The global implications of regional exchange rate regimes

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Abstract

We examine the implications of a regional fixed exchange rate regime for global exchange rate volatility. We find that the concept of the optimum currency area plays a key role. There are significant negative effects on the volatility of the remaining flexible parities when the countries participating in the regional peg -the "ins"- are not an optimum currency area. Or, but to a smaller extent, when the "ins" and the "outs" are asymmetric with regard to labor market flexibility and monetary policy conduct.

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Introduction

The post Bretton Woods international monetary arrangements have been asymmetric. Typically, some countries maintain a system of -more or less- fixed parities among themselves while, at the same time, allowing the external value of their currencies to move freely against currencies that do not belong to their monetary arrangement. We call such a regime a *mixed* system. The EMS (or EMU) is an example of such a system (other examples include unilateral pegs, currency boards and so on).

Although a great deal of attention has been devoted to the study of fixed and flexible exchange rate regimes *in isolation*, to the best of our knowledge, no attempt has been made to study mixed systems. The objective of this paper is to fill this gap. We are mostly interested in the *global* implications of a regional fixed exchange rate regime and, in particular, whether such a regime leads to a global reduction of exchange rate volatility or simply transfers volatility from one part of the global system to another. Also, we examine the factors that determine the type and magnitude of volatility transfer that takes place.

The answers to these questions have practical importance. For instance, they can help evaluate the contribution of the EMS (EMU) to global exchange rate volatility (for instance, its effects on the DM/USD or the DM/GBP rate). They can also form the basis for assessing the implications of EMU for the EURO/USD rate. If the formation of EMU brings about greater global stability in exchange rates by itself then there may be less of a need for explicit international policy coordination (e.g. the adoption of target zones by major currency blocks) in order to achieve such an objective. Finally, one can use our findings to think about what would happen to the rest of the world (say, China's exchange rate) if the EU, the USA and Japan decided to limit fluctuations in their exchange rates.

The existing literature has not yet provided a concrete framework for thinking about these issues. And a priori, there does not seem to exist any strong presumption concerning the sign of the global effects. Volatility eliminated in one place (say, in the DM/FF rate or in economic activity in Germany) may completely disappear from the system. Alternatively, it may simply resurface elsewhere (say, in the DM/GBP rate and in British macroeconomic activity). Moreover, general arguments of the type that "..if the fixed exchange rate system lowers macroeconomic volatility in the pegging countries then it will also reduce exchange rate volatility.." may not be informative because the direction of volatility changes is not uniform across the main economic variables.

We believe that these questions can be best addressed within the context of a multi-country, general equilibrium model of the type commonly used nowadays in the exchange rate literature (for examples of a *two* country version, see Chari, Kehoe and McGrattan, 2000, Collard and Dellas, 2002). We use a three country model whose main features include perfect competition, nominal wage rigidities[1], active monetary policy (forward looking Taylor rules) and a variety of shocks (supply, fiscal and monetary). We use a generic calibration of the model that relies heavily on parameters commonly used in the literature and serves as a useful benchmark. Its purpose is to illuminate the role played by various types of international asymmetries (labor markets, Taylor rules, and so on).

The key finding is that the extent and type of asymmetries determine the sign –and size– of global effects. In general, the global repercussions are limited when the countries that fix their currencies are sufficiently symmetric. Even in this case, there are some global effects when the "ins" have labor markets that differ in terms

[1] Other sources of nominal rigidities are possible. Our choice of wage rather than price rigidities is motivated by recent empirical work by Christiano, Eichenbaum, and Evans, 2001, that finds that the former dominate.

of flexibility from those in the countries that are outside the monetary arrangement (the "outs"), or when the "ins" and the "outs" differ in terms of aggressiveness in the pursuit of inflation stabilization objectives. Nevertheless, the strongest global effects emerge when the countries participating in the system of fixed parities do not satisfy the optimum currency area criterion of a similar economic structure. The sign of these effects depends on the characteristics of the country that does the pegging (for instance, France) relative to the "leader"(for instance, Germany). Based on the obtained relationship between country characteristics and volatility, we speculate that global exchange rate volatility under EMU would be more likely to decline were the US -rather than the EU- to target the EUR/USD rate.

The remainder of the paper is organized as follows. Section 1 presents the three country model. Section 2 describes the calibration and section 3 presents the main findings.

1 The model

The three countries are modelled in a similar fashion[2] so we describe only one country, the UK (a technical appendix to this paper, available at our website, offers a detailed description of the other two countries).

The economy consists of a large number of identical households and firms, a fiscal authority and a monetary authority.

1.1 The household

The household maximizes expected lifetime utility:

[2]Nevertheless, they may still differ in terms of size, economic structure, shocks and so on.

$$E_0[\sum_{t=\infty} \beta^t U(C_t^B, h_t^B)] \tag{1}$$

where $0 < \beta < 1$ is a constant discount factor, C_t^B denotes UK consumption[3] in period t and h_t^S is the number of hours worked by the UK representative household. $U(C_t^B, h_t^B)$ is a utility function, increasing and concave in its first argument, and decreasing and convex in its last argument. The following utility function will be used:

$$U(C_t^B, h_t^B) = \log(C_t^B) + \theta \log(1 - h_t^B) \tag{2}$$

where θ is a weight for the marginal utility of leisure.

In each and every period the UK household faces two budget constraints. The first takes the form:

$$\begin{aligned} & P_t^B C_t^B + P_t^B I_t^B + \int_\ell (\frac{\widetilde{P}_t^F}{e_t^B} B_{S,t+1}^F + \frac{e_t^G}{e_t^B} \widetilde{P}_t^G B_{S,t+1}^G + \widetilde{P}_t^B B_{S,t+1}^B) d\ell + M_{t+1}^B + P_t^B T_t^B \\ = \; & W_t^B h_t^B + z_t^B K_t^B + \Pi_t^B + \frac{B_{S,t}^F}{e_t^B} + \frac{e_t^G}{e_t^B} B_{S,t}^G + B_{S,t}^B + M_t^B + N_t^B \end{aligned} \tag{3}$$

where P_t^B denotes the price of UK consumption and investment goods, I_t^B is investment, e_t^B is the FF/GBP exchange rate, e_t^G is the FF/DM rate (hence e_t^G/e_t^B is the GBP/DM rate), $\widetilde{P}_t^j$ is the price paid for an asset that will deliver 1 unit of country j's currency (j = F, G, B) next period if state ℓ realizes (that is, we assume complete asset markets). A typical UK household owns $B_{S,t}^j$ such assets entering period t. M_t^B is the stock of money held by the UK household in period t, T_t^B is *lump-sum taxes*, W_t^B is the nominal wage, z_t^B is the rental rate for capital, K_t^B is

[3] The superscript B –British– denotes the UK.

the physical capital stock at the beginning of period t, Π_t^B are the profits of the UK firms and N_t^B is a per-capita amount of money issued by the Bank of England (BoE) and given to the households in the form of a helicopter drop.

According to the budget constraint, the household enters period t holding an amount of money equal to M_t; it receives income from its financial investments, $B_{S,t}^j$, from its labor services, from renting capital to the firms. It also receives its share of the profits distributed by the firms and its share of the money injection by the BoE. It uses these funds to buy new financial assets, to build its cash reserves, to pay taxes and to purchase goods for consumption and investment purposes.

The household also faces a cash-in-advance (CIA) constraint on consumption purchases:

$$P_t^B C_t^B \leq M_t^B \tag{4}$$

Physical capital accumulates according to

$$K_{t+1}^B = \Phi(\frac{I_t^B}{K_t^B})K_t^B + (1-\delta)K_t^B \tag{5}$$

where $0 \leq \delta \leq 1$ denotes the rate of depreciation. The concave function $\Phi(.)$ captures the presence of adjustment costs to investment. It is assumed to be twice differentiable and homogenous of degree 0. Furthermore, we assume the absence of adjustment costs in the steady state: $\Phi(\gamma+\delta-1) = \gamma+\delta-1$, $\Phi'(\gamma+\delta-1) = 1$ and $\frac{\Phi''(\gamma+\delta-1)(\gamma+\delta-1)}{\Phi'(\gamma+\delta-1)} = \varphi$.

Finally, we will assume that –at least a fraction of– the nominal wages is fixed one period in advance at a level that is equal to the expected labor market clearing wage. In particular, the fixed nominal wages are set using labor contracts of the form $W_t^j = (1-\vartheta)\widetilde{W}_t^j + \vartheta E_{t-1}\widetilde{W}_t^j$where $\widetilde{W}_t^j$ is the nominal wage that would clear the labor market in a Walrasian framework, and $0 \leqslant \vartheta \leqslant 1$ is the share of labor contracts in the economy.

The households that have signed labor contracts must then supply whatever quantity of labor is demanded by the firms.

1.2 The firms

There are two types of firms, those that produce an intermediate good, Y, and those that produce a final good, Q.

The production of the intermediate good is done according to:

$$Y_t^B = a_t^B (K_t^B)^\alpha (\Gamma_t h_t^B)^{1-\alpha} \tag{6}$$

where K_t denotes the physical capital stock at the beginning of period t. Γ_t represents Harrod neutral, deterministic, technical progress evolving according to $\Gamma_t = \gamma \Gamma_{t-1}$. $\gamma \geq 1$ denotes the deterministic rate of growth. a_t^B is a stationary, exogenous, stochastic technology shock.[4]

The representative intermediate good firm chooses the quantity of capital and labor to lease in period t in order to maximize its current profits

$$\pi_t = P_{Yt}^B Y_t^B - W_t^B h_t^B - z_t^B K_t^B \tag{7}$$

where P_{Yt}^B is the price of the UK intermediate good.

The country specific intermediate goods are then combined to produce the final goods in the three countries.

$$Y_t^B = Y_{Ft}^B + Y_{Gt}^B + Y_{St}^B \tag{8}$$

where $Y_{j,t}^B$ denotes the amount of UK intermediate good that is used as an input to produce country j's final good in period t.

[4]The stochastic properties of the technology shock will be specified later.

1.3 Production of the final domestic good

The production of the final good in the UK, Q_t^B, takes place according to:

$$Q_t^B = [\varpi_4^{1-\rho}(Y_{S,t}^F)^\rho + \varpi_5^{1-\rho}(Y_{S,t}^G)^\rho + \varpi_6^{1-\rho}(Y_{S,t}^B)^\rho]^{\frac{1}{\rho}} \tag{9}$$

The level of production is selected in order to maximize profits:

$$\pi^B = P_t^B Q_t^B - \frac{P_{Yt}^F}{e_t^B} Y_{S,t}^F - \frac{e_t^G}{e_t^B} P_{Yt}^G Y_{S,t}^G - P_{Yt}^B Y_{S,t}^B \tag{10}$$

where ϖ_4, is the weight of the French goods in the UK final good basket, ϖ_5, is the weight of German goods in this basket and ϖ_6 denotes the weight of UK goods in the domestic (UK) basket. Recall that $Y_{F,t}^j$ is the amount of the intermediate good of country j (j = F, G, B) used in the production of the UK final good. $\frac{1}{\rho-1}$ is the elasticity of substitution between the domestic and foreign intermediate goods. This way of modelling import and export activities is called the *Armington aggregation* and implies that the imported goods have to be transformed into a domestic good, Q_t^B, before they can be consumed or used for investment. It follows that the three countries will have different price levels for their final goods, P_t^i, as these goods are not perfect substitutes.

Clearing of the UK final good market requires:

$$Q_t^B = C_t^B + I_t^B + G_t^B \tag{11}$$

where G^B is UK government expenditure.

1.4 The government

In each period the government acquires an amount G_t of the final good. The cyclical component of government expenditures ($g_t = G_t/\Gamma_t$) is exogenously determined by a stationary AR(1) process such that:

$$\log(g_t) = \rho_g \log(g_{t-1}) + (1-\rho_g)\log(g) + \varepsilon_{gt} \tag{12}$$

with $|\rho_g| < 1$ and $\varepsilon_{gt} \rightsquigarrow \mathcal{N}(0, \sigma_g)$.

These expenditures are financed by means of lump–sum taxation

$$P_t^B G_t^B = P_t^B T_t^B \tag{13}$$

1.5 The monetary authorities

The behavior of the monetary authorities depends on the international monetary arrangement in place. Under a flexible exchange rate regime, we assume that monetary authorities pursue active monetary policy. In particular, central banks are assumed to follow a Taylor rule. For instance, in the UK this rule takes the form[5]

$$\widehat{R}_t^B = \rho^B \widehat{R}_{t-1}^B + (1-\rho^B)(K_y^B E_t(\widehat{Y}_{t+1}^B) + K_\Pi^B E_t(\widehat{\Pi}_{t+1}^B)) + \zeta_{r,t}^B \tag{14}$$

where R_t^B is the gross nominal interest rate, ρ^B denotes the degree of interest rate smoothing, $E_t(\widehat{Y}_{t+1}^B)$ is expected output (relative to target), $E_t(\widehat{\Pi}_{t+1}^B)$ is expected CPI inflation (relative to target) and $\zeta_{r,t}^B$ is an exogenous policy shock (for instance, a change in the inflation target or variation in the nominal interest rate that is not due to a response of BoE to deviations of inflation or output growth from their target levels). K_y^B and K_Π^B are fixed weights.

The supply of money then evolves according to

[5] We have also experimented with Taylor rules that include an exchange rate target. As it is commonly reported in the literature, such specifications do not find much of an independent role for exchange rate policy.

$$M_{t+1}^{B} = \mu_t^{B} M_t^{B} \tag{15}$$

where μ_t is the gross rate of growth. This is selected endogenously in order to deliver the nominal interest rate dictated by the Taylor rule above. Note that per capita $(\mu_t^B - 1)M_t^B$ is equal to N_t^B (see the household's budget constraint).

In addition to the flexible exchange rate system we consider a unilateral peg by France. Under this regime, France selects the growth rate of its supply of money, μ_t, in order to maintain a fixed DM/FF rate (while the Bundesbank pursues its Taylor rule). This policy is implemented by solving for the exchange rate as a function of the state variables of the system (a set that includes μ_t) and then selecting a value for μ_t that satisfies the exchange rate target, e. Our framework can be easily adapted to deal with bilaterally pegged systems. We abstract from them because they seem to be of limited practical relevance.

1.6 The equilibrium

We now turn to the description of the equilibrium of the economy. Recall that capital is perfectly mobile across countries while labor is not.

Definition 1 *An equilibrium of this economy is a sequence of prices*

$$\{\mathcal{P}_t\}_{t=0}^{\infty} = \left\{W_t^j, z_t^j, P_t^j, P_{Yt}^j, P_{bt}^j(s'), R_t^j, e_t^G, e_t^B\right\}_{t=0}^{\infty} \quad j \in (F, G, B)$$

and a sequence of quantities

$$\{\mathcal{Q}_t\}_{t=0}^{\infty} = \left\{\left\{\mathcal{Q}_t^1\right\}_{t=0}^{\infty}, \left\{\mathcal{Q}_t^2\right\}_{t=0}^{\infty}\right\}$$

with

$$\left\{\mathcal{Q}_t^1\right\}_{t=0}^{\infty} = \left\{\left\{C_t^j, I_t^j, \left\{B_{it+1}^j\right\}_{i\in(F,G,B)}, K_{t+1}^j, M_{t+1}^j\right\}_{j\in(F,G,B)}\right\}_{t=0}^{\infty}$$

and

$$\{\mathcal{Q}_t^2\}_{t=0}^{\infty} = \left\{ \left\{ K_t^j, h_t^j, Y_t^j, \{Y_{it}^j\}_{i\in(F,G,B)}, Q_t^j \right\}_{j\in(F,G,B)} \right\}_{t=0}^{\infty}$$

such that:

(i) given a sequence of prices $\{\mathcal{P}_t\}_{t=0}^{\infty}$ *and a sequence of shocks,* $\{\mathcal{Q}_t^1\}_{t=0}^{\infty}$ *is a solution to the representative household's problem;*

(ii) given a sequence of prices $\{\mathcal{P}_t\}_{t=0}^{\infty}$ *and a sequence of shocks,* $\{\mathcal{Q}_t^2\}_{t=0}^{\infty}$ *is a solution to the representative firms' problem;*

(iii) given a sequence of quantities $\{\mathcal{Q}_t\}_{t=0}^{\infty}$ *and a sequence of shocks,* $\{\mathcal{P}_t\}_{t=0}^{\infty}$ *clears the goods markets*

$$Q_t^F = C_t^F + I_t^F + G_t^F \tag{16}$$

$$Q_t^G = C_t^G + I_t^G + G_t^G \tag{17}$$

$$Q_t^B = C_t^B + I_t^B + G_t^B \tag{18}$$

$$Y_t^F = Y_{Ft}^F + Y_{Gt}^F + Y_{St}^F \tag{19}$$

$$Y_t^G = Y_{Ft}^G + Y_{Gt}^G + Y_{St}^G \tag{20}$$

$$Y_t^B = Y_{Ft}^B + Y_{Gt}^B + Y_{St}^B \tag{21}$$

as well as the financial, money and capital markets.

(iv) Nominal wages are set using labor contracts of the form $W_t^j = (1-\vartheta)\widetilde{W}_t^j + \vartheta E_{t-1}\widetilde{W}_t^j$ *where* $\widetilde{W}_t^j$ *is the nominal wage that would clear the labor market in a Walrasian framework, and* $0 \leqslant \vartheta \leqslant 1$ *is the share of labor contracts in the economy.*

2 Model parameterization: Calibration

The model is solved under a generic set of parameters. which imposes perfect symmetry across countries in all but a single dimension. The asymmetric dimension regards either the labor markets where we allow different degrees of wage rigidities across countries, or the conduct of monetary policy where we allow different countries to follow different Taylor rules, or, finally, the properties of the exogenous shocks. The symmetric parameter values used[6] are similar to those typically used in the open economy literature (see Backus, Kehoe and Kydlnd, 1995) shown in table 1.

Table 1: Calibration I

Discount factor	β	0.988
Rate of real growth	γ	1.0069
Depreciation rate	δ	0.020
Labor share	$1-\alpha$	0.64
Substitution between domestic and foreign goods	ρ	0.25
Adjustment cost	φ	-0.174
Weight of home goods in home GDP	ϖ_{ii}	0.80
Trade interdependence between i and j	ϖ_{ij}	0.10
Persistence of technology shock	ρ_a	0.93
Volatility (sd) of technology shock	σ_a	0.008
Persistence of government spending shock	ρ_g	0.90
Volatility (sd) of government spending shock	σ_g	0.02
Money supply gross rate of growth	μ	1.0228
Persistence of money shock	ρ_m	0.0
Volatility (sd) of money shock	σ_m	0.014

This calibration is useful for discerning systematic relationships than the second calibration.

[6] We assume a common average rate of money supply growth for simplicity. For the flexible exchange rate regime we can easily allow for long term differences in money supply and inflation. This does not matter for the results, as we work with deviations from the steady state.

2.1 Solution

After adjusting the variables for both technological progress and nominal growth (that is, making the model stationary) we calculate the deterministic steady state and log–linearizing around it. The resulting dynamic system is solved using standard methods.

3 The results

The solution to the model is used to generate artificial time series for the main variables of interest. These series are then detrended using the Hodrick-Prescott filter and the resulting series are used to compute the various moments. We focus exclusively on the issue of volatility, but other properties of the solutions can be easily computed. Tables 2–5 report the results. In tables 2–5 we vary

- the degree of nominal wage rigidity
- the weight on the inflation target in the Taylor rule
- the volatility of the supply shock
- the volatility of the money shock

in the three countries.

The key finding is that the extent and type of asymmetries determine the sign –and size– of global effects. In general, the global repercussions are limited when the countries that fix their currencies –the "ins"–are sufficiently symmetric (when they satisfy the optimum currency criteria). There are some global effects in the presence of asymmetries between the "ins" and "outs" and, in particular, when they differ in terms of labor market flexibility, or inflation stabilization aggressiveness. Nonetheless, the strongest global effects emerge when the countries

Table 2: Asymmetries in labor market flexibility and volatility

	y^F	y^G	y^B	p^F	p^G	p^B	e^{FG}	e^{FB}	e^{GB}
$\vartheta^F = 1,\ \vartheta^G = 1,\ \vartheta^B = 1$									
FL	1.02	1.04	1.02	1.20	1.20	1.18	2.84	2.91	2.87
FX	1.13	0.99	1.02	1.01	1.08	1.20	0.00	2.85	
$\vartheta^F = 0.5,\ \vartheta^G = 0.5,\ \vartheta^B = 1$									
FL	1.38	1.40	1.03	2.41	2.40	1.19	5.69	4.47	4.43
FX	1.08	1.17	1.03	1.74	1.96	1.22	0.00	4.14	
$\vartheta^F = 0.1,\ \vartheta^G = 0.1,\ \vartheta^B = 1$									
FL	1.92	1.93	1.03	3.48	3.45	1.21	8.01	5.82	5.79
FX	1.34	1.53	1.04	2.50	2.75	1.24	0.00	5.23	
$\vartheta^F = 1,\ \vartheta^G = 1,\ \vartheta^B = 0.5$									
FL	1.03	1.04	1.37	1.21	1.21	2.36	2.84	4.46	4.43
FX	1.12	1.00	1.40	1.02	1.09	2.43	0.00	4.56	
$\vartheta^F = 1,\ \vartheta^G = 1,\ \vartheta^B = 0.1$									
FL	1.03	1.04	1.89	1.21	1.22	3.39	2.84	5.82	5.78
FX	1.12	1.00	1.96	1.03	1.11	3.50	0.00	6.00	
$\vartheta^F = 0.5,\ \vartheta^G = 1,\ \vartheta^B = 1$									
FL	1.37	1.04	1.02	2.40	1.21	1.19	4.38	4.47	2.87
FX	1.19	1.00	1.01	1.25	1.15	1.17	0.00	2.85	
$\vartheta^F = 1,\ \vartheta^G = 0.5,\ \vartheta^B = 1$									
FL	1.03	1.39	1.02	1.21	2.39	1.18	4.39	2.91	4.43
FX	1.24	1.14	1.04	1.58	1.88	1.26	0.00	4.14	

The reported numbers are standard deviations. y^i is GDP in country i, $i = F, G, B$. p^i is inflation in i. e^{ij} is the nominal exchange rate between i and j. FL has all three countries in a flexible exchange rate system while FX has F pegging unilaterally its currency to G's currency. ϑ^i is the degree of nominal wage rigidity in country i ($\vartheta^i = 1$ denotes perfect wage rigidity).

Table 3: Asymmetries in the conduct of monetary policy and volatility

	y^F	y^G	y^B	p^F	p^G	p^B	e^{FG}	e^{FB}	e^{GB}
$K_\Pi^F = 1.05,\ K_\Pi^G = 1.05,\ K_\Pi^B = 1.5$									
FL	1.09	1.10	1.04	2.22	2.23	1.21	5.95	4.82	4.81
FX	1.38	1.09	1.07	1.86	1.96	1.30	0.00	4.71	
$K_\Pi^F = 1.05,\ K_\Pi^G = 1.5,\ K_\Pi^B = 1.5$									
FL	1.03	1.09	1.03	1.22	2.23	1.19	4.75	2.91	4.81
FX	1.38	1.09	1.07	1.86	1.96	1.30	0.00	4.71	
$K_\Pi^F = 1.5,\ K_\Pi^G = 1.05,\ K_\Pi^B = 1.5$									
FL	1.08	1.05	1.03	2.22	1.22	1.20	4.73	4.82	2.87
FX	1.13	0.99	1.02	1.01	1.08	1.20	0.00	2.85	
$K_\Pi^F = 1.5,\ K_\Pi^G = 1.5,\ K_\Pi^B = 1.05$									
FL	1.03	1.05	1.07	1.22	1.22	2.17	2.84	4.84	4.74
FX	1.13	1.00	1.07	1.03	1.10	2.19	0.00	4.70	

The reported numbers are standard deviations. y^i is GDP in country i, $i = F, G, B$. p^i is inflation in i. e^{ij} is the nominal exchange rate between i and j. FL has all three countries in a flexible exchange rate system while FX has F pegging unilaterally its currency to G's currency. K_Π^i is the inflation reaction coefficient in the Taylor rule in country i.

Table 4: Asymmetries in the volatility of the supply shocks and volatility

	y^F	y^G	y^B	p^F	p^G	p^B	e^{FG}	e^{FB}	e^{GB}
	$\sigma(\varepsilon_\xi^F) = 0.004$, $\sigma(\varepsilon_\xi^G) = 0.008$, $\sigma(\varepsilon_\xi^B) = 0.008$								
FL	0.62	1.04	1.02	0.80	1.20	1.18	2.49	2.55	2.87
FX	0.73	0.99	1.02	0.89	1.08	1.20	0.00	2.85	
	$\sigma(\varepsilon_\xi^F) = 0.008$, $\sigma(\varepsilon_\xi^G) = 0.004$, $\sigma(\varepsilon_\xi^B) = 0.008$								
FL	1.02	0.62	1.02	1.20	0.80	1.18	2.50	2.91	2.52
FX	1.09	0.62	1.02	0.84	0.72	1.20	0.00	2.51	
	$\sigma(\varepsilon_\xi^F) = 0.004$, $\sigma(\varepsilon_\xi^G) = 0.004$, $\sigma(\varepsilon_\xi^B) = 0.008$								
FL	1.08	1.05	1.03	2.22	1.22	1.20	4.73	4.82	2.87
FX	1.13	0.99	1.02	1.01	1.08	1.20	0.00	2.85	

The reported numbers are standard deviations. y^i is GDP in country i, $i = F, G, B$. p^i is inflation in i. e^{ij} is the nominal exchange rate between i and j. FL has all three countries in a flexible exchange rate system while FX has F pegging unilaterally its currency to G's currency. $\sigma(\varepsilon_\xi^i)$ is the standard deviation of the supply shock in country i.

Table 5: Asymmetries in monetary policy instability and volatility

	y^F	y^G	y^B	p^F	p^G	p^B	e^{FG}	e^{FB}	e^{GB}
	$\sigma(\varepsilon_z^F) = 0.024$, $\sigma(\varepsilon_z^G) = 0.014$, $\sigma(\varepsilon_z^B) = 0.014$								
FL	1.03	1.09	1.03	1.21	1.45	1.19	3.36	2.91	3.38
FX	1.20	1.08	1.04	1.25	1.31	1.24	0.00	3.40	
	$\sigma(\varepsilon_z^F) = 0.014$, $\sigma(\varepsilon_z^G) = 0.024$, $\sigma(\varepsilon_z^B) = 0.014$								
FL	1.07	1.04	1.03	1.46	1.21	1.19	3.33	3.42	2.87
FX	1.13	0.99	1.02	1.01	1.08	1.20	0.00	2.85	
	$\sigma(\varepsilon_z^F) = 0.014$, $\sigma(\varepsilon_z^G) = 0.014$, $\sigma(\varepsilon_z^B) = 0.024$								
FL	1.03	1.04	1.07	1.21	1.21	1.43	2.84	3.42	3.39
FX	1.13	1.00	1.07	1.02	1.09	1.45	0.00	3.37	

The reported numbers are standard deviations. y^i is GDP in country i, $i = F, G, B$. p^i is inflation in i. e^{ij} is the nominal exchange rate between i and j. FL has all three countries in a flexible exchange rate system while FX has F pegging unilaterally its currency to G's currency. $\sigma(\varepsilon_z^i)$ is the standard deviation of the monetary shock in country i.

participating in the system of fixed parities do not satisfy the optimum currency area criterion of a similar economic structure. The sign of these effects depends on the characteristics of the country that does the pegging (for instance, France) relative to the "leader"(for instance, Germany).

Based on the obtained relationship between country characteristics and volatility, we draw two conclusions concerning the EUR/USD rate. First, as the US and the EU do not satisfy the optimum currency area criteria, an attempt to target the EUR/USD under EMU is likely to have global implications (the world in this case consists of the EU, the US, and the rest). And second, we speculate that global exchange rate volatility would be more likely to decline were the US -rather than the EU- to target the EUR/USD rate. We base this on the fact that volatility decreases when the exchange rate targeting is done by the country with: a) the more flexible labor market (pen-ultimum block in table 2); b) the more volatile supply shocks (table 4); c) the more aggressive reaction to deviations of inflation from target (table 3); and, d) the lower the volatility[7] of the random variation in monetary policy (5). Concerning point (c), the estimate of the inflation reaction coefficient in the Taylor rule for the US is around 1.5, a value that is close to the average value we estimated for France and Germany. We do not have any presumption concerning how element (d) compares across the US and the Euro zone. Hence, based on (a) and (b) it appears that global exchange rate volatility can get more help from the US than from the EU.

Conclusions

A great deal of attention has been devoted to the study of fixed and flexible exchange rate regimes but no attempt has been made to study mixed systems. In this paper we have investigated the implications of a regional fixed exchange rate

[7]Monetary policy is more stable the higher policy credibility, the less frequent the change of inflation targets and so on.

system for global exchange rate volatility.

The main finding is that the familiar concept of the optimum currency area[8] plays an important role in determining whether volatility eliminated somewhere disappears or simply reappears somewhere else. In general, the global repercussions are limited when the countries that fix their currencies are similar (they are an optimum currency area). If not, there can be significant global effects. Based on the obtained relationship between country characteristics and volatility we speculate that global exchange rate volatility under EMU would be likely to decline were the US –rather than the EU– to target the EUR/USD rate.

[8] For a survey, see Tavlas, 1993.

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