do not consider the direct and indirect effects of currency misalignments on other countries. In this paper, we analyze how misalignments of the dollar, the euro, and the renminbi affect their respective economies and those of their trading partners using a multi-country dataset GVAR model. Our model includes 15 advanced and emerging countries and uses quarterly data spanning the period 1980–2010. We find that misalignments significantly influence the world economy. We show that overvaluation and undervaluation shocks do not produce the same effects.

1. Introduction

Since the adoption of floating exchange rates by the major currencies in the 1970s, wide exchange rate fluctuations became a key issue for the stability of the world economy. Indeed, as stressed, among others, by Williamson (1983) and Isard et al. (2001), currency misalignments are costly. For instance, an overvaluation tends to undermine countries' competitiveness – and, then, growth performance – and may generate protectionist pressures in countries with sizeable current account deficits. At the beginning of the 1980s, the strong U.S. dollar appreciation in both nominal and real terms spawned intense debates on the so-called yen undervaluation (see Funabashi, 1988). Since the 1990s, the renminbi–U.S. dollar exchange rate is at the center of the debates relative to exchange rate policies. An extensive literature stresses that exchange rates misalignments and global imbalances have close relationships (Blanchard and Milesi-Ferretti, 2011; Brender and Pisani, 2010). More recently, the deep economic damages caused by the subprime crises have increased the probability of a currency war among industrialized countries on the one hand, and between these latter and emerging countries on the other hand.[1] Cline and Williamson (2010) show that more and more countries – for instance Brazil, China, Japan, Korea, Singapore, and Switzerland – use foreign exchange interventions and–or capital controls to contain currency appreciation.

Exchange rate policies are issues that are multilateral by nature. Indeed, a weaker exchange rate in a specific country implies stronger ones for some other economies. The IMF has recognized this multilateral dimension by establishing in 1995 the Coordinating Group on Exchange Rate Issues (CGER, see Isard et al., 2001). The main purpose of the CGER is to offer a methodology identifying currency misalignments and solutions to correct them in a multilateral framework.[2] From this standpoint, coordinated exchange rate realignments are a major issue for the stability of the international monetary system (Angeloni et al., 2011).

In addition, a recent literature has demonstrated the role of exchange rates in economic growth models (Arslan et al., 2012; Rapetti, 2013).[3] Some empirical studies – for instance Rodrik (2008), Eichengreen (2008) and Sallenave (2009) – have shown that undervalued exchange rates favor economic growth. In a similar vein, Skott et al. (2012) have built a theoretical two-sector equilibrium model to establish a positive

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[1] According to Cline and Williamson (2010), the term currency war has been introduced by the finance minister of Brazil, Guido Mantega. This latter has asked the IMF to develop an index measuring whether a currency is held artificially low or not. In other words, he envisaged that the IMF produces information on currency manipulation by members countries.

[2] Eight years ago, Williamson and Miller (1987) developed a blueprint for exchange rate stability in a multilateral framework.

[3] See Aguirre and Calderon (2005), Berg and Miao (2010).

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association between economic development and an accommodating exchange rate policy coupled with an investment promotion.

If a large part of the literature highlights benefits (detriments) of undervalued (overvalued) currencies, it does not consider the direct and indirect effects of currencies' misalignments on the economic performances of other countries.[4] Currency misalignments affect current accounts through several channels: the financial channel (in particular the valuation effect), the channel of savings and investment, and the competitiveness channel. In this paper, we analyze how undervaluation (overvaluation) of the dollar, the euro, and the renminbi affect their respective economies and those of some of their trading partners using a multi-country dataset GVAR[5] model. Thus, we focus our attention on the competitiveness channel. GVAR modeling has become a very useful econometric tool these last years. After Pesaran et al.'s (2004) introduction of the global VAR, several papers have analyzed the macroeconomic or financial interdependencies in this specific way. As a multicountry framework, it is particularly adapted to assess spillover effects in the aftermath of a historical slowdown in U.S. equity prices (Sgherri and Galesi, 2009). Hiebert and Vansteenkiste (2010) examine for 12 manufacturing industries over the 1977–2003 period the response of U.S. manufacturing labor market variables to various shocks, including trade openness and technology. Dees and Saint-Guilhem (2011) estimate a GVAR model to assess the role of the United States as an engine of global economy growth. They stress the evolving influence of this country on the world economy across time. They show that, if the direct influence of the U.S. economy has declined, it remains significant through the third market effect.

Our paper is related to the GVAR models that built a global trade flows framework (see Bussière et al., 2012; Dees et al., 2007a; Greenwood-Nimmo et al., 2012) to analyze the dynamics of global trade flows and global imbalances. Our model includes 15 countries accounting for more than 70% of the world exports, and aims at shedding some light on the international transmission of exchange rate misalignments. Our sample countries include both advanced and emerging economies in order to better consider interdependencies across countries. In addition, we use quarterly data spanning the period 1980–2010. Contrary to the traditional literature (Pesaran and Smith, 2006; Pesaran et al., 2004), we consider deviation levels of each of our three key currencies with respect to their equilibrium level estimated with the BEER approach. Two distinct indexes are then calculated in order to disentangle clearly periods of overvaluation from undervaluation ones. Relative to the previous literature that considers phases of appreciation and depreciation of the real exchange rate, we offer a more accurate analysis of the effects of misalignments on macroeconomic variables. As GVAR models are linear, the use of two sub-indices of misalignments allows us to avoid the symmetric effects of currency overvaluation–undervaluation due to this linearity property. Indeed, we consider that there is no reason to assume that shocks to exchange rate overvaluation and undervaluation lead to rigorously similar (but with opposite signs) effects in terms of size.

This paper contributes to three strands of literature. First, considering the literature on the effects of misalignments on economic growth, it suggests that it is very important to integrate in the analysis interdepencies. Indeed, we find that misalignments of the three key currencies significantly influence the world economy. Second, the paper sheds some lights on the debate concerning the asymmetric effects of exchange rate changes (Chinn and Wei, 2013). Indeed, we show that overvaluation shocks and undervaluation shocks do not produce the same effects in terms of size. Finally, by disentangling between overvaluation and undervaluation shocks, we contribute to the recent literature on the contribution of the exchange rate to the reduction of current account deficits (Chiu et al, 2010; Kappler et al, 2013).

The rest of this paper is organized as follows. In the next section we describe the GVAR model. In Section 3 we discuss its estimation. Section 4 is devoted to the derivation of our index of undervaluation and overvaluation. Sections 5 and 6 report respectively the results from the generalized impulse response functions and the generalized forecast error variance. Section 7 concludes.

2. The Global VAR theoretical framework

2.1. Individuals' country-specific models

Consider a set of N countries, with country 0 denoting the reference one. Following the notations of Pesaran et al. (2004), we confine our exposition to a first order dynamic specification represented by a $VARX^*(1,1)$[6]:

$$x_{it} = a_{i0} + a_{i1}t + \Phi_i x_{i,t-1} + \Lambda_{i0}x^*_{it} + \Lambda_{i1}x^*_{i,t-1} + \mu_{it} \quad (1)$$

where $t = 1,2,\ldots,T, i = 1,2\ldots,N$, $x_{i,t}$ is a $k_i \times 1$ vector containing country specific variables, $x^*_{i,t}$ is a $k_i^* \times 1$ vector of foreign variables. Λ_{i0} and Λ_{i1} are $k_i \times k_i^*$ matrices of coefficients related to respectively, contemporaneous and lagged foreign variables. The vector of fixed intercepts a_{i0} is a $k_i \times 1$ and a_{i1} is a $k_i \times 1$ vector of coefficients of the deterministic time trend. The $k_i \times 1$ vector of idiosyncratic country specific shocks is given by μ_{it} and is assumed to be serially uncorrelated with zero mean and non singular covariance matrix:

$$\mu_{it} \sim i.i.d.(0, \Sigma_{ii}) \quad (2)$$

where $\sigma_{ii,ls} = cov(\mu_{il}, \mu_{ls})$ and

$$\Sigma_{ii} = \sigma_{ii,ls} \quad (3)$$

where i is the country index, l and s are variables belonging to this country i. We also allow μ_{it} to be correlated across regions to a limited degree.

Foreign variables are constructed using trade weights that reflect the specific geographical trade composition of each country. The choice of trade weights rests on the fact that bilateral trade exerts a strong influence on inter-country business cycle linkages (see, among others, Forbes and Chinn (2004), Imbs (2004), and Baxter and Kouparitsas (2005)). The construction of foreign variables is as follows:

$$x^*_{it} = \sum_{j=1}^{N} w_{ij}x_{jt} \quad (4)$$

where

$$\sum_{j=1}^{N} w_{ij} = 1 \quad (5)$$

[4] An exception is the paper by Mattoo et al. (2012). Using disaggregated trade data for 124 developing exporters and 57 large importers over the period 2000–2008, they find that changes in the renminbi exchange rate have significant spillover effects. For instance, a 10% appreciation of the Chinese currency increases a developing country's exports by 1.5 to 2% on average.

[5] Global Vector Autoregressive Modelling.

[6] The GVAR model comprises country-specific $VARX^*$ models that relate the core variables of each economy to their foreign counterparts. Each of them are then combined to form the GVAR model. Lag orders p_i and q_i of respectively domestic and foreign variables are selected using the Akaike information criterion, which corresponds to the maximized value of the log-likelihood function $\sum_i = \hat{\epsilon}_{it}\hat{\epsilon}'_{it}$ computed according to the residuals ϵ_{it} obtained from the estimation of the individual VARX models given by Eq. (1). Table for the lag order p_i and q_i are available upon request. We allow lags up to four. The lag order of the foreign variables q_i is found to be equal to one in all countries and two for domestic variables p_i. The order in the GVAR in what follows is thus a $VARX$ $(2,1)$ for both $GVAR_{under}$ and $GVAR_{over}$. Table displaying the number of cointegration relationship based on the trace test is also available upon request. We used the 95% MacKinnon's critical value model and do not impose ad hoc adjustments in the number of cointegration relations and consider the exact number of cointegration relationships.