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WHICH EXCHANGE RATE REGIME IN CENTRAL EUROPEAN COUNTRIES?

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ABSTRACT. The paper first compares the monetary and exchange-rate policies conducted in the CEECs and by one of the neighbouring countries of the United States (Mexico). It is shown that Mexico has implemented reasonably expansionary policies, boosting production while avoiding financial imbalances and inflation, whereas in the CEECs policies are more rigid, and have led to the appearance of imbalances. The paper discusses possible causes of these differences, other than the exchange rate strategy of the countries. It uses a theoretical two-country model (a "large" country and a "small" country) to analyse the optimal exchange-rate policy in the small country.

JEL Classification: E52; F31.
Keywords: Exchange Rate; Monetary Policy.

RÉSUMÉ. Cet article compare d'abord la politique monétaire et de change menée par les PECO et celle poursuivie par l'un des pays voisins des États-Unis, le Mexique. Il montre que le Mexique a appliqué une politique raisonnablement expansionniste, stimulant la production tout en évitant les déséquilibres financiers et l'inflation, alors que les PECO ont suivi une stratégie plus rigide qui a conduit à l'apparition de déséquilibres. L'article examine les facteurs qui expliquent ces différences, autres que les choix faits en matière de gestion du taux de change par ces pays. Partant d'un modèle théorique à deux pays, (un "grand" pays et un "petit" pays), les auteurs analysent la politique de taux de change optimale dans le petit pays.

Classification *JEL* : E52 ; F31.
Mots-clefs : Taux de change ; politique monétaire.

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Introduction

In many cases, emerging countries which had, at first, chosen a fixed or a quasi-fixed exchange rate regime (Mexico, Korea, Thailand…) had to turn to a more flexible regime after an exchange rate crisis. However, this observation does not seem to discourage the Central European countries from joining EMU (the European Monetary Union) in the near future.

The literature tends to converge. Moving to a fixed exchange-rate system after joining the EU would be a source of difficulties for the emerging countries of Central Europe (CEECs), for various reasons, of a cyclical or a structural nature:

– shocks and cycles are different in the emerging countries and the euro zone (Dibooglu and Kutan, 2001; Estrin, Urga and Lazarova, 2001; Korhonen and Firdmuc, 2001; Koćenda, 2001; Brada and Kutan, 2001; Brada, Kutan and Zhou, 2002). After unification, these countries are unlikely to draw nearer to other EU countries, notably with a different industrial specialisation. The hope stemming from the prospect of endogenous criteria of an optimal currency area (Frankel and Rose, 1998) is undoubtedly in vain. This means that the asymmetries being large between the central European countries and the western European countries, a common monetary policy would be penalizing for the CEECs;

– in the CEECs, there is a shortfall in supply and productivity gains and a shortage in savings, and this will generate inflationary pressures that are incompatible with fixed nominal exchange rates (Eichengreen and Masson, 1998; Bofinger; 1996; Dibooglu and Kutan, 2001). Fighting these inflationary pressures by choosing rigid inflation targets, similar to those of the ECB, would be very detrimental by reducing companies' profit margins, when investment requirements are substantial (Aglietta, Baulant and Moatti, 2001). Normally, during the catching-up process, the excess of inflation in the low income country should be offset by a nominal depreciation of the currency;

– the convergence process with respect to price levels starting off from a lower level than in the CEECs implies higher inflation (Janackova, 2000; Richards and Tersman, 1996). If the convergence process of price levels is not corrected by a depreciation of the exchange rate, competitiveness considerably deteriorates.

On the one hand, this calls for a monetary policy that is not excessively restrictive in the CEECs; on the other hand exchange rate flexibility is the way to avoid that the entire adjustment be carried out via domestic prices:

– the quick increase in productivity in manufacturing leads to the apparition of the well-known Balassa-Samuelson effects;

– fixed exchange rates entail the threat of speculative crises (Bofinger and Wollmerschaeuser, 2000), and this is the argument propounded by partisans of "corner solutions" (pure flexibility or unification, see for example the discussions in Fischer, 2001; Eichengreen, 1994; Obstfeld and Rogoff, 1995).

Indeed Central European countries that have open economies and trade a lot with Europe have chosen fixed exchange rates (Von Hagen and Zhou, 2002). But the above shows that

the trade flows argument is insufficient. Actually, **the example of Mexico shows that trade integration is not a convincing argument in favour of setting fixed exchange rates with the "big neighbour"** (the United States for Mexico, the euro zone for the CEECs).

Trade integration and monetary integration

Many of the Central and Eastern European countries (CEECs) that joined the European Union in 2004 also want to join the European Monetary Union rapidly (between 2006 and 2009). Certain (Estonia) have a currency board with the euro, others (Hungary) are in the fluctuation margins of the EMS. This may seem reasonable given the trade integration between these countries and the euro zone; but the counter-example of Mexico, with its large trade integration with the United States, as it prefers to keep an independent currency, should give food for thought.

How do the ten future EU countries compare with Mexico?

Per capita income is similar in the CEECs and Mexico: between $11,000 and $12,000 in PPP. Long-run growth is stronger in the ten CEECs than in the euro zone (FIGURE 1), and this is also the case on average (with the noticeable exception of 1995) for Mexico (FIGURE 2).

The relative sizes of Mexico compared to the US and of the ten enlargement countries compared to Euroland are very similar (FIGURES 3a and 3b).

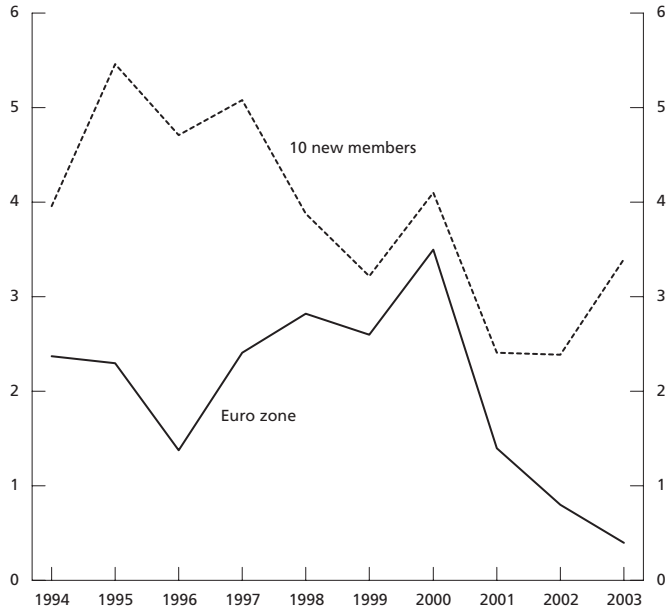
The ten CEECs ship a substantial percentage of their exports to the EU, in most cases ranging between 60% and 75% (TABLE 1); moreover, most of their remaining exports head to the other CEECs. 88% of Mexico's exports are shipped to the United States;

The ten CEECs and Mexico receive substantial direct investment from their "big neighbour": between 4% and 5% of GDP on average since 1995 for the CEECs, between 2 and 3% of GDP for Mexico.

There are therefore many similarities between the cases of the ten CEECs future members of the EU and that of Mexico. **They are quite small countries with high trade and financial integration (with the EU and the United States, respectively) and more robust growth than their neighbour.**

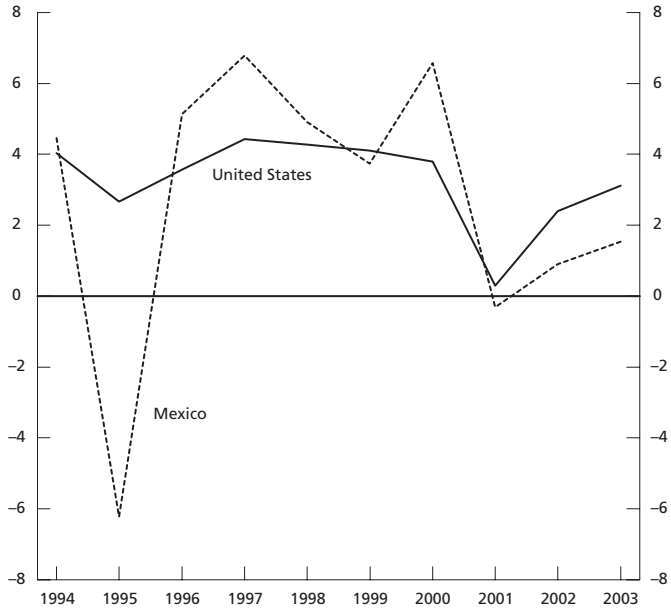
Perhaps, despite the economic, financial and trade integration, it could be favourable to keep a country's monetary autonomy? It might notably help **dampen the shocks that result from trade fluctuations in the big country that is the country's largest trading partner.**

Figure 1 - Real GDP (%)



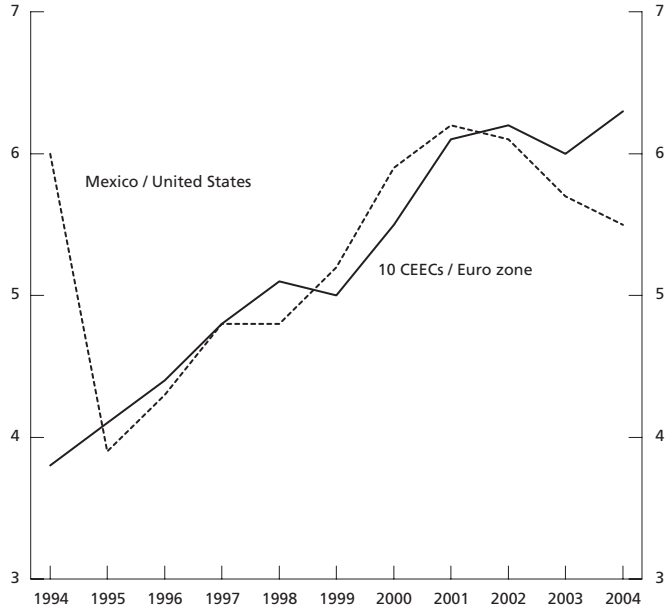
Sources: OECD, Economist Intelligence Unit.

Figure 2 - Real GDP (%)



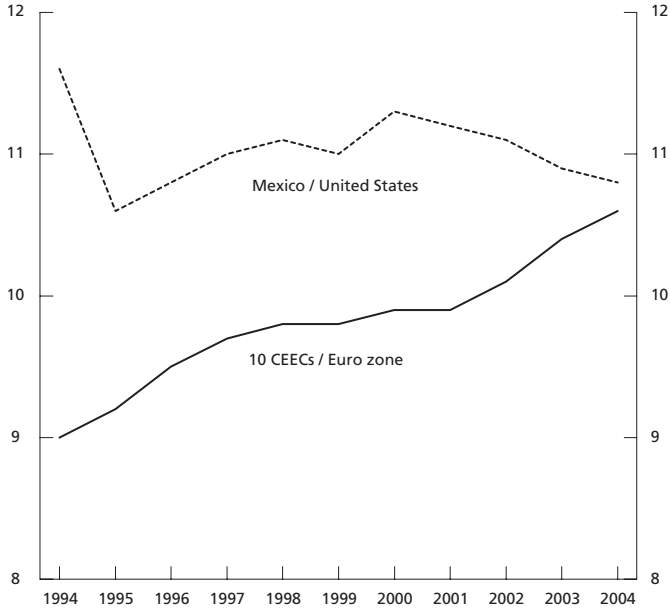
Sources : OECD, CDC IXIS.

Figure 3a - Nominal GDP ($, ratio in %)



Sources : DRI, CDC IXIS.

Figure 3b - Nominal GDP ($PPP, ratio in %)



Sources : DRI, CDC IXIS.

Table 1 - Share of exports going to the European Union or to the other CEECs (%)

	EU	Other CEECs
Czech Republic	69	20
Poland	71	16
Hungary	76	11
Slovakia	59	33
Slovenia	66	24
Malta	49	0
Cyprus	41	11
Latvia	63	21
Lithuania	50	34
Estonia	63	19

What is the apparent exchange rate policy of the CEECs?

Let us look at the cases of Poland, the Czech Republic and Hungary. As we pointed out above, the Hungarian forint has been pegged to the euro since 2001 after a long period of depreciation (FIGURE 4a); the Czech koruna has strengthened against the euro between 1999 and the first half of 2002, then has depreciated slowly; the zloty has fluctuated quite sharply: a large depreciation between 1994 and 1999, then an appreciation between 1999 and 2001, followed again by a sharp depreciation in 2002 and 2003 (FIGURE 4b). Overall, since 1998-99, and at least until 2002, these countries have pursued a strong currency policy.

We know that these countries have implemented a monetary policy based on inflation targets. The Czech Republic adopted an inflation target for its central bank from December 1997 onwards. TABLE 2 below shows the value of the inflation target.

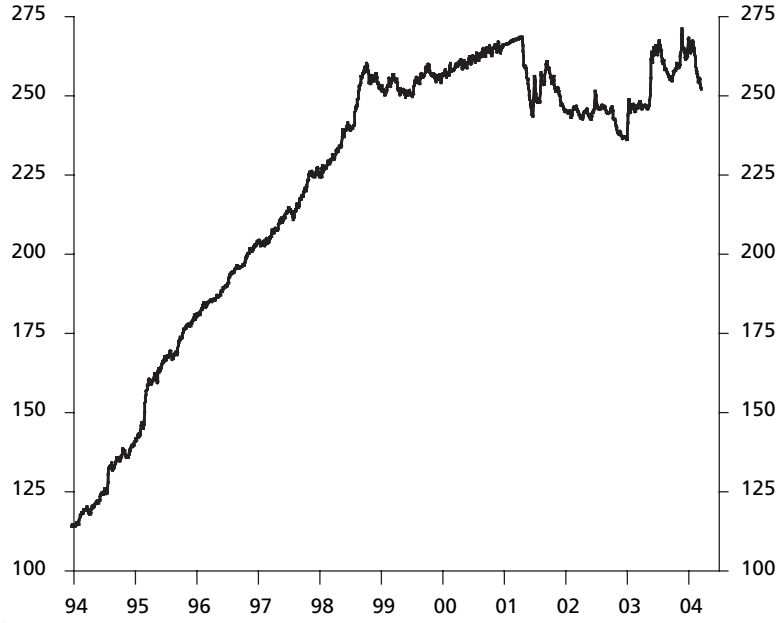
Poland adopted a policy of inflation targeting in 1998. TABLE 3 shows the targets that were set.

Hungary lastly changed over to inflation targeting in July 2001, with an inflation target centred around 2%. Monetary policy has remained tight until the start of 2002 in these three countries; after this date, the lower inflation due tot the cyclical downturn in the euro made it possible to cut short term interest rates. Let us come back to the exchange rate policy.

FIGURE 5 shows a strong real appreciation in all three cases against the euro until 2001 or 2002 (nominal appreciation or relative nominal stability with excess inflation). It results in substantial trade deficits (FIGURE 6), which do not affect the exchange rate because of the very high level of direct investments (FIGURE 7).

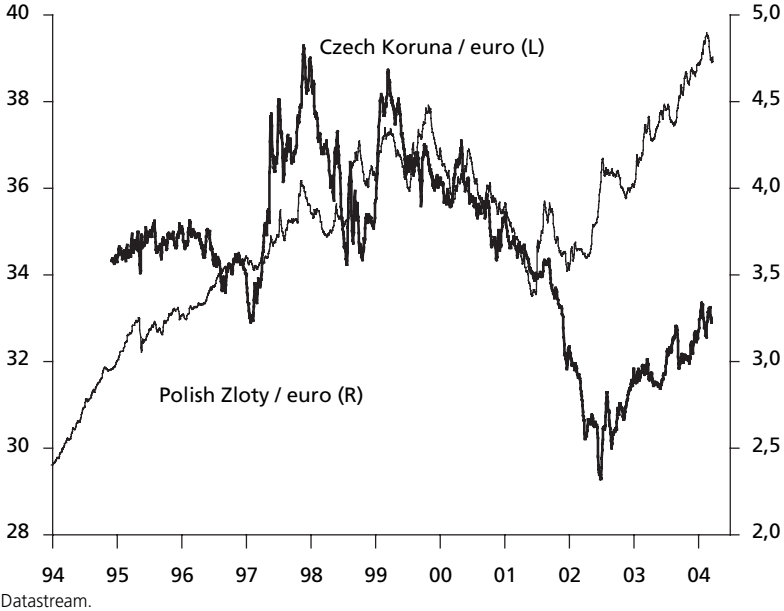
The real appreciation of central European currencies between 1995 and 2002 is one of the mechanisms, which permitted a rapid disinflation (FIGURE 8), but at the price of a large loss in competitiveness, hence the trade deficits.

Figure 4a - Hungarian forint: exchange rate against euro



Source: Datastream.

Figure 4b - Exchange rate against euro



Source: Datastream.

Table 2 - Inflation target in the Czech Republic (%)

1998	5.5-6.5
1999	4-5
2000	3.5-5.5
2001	2-4
2002	2.75-4.75
2003	2 -4 (1-3 for inflation net of administered prices)

Table 3 - Inflation target in Poland (%)

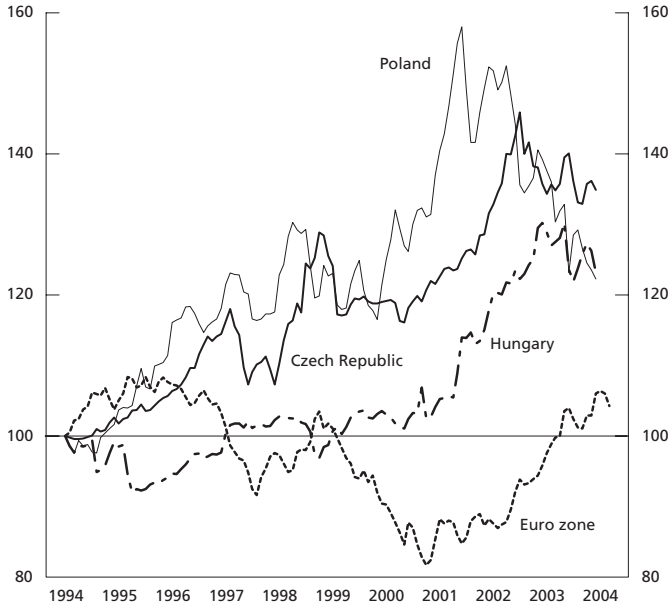
1999	6.4-7.8 then 8-8.5
2000	5.4-6.8
2001	6-8
2002	4-6
2003	less than 4

The external deficit is linked both to a rapid increase in domestic debt, consistent with the decline in households' savings rates (FIGURE 9a) and to the constantly very expansionary fiscal policies that have been implemented (FIGURE 9b).

All in all, these three "large" CEECs have implemented, until 2002, monetary and exchange-rate policies focused far more on fighting inflation than stimulating foreign trade, rebalancing the trade balance or stabilising growth.

After 2002, a reversal of these policies is visible, especially in Poland. Clearly enough, the prospect of the entry in the Monetary Union has made the financial imbalances sustainable so far; the expectation that those countries would join the euro in the future has probably avoid a currency crisis, in spite of the large trade deficits, and has certainly increased the size of foreign direct investments to those countries, therefore offsetting the current account deficits. Bizarrely, the prospect of monetary integration made it possible for CEECs to pursue a policy of real exchange rate appreciation *vis-à-vis* the euro between 1995 and 2001.

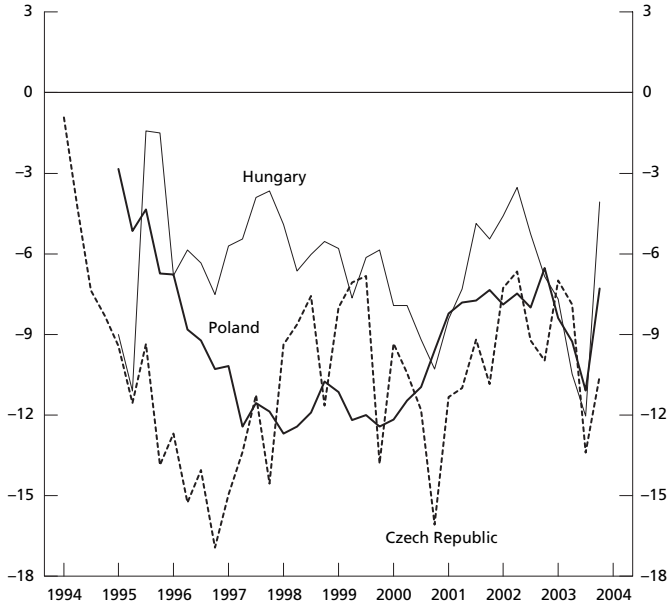
Figure 5 - Real trade-weighted exchange rate deflated by prices (1994 = 100)*



* rise = real appreciation.

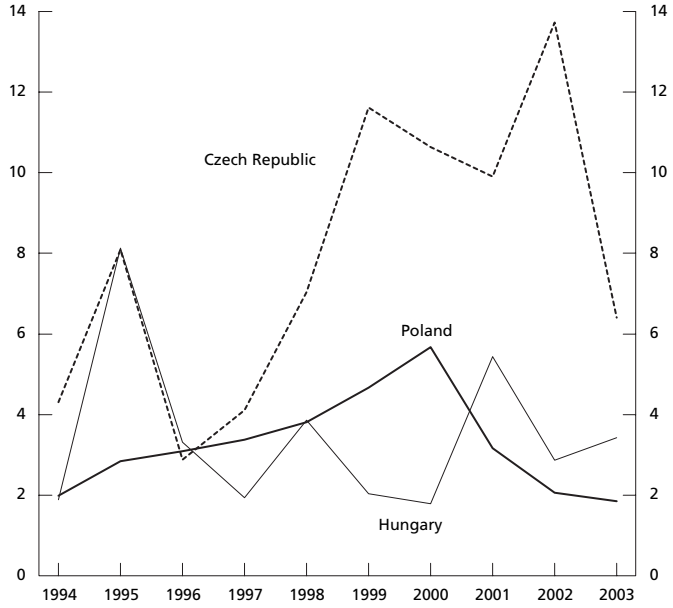
Source: Datastream.

Figure 6 - Trade balance (as % of GDP)



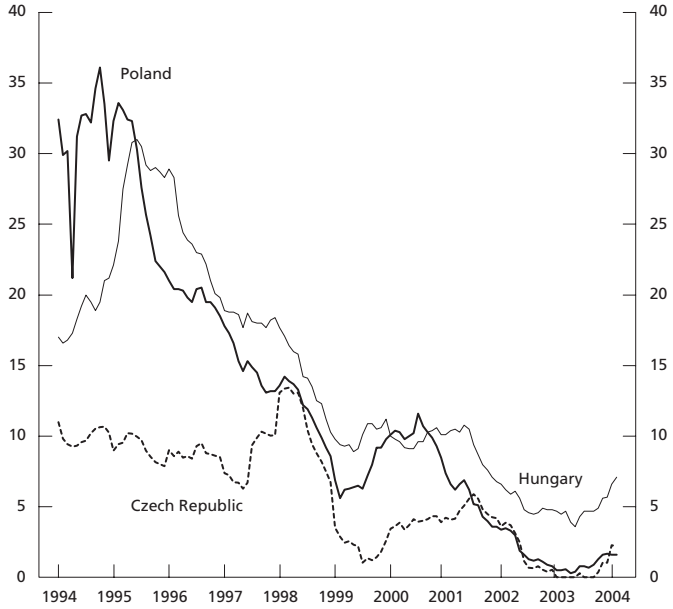
Source: Datastream.

Figure 7 – Net direct investment (as % of GDP)



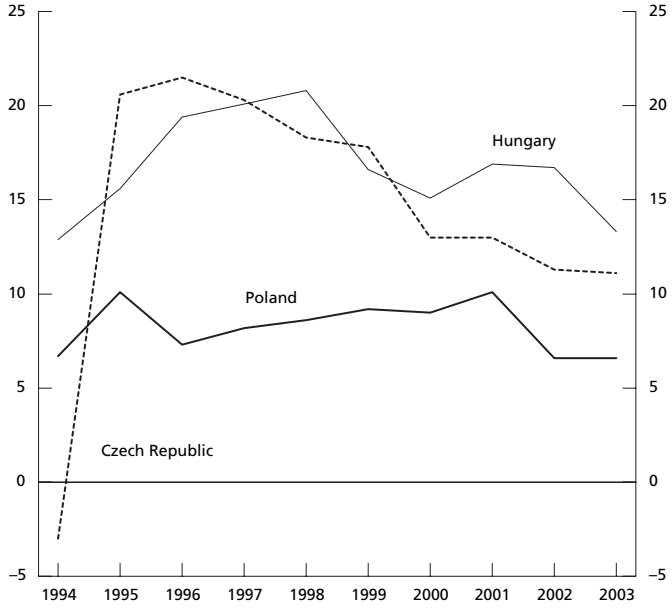
Source: Economist Intelligence Unit.

Figure 8 – Consumer price index (Y/Y as %)



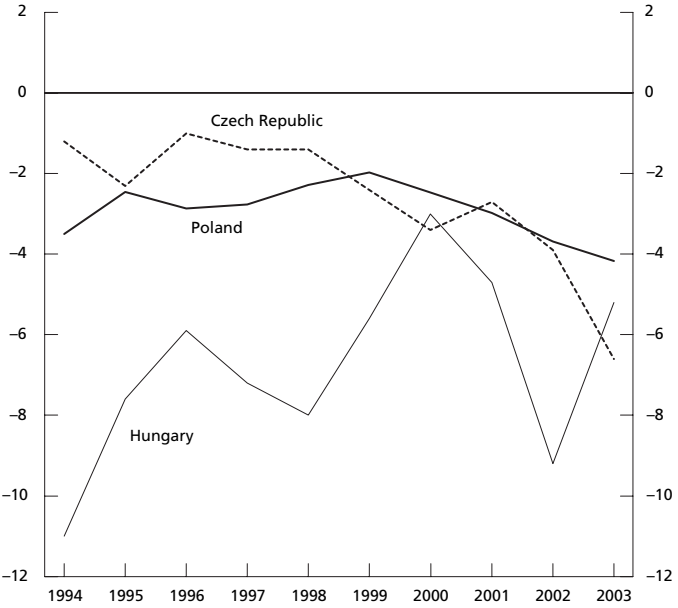
Source: Datastream.

Figure 9a – Households' savings rate



Source: OECD.

Figure 9b – Fiscal deficit (as % of GDP)



Sources: OECD, Economist Intelligence Unit, CDC IXIS.

Monetary and exchange-rate practice in Mexico

It is very different. In the long run, the peso has depreciated against the US dollar (FIGURE 10a), and is still depreciating in 2002-2003. Before the devaluation of the peso, inflation in Mexico was much higher than in the United States (FIGURE 10b), and competitiveness worsened continuously.

Mexico's competitiveness was restored with the devaluation of 1994-1995, and since then has trended in lockstep with that of the United States (FIGURE 11).

After the currency crisis of 1994-95, monetary policy in Mexico has been on average stimulating, (except during the emerging country crisis of 1998, FIGURE 12).

This policy has allowed Mexico to most often post higher growth than the United States as has been seen above (FIGURE 2).

Since 1996, unemployment in Mexico has declined and stabilized well under the level of unemployment in the United States, the budget deficit has been constantly very small as well as the trade deficit (FIGURE 13).

All in all, Mexico has had an efficient monetary and exchange-rate practice, which has paved the way for disinflation (in Mexico), and a competitiveness gain over the United States since the mid-1990s, without any serious imbalance.

Of course, Mexico will keep its monetary independence, which is extremely different from the situation in the CEECs, with the prospect of joining the euro. Financial markets have therefore played a strategy of convergence for Central European Countries, stabilizing *de facto* their currencies *vis-à-vis* the euro, which is not the case for Mexico.

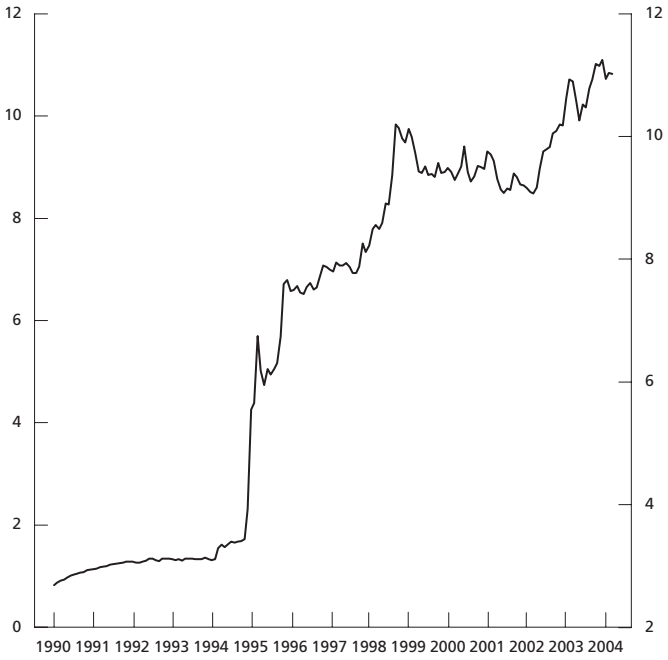
The monetary practice of Mexico has therefore been apparently very efficient whereas that of the three CEECs we are studying, as it has been more rigid and has led to a real overvaluation, has resulted in substantial financial imbalances.

Again, those imbalances have been sustainable so far partly because of the prospect of joining the euro in the future, which means that the comparison with Mexico, which will keep its monetary independence, is clearly biased.

Also, they may depend on the **situation in the neighbouring large country**; the United-States have almost constantly experienced more growth than Euroland country (FIGURE 14).

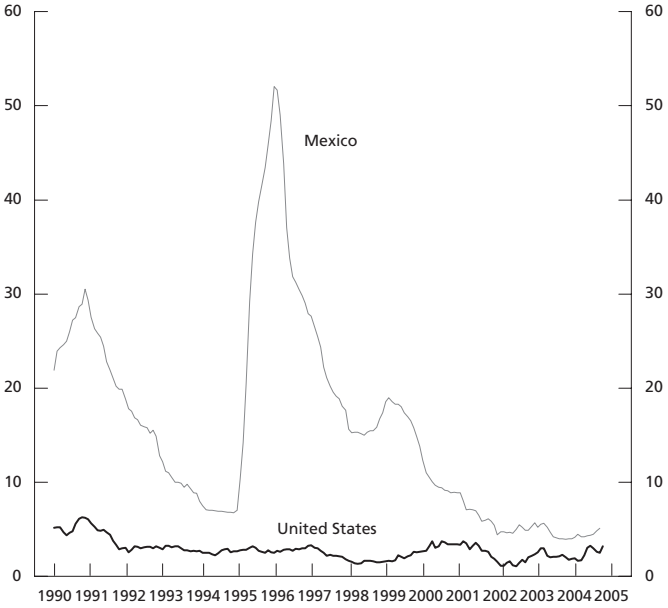
However, even taking into account these structural differences between Central European Countries and Mexico, it appears that the monetary and exchange rate strategies have differed, with, at least until 2001-2002, the choice in Central Europe of a conservative monetary policy making disinflation possible at the cost of a loss in competitiveness; since 1995 in Mexico, a policy of stable and favourable real exchange rates.

Figure 10a – Mexico: exchange rate against the US$ (Peso/$)



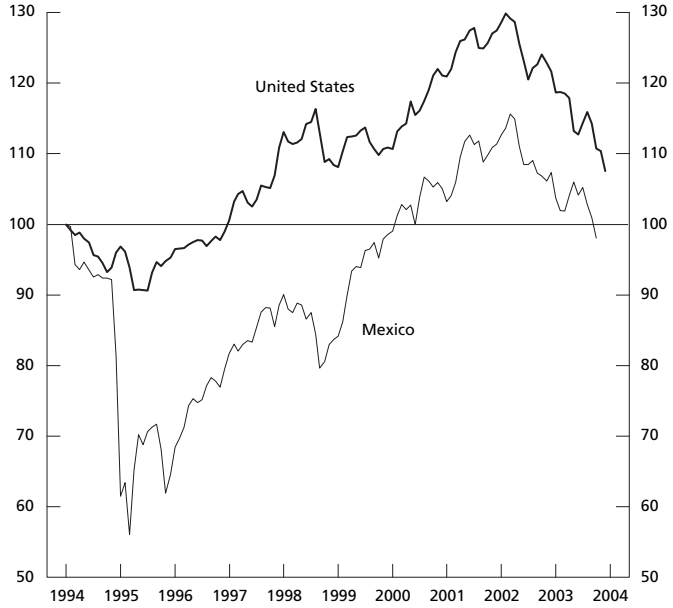
Source: Datastream.

Figure 10b – Inflation (Y/Y)



Sources: Datastream, IXIS CIB.

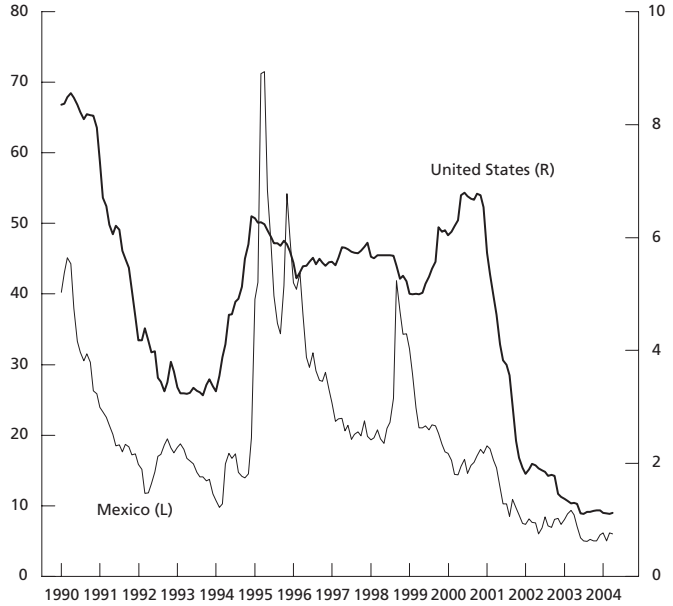
Figure 11 – Real trade-weighted exchange rate (1994 = 100)*



* rise = real appreciation

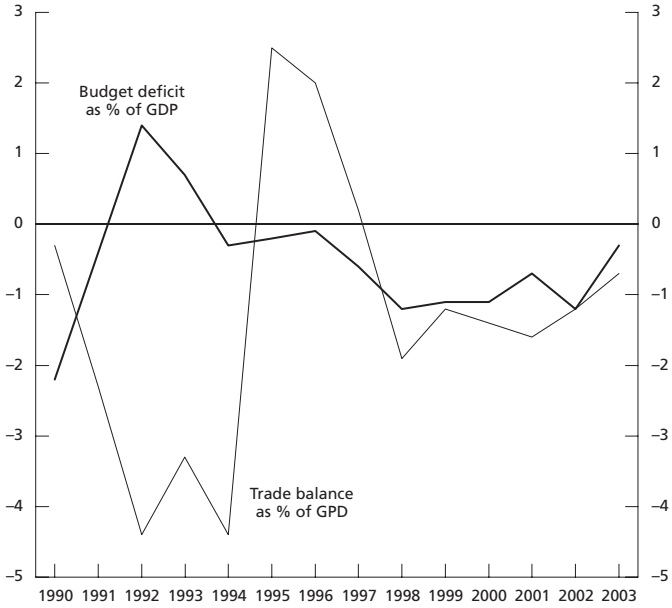
Source: Datastream.

Figure 12 – Three-month interest rate



Source: Datastream.

Figure 13 – Mexico: trade balance and budget deficit



Source: Economist Intelligence Unit.

Figure 14 – GDP growth (Y/Y in %)

Sources: Bureau of Economic Analysis, European Central Bank.

The theoretical model

We are now going to develop a theoretical model that highlights the case in which fixed nominal exchange rates are noticeably detrimental for a "small country" with significant trade integration with a "large country". We will introduce the preferences of the authorities in countries, supply and demand shocks or structural asymmetries, and an effect from expectations about the exchange rate policy on interest rates in the small country.

We will try to make the model as consistent as possible, keeping it simple, with the situation between EU and Central European Countries. We will also try to limit the number of cases and shocks to those which are relevant in the present situation of Europe, namely:
– slow growth in Euro zone countries;
– ECB focusing on the stabilization of prices;
– insufficient level of supply of goods and services in CEECs;
– insufficient flexibility of the goods and labor markets in central Europe.

We will first present:
– the model;
– the policy choices of the large country;
– the policy choices of the small country.

Description of the model

The "large country"

All parameters are assumed to be positive. Its economic equilibrium does not depend on that of the "small country". We have:

$$y = -\alpha r + \varepsilon \tag{1}$$

y stands for production, r the interest rate, ε the **demand disturbance**.

$$p = \theta\left(y - z - \eta\right) \tag{2}$$

z stands for the supply of goods, p price level, η is a **supply disturbance**. As we look at short-term effects, we do not distinguish between the price level and inflation, and we will also interpret as representing inflation.

Production decreases with the interest rate, and the price level rises with the excess demand for goods.

The "small country"

Demand y^* depends on production in the big country and on competitiveness in the small country compared to the large country.

$$y^* = -\alpha r^* + \beta\left(e + p - p^*\right) + \gamma y \tag{3}$$

e stands for the exchange rate (when e rises the currency of the small country depreciates against the big country's); p^* is the price level in the small country.

$$p^* = \theta\left(y^* - z^*\right) + \mu\left(e + p\right) \qquad \left(\mu < 1\right) \tag{4}$$

$e + p$ stands for imported inflation in the small countries, μ is the share of imported goods in demand in the small country. Normally, in an emerging country, z^* (the supply of goods and services) is insufficient and inflation tends to increase. If the goods and labor markets are very flexible, θ is large (production adjuste quickly to supply).

We suppose that exchange rate e is chosen by the authorities of the small country and that, with perfect international mobility of capital:

$$r^* = r + \dot{e}^a \tag{5}$$

where $\dot{e}^a$ stands for the currency's expected depreciation.

The authorities' goal is (written under the form of a **loss function**).

- In the **large country:**

$$L = \left(Y - y\right)^2 + Ap^2 \tag{6a}$$

where Y stands for full employment production.

L is minimised by the choice of r; A stands for the relative weight of the price stability target.

- In the **small country:**

$$L^* = \left(Y - y^*\right)^2 + Bp^{*2} \tag{6b}$$

L^* is minimised by the choice of e, B is the equivalent of A, for the small country. This means that, once the exchange rate policy is chosen, the interest rate of the small country depends on the large country's monetary policy.

In the case of Euro zone, one can think that the aversion for inflation of the Central Bank is large, which means that the interest rate r is chosen with **a large value of A in the loss function**.

Normally, a small country with an initially low level of income should put more weight on growth, on the reduction of unemployment, and one should have therefore $B < A$; this is clearly the case for Mexico (see the above discussion), perhaps not for CEECs.

The equilibrium is repeated. At **period 0**, the equations (1) to (5) and the choices made by the authorities determine r, r^*, e, y, y^*, p, p^*. In **period 1**, the same equilibrium is achieved with different disturbances (ε and η) in the large country, and this determines the expectations provided in period 0 with respect to exchange rate e, e^a , hence the interest rate r^* of period 0.

(3) (4) and (5) imply:

$$y^*\left(1 + \beta\theta\right) = -\alpha\left(r + \dot{e}^a\right) + \beta\theta z^* + \beta\left(1 - \mu\right)\left(e + p\right) + \gamma y \tag{7}$$

hence, identifying p and y of the large country:

$$\begin{aligned} y^*\left(1 + \beta\theta\right) = {} & -\alpha\dot{e}^a + \beta\theta z^* + \beta\left(1 + \mu\right)e - \alpha\left(1 + \beta\left(1 - \mu\right)\theta + \gamma\right)r \\ & + \left(\beta\left(1 - \mu\right)\theta + \gamma\right)\varepsilon - \beta\left(1 - \mu\right)\theta\left(z + \eta\right) \end{aligned} \tag{8}$$

In (7) and (8), the interest rate r in the large country is taken as given. In the next section, we will identify the way r is determined. $\dot{e}^a$, the expected depreciation is also taken as given.

Production in the small country grows if a favourable demand disturbance appears in the large country ($\varepsilon > 0$), decreases with the interest rate of the large country (r), and decreases with a rise in the supply of the large country ($z > 0$) which reduces prices in the large country and deteriorates the competitiveness of the small country.

We also have:

$$p^*\left(1+\beta\theta\right) = -\alpha\theta\dot{e}^a - \theta z^* + \left(\beta\theta+\mu\right)e - \theta\left(\beta\theta+\mu\right)\left(z+\eta\right) - \alpha\theta r\left(1+\beta\theta+\mu+\gamma\right) + \theta\left(\beta\theta+\mu+\gamma\right)\varepsilon \tag{9}$$

A rise in production in the large country ($\varepsilon > 0$) increases the price of the small country directly *via* imported inflation and *via* the positive effect on production in the small country. A low level of supply (z^*) in the small country leads to more inflation.

We still have to specify how the small country chooses the exchange rate e. The level of interest rate $r + \dot{e}^a = r^*$ in the small country is imposed on it; we suppose that the authorities of the small country take the currency's expected depreciation as given. Let us suppose that there is a **monetary equilibrium**: $m^* = p^* + y^* - \gamma r^*$; among the determinants (8) and (9) of y^* and p^*, only e is determined in the small country; the choice of the money supply m^* is then equivalent to that of nominal exchange rate e.

The instruments of monetary policy are therefore:
– the interest rate r in the large country;
– the nominal exchange rate e in the small country.

Since the policy decisions of the small country have no effect on the large country, the equilibrium is sequential: first, choice of r in the large country then, choice of e in the small country.

Policy choices of the large country

The large country minimises L of (6a) by the choice of the interest rate r once the disturbances ε and η are observed, i.e.:

$$Min\left(Y+\alpha r-\varepsilon\right)^2 + A\theta^2\left(-\alpha r+\varepsilon-\left(z+\eta\right)\right)^2 \tag{10}$$

hence:

$$\alpha r = \varepsilon - \frac{\left(Y + A\theta^2\left(z+\eta\right)\right)}{1+A\theta^2} \tag{11}$$

hence, in the small country, after taking into account the determination of the interest rate:

$$y^*\left(1+\beta\theta\right) = -\alpha\dot{e}^a + \beta\theta z^* + \beta\left(1-\mu\right)e - \varepsilon + \frac{Y}{1+A\theta^2}\left(1+\beta\left(1-\mu\right)\theta+\gamma\right) + \frac{\left(A\theta^2\left(1+\gamma\right)-\beta\left(1-\mu\right)\theta\right)\left(z+\eta\right)}{1+A\theta^2} \tag{12}$$

and

$$\begin{aligned} & p^*\left(1+\beta\theta\right) = -\alpha\theta\dot{e}^a - \theta z^* + \left(\beta\theta+\mu\right)e - \theta\varepsilon \\ & +\frac{\theta\left(1+\beta+\mu+\gamma\right)}{1+A\theta^2}y + \frac{\theta}{1+A\theta^2}\left(-\beta\theta-\mu+A\theta^2\left(1+\gamma\right)\right)\left(z+\eta\right) \end{aligned} \tag{13}$$

A favourable demand disturbance in the large country ($\varepsilon > 0$) leads to an increase in the interest rate r, hence to a decrease in production and inflation in the small country (y^* and p^*); a favourable supply disturbance in the large country ($\eta > 0$), if A is large (the large country favours the stabilization of inflation), reduces the common interest rate, hence increases y^* and p^*.

If $A = +\infty$ (very large (ECB-like) weight on the stabilization of inflation in the large country), $\alpha r = \varepsilon - z$, $y = z - \eta$, $p = 0$ and:

$$\begin{cases} y^*\left(1+\beta\theta\right) = -\varepsilon - \alpha\dot{e}^a + \beta\theta z^* + \beta\left(1-\mu\right)e + \left(1+\gamma\right)\left(z+\eta\right) \\ p^* = \theta\left(y^* - z^*\right) + \mu e \end{cases}$$

If A is high, a rise in $z + \eta$ (supply in the large country) leads to a fall in r, and a rise in y, hence a rise in y^* and p^*. A rise in demand in the large country ($\varepsilon > 0$) does not change, given the reaction in monetary policy, production in the large country, but it does lead to a rise in the interest rate of the small country and therefore to a fall in its production.

Exchange rate policy of the small country

The small country knows the monetary policy of the large country, and therefore knows that its production and its inflation are determined by (12) and (13); it takes $\dot{e}^a$ as given.

The minimisation of ((6b) given (12) and (13) leads to:

$$\begin{aligned} & \left[\left(\beta\left(1-\mu\right)\right)^2 + B\left(\beta\theta+\mu\right)^2\right]e = Y\begin{bmatrix} \beta\left(1-\mu\right)\left(\left(1+\beta\theta\right) - \frac{1}{1+A\theta^2}\left(1+\beta\left(1-\mu\right)\theta+\gamma\right)\right) \\ -B\left(\beta\theta+\mu\right)\frac{\theta\left(1+\beta\theta+\mu+\gamma\right)}{1+A\theta^2} \end{bmatrix} \\ & +\left(\alpha\dot{e}^a+\varepsilon\right)\left[\beta\left(1-\mu\right)+\theta B\left(\beta\theta+\mu\right)\right] + \theta z^*\left[-\beta^2\left(1-\mu\right)+B\left(\beta\theta+\mu\right)\right] \\ & +\frac{z+\eta}{1+A\theta^2}\begin{bmatrix} -\beta\left(1-\mu\right)\left(A\theta^2\left(1+\gamma\right)-\beta\left(1-\mu\right)\theta\right) \\ -B\left(\beta\theta+\mu\right)\theta\left(-\beta\theta-\mu+A\theta^2\left(1+\gamma\right)\right) \end{bmatrix} \end{aligned} \tag{14}$$

A positive demand disturbance in the large country ($\varepsilon > 0$) leads to an increase in interest rates (in both countries), hence to a depreciation of the currency of the small country ($e > 0$) to stabilize both output and inflation.

A positive supply shock in the large country ($\eta > 0$) if A is large (the large country mostly stabilizes inflation) leads to an *ex ante* increase in production and inflation in the small country, hence to an appreciation of its currency.

It has been argued before that a large parameter A (the ECB weights more the stabilization of prices than the stabilization of output) corresponds well to the current situation in Europe.

We have argued as well that:

– demand in western Europe is growing slowly, which corresponds to a situation where $\varepsilon < 0$, hence to an appreciation of central European currencies (because of the decrease in interest rates);

– supply in central Europe is insufficient (z^* is low), which leads to a depreciation of central European currencies if B (weight put in central Europe on the stabilization of prices) is not too large, which we have assumed is the case.

(14) lastly allows us to calculate the expected depreciation of exchange rate $\dot{e}^a$. We suppose that the demand ε and supply η disturbances are independent from one period to another and that Y, z^* and z are constant over time.

This implies:

$$\left(\left(\beta(1-\mu)\right)^z + B\left(\beta\theta+\mu\right)^2\right)\left(e-e^a\right) = \left(\beta(1-\mu)+\theta B\left(\beta\theta+\mu\right)\right)\varepsilon$$
$$+\frac{\eta}{1+A\theta^2}\begin{bmatrix} -\beta(1-\mu)\left(A\theta^2(1+\gamma)-\beta(1-\mu)\theta\right)-B\left(\beta\theta+\mu\right)\theta \bullet \\ \left(-\beta\theta-\mu+A\theta^2(1+\gamma)\right)\end{bmatrix} \qquad (15)$$

With $e^a - e = \dot{e}^a$

Let us suppose $\varepsilon > 0$ (favourable demand shock in the large country); the rise in interest rate r then reduces y^* and p^*; it triggers the currency's depreciation in the small country ($e > 0$) as a reaction. Consequently, since the expected value of ε is nil, $e - e^a > 0, \dot{e}^a$ decreases with ε.

If $\eta > 0$ (favourable supply shock in the large country), the interest rate of the large country decreases, (and this is favourable for the small country in terms of production), but the price of the large country decreases (and this unfavourable for the small country in terms of production). The direction of the reaction of the exchange rate is therefore ambiguous. If A (reaction to inflation in the large country) is large, a positive supply shock in the large country leads to an unambiguous appreciation of the currency of the small country.

However, since $e^a - e$ varies in the opposite sense to e, **in all cases the reaction of expectations about the exchange rate reduces the need to change the exchange rate, and is stabilising**.

If $\varepsilon > 0$, $\dot{e}^a < 0$, which reduces the increase in the interest rate r^* of the small country $\left(r^* = r + \dot{e}^a, \text{and } r \text{ increases with } \varepsilon\right)$. If $\eta > 0$, $\dot{e}^a > 0$, which reduces the decline in r^*.

Advantage of exchange-rate flexibility for the small country

We are here going to focus first on the effects of disturbances in the large country (ε demand shock, η supply shock).

To simplify denotations, we define:

$$\omega_0 = \frac{\beta(1-\mu)}{\left(\beta(1-\mu)\right)^2 + B\left(\beta\theta+\mu\right)^2};\ \omega_1 = \frac{\theta B\left(\beta\theta+\mu\right)}{\left(\beta(1-\mu)\right)^2 + B\left(\beta\theta+\mu\right)^2}$$
$$\omega_2 = \frac{1}{1+A\theta^2}\begin{bmatrix}\omega_0\left(\beta(1-\mu)\theta - A\theta^2(1+\gamma)\right)\\ +\omega_1\left(\beta\theta+\mu-A\theta^2(1+\gamma)\right)\end{bmatrix} \quad (16)$$

We then have, by rewriting (14) omitting *Y*, *z** and *z*:

$$e = \left(\alpha\left(e^a - e\right)+\varepsilon\right)\left(\omega_0+\omega_1\right)+\omega_2\eta \quad (17)$$

and rewriting (15):

$$e - e^a = \left(\omega_0+\omega_1\right)\varepsilon + \omega_2\eta \quad (18)$$

hence:

$$\begin{cases} e = \left(\varepsilon\left(\omega_0+\omega_1\right)+\eta\omega_2\right)\left(1-\alpha\left(\omega_0+\omega_1\right)\right)\\ \alpha\left(e^a-e\right)+\varepsilon = \varepsilon\left(1-\alpha\right)\left(\omega_0+\omega_1\right)\right) - \alpha\omega_2\eta \end{cases} \quad (19)$$

This leads to:

$$\begin{cases} y^*\left(1+\beta\theta\right) = -\varepsilon\left(1-\alpha\left(\omega_0+\omega_1\right)\right)\left(1-\beta(1-\mu)\left(\omega_0+\omega_1\right)\right)\\ \qquad + \eta\left[\alpha\omega_2 + \beta(1-\mu)\bullet\omega_2\left(1-\alpha\left(\omega_0+\omega_1\right)\right) - \frac{\left(\beta(1-\mu)\theta - A\theta^2(1+\gamma)\right)}{1+A\theta^2}\right]\\ p^*\left(1+\beta\theta\right) = -\varepsilon\left(1-\alpha\right)\left(\omega_0+\omega_1\right)\right)\left(\theta-\left(\beta\theta+\mu\right)\left(\omega_0+\omega_1\right)\right)\\ \qquad + \eta\left[\alpha\theta\omega_2 + \left(\beta\theta+\mu\right)\omega_2\left(1-\alpha\right)\left(\omega_0+\omega_1\right)\right)\\ \qquad\qquad - \frac{\theta\left(\beta\theta+\mu-A\theta^2(1+\gamma)\right)}{1+A\theta^2}\right] \end{cases} \quad (20)$$

We have assumed that *A* is large (the Central Bank of the large country focuses on the stabilization of inflation); this implies that $\omega_2 < 0$ (*e* appreciates when $\eta > 0$ depreciates when $\varepsilon > 0$).

If the small country keeps a **fixed exchange-rate system**, we have *e* = 0 and:

$$\begin{cases} y^*\left(1+\beta\theta\right) = -\varepsilon + \frac{\left(A\theta^2(1+\gamma)-\beta(1-\mu)\theta\right)}{1+A\theta^2}\eta\\ p^*\left(1+\beta\theta\right) = -\theta\varepsilon + \frac{\theta\left(-\beta\theta-\mu+A\theta^2(1+\gamma)\right)}{1+A\theta^2}\eta \end{cases} \quad (23)$$

If there is no reaction of the exchange rate, a positive demand shock in the large country ($\varepsilon > 0$) leads to a rise in interest rates r and r^* and reduces production and the price of the small country; a positive supply shock in the large country ($\eta > 0$), if A is large (which we have assumed), leads to a decline in the large country's interest rate, and therefore increases production and the price of the small country.

Let us look now at what the small country loses **by choosing fixed exchange rates**.

Demand shocks (ε) in the large country

If $B = 0$ (priority given to stabilising demand), the loss is manifest since $y^* = \frac{-\varepsilon}{1+\beta\theta}$ in fixed exchange rates, $y^* = 0$ in flexible exchange rates.

If B **is high** (priority given to price stabilisation), we have $p^* = \frac{-\theta\varepsilon}{1+\beta\theta}$ in fixed exchange rates and $p^* = 0$ in flexible exchange rates and the loss stemming from the choice of fixed exchange rates is also very high.

Supply shocks (η) in the large country

If $B = 0$ (the ECB penalizes unemployment only), with fixed rates (A being large, as previously assumed), $y^* = \frac{(1+\gamma)\eta}{1+\beta\theta}$ with flexible rates, $y^* = 0$.

If $B = +\infty$ the ECB penalizes inflation only, with fixed rates $p^* = \frac{(1+\gamma)\eta}{1+\beta\theta}$, with flexible rates, $p^* = 0$.

Flexible exchange rates are always largely preferable for the small country in the event of a demand shock in the large country, if the large country's aversion for inflation is large.

Let us examine the case of insufficient demand in the large country ($\varepsilon < 0$). It leads to decline in interest rates and to an increase in inflation and production in the small country. This is not what one normally has in mind; that slow growth in Western Europe leads to insufficient growth in Central Europe. However, if the ECB reacts normally to slow growth in Western Europe, this might very well lead to "overheating" in Central Europe if interest rates are closely related.

Structural distortions in the small country

Insufficient supply

Let us return to expression (14) of the optimal exchange rate in the small country, without taking into account shocks in the large country any more but by looking at the effects from structural distortions to be expected in the CEECs. Primarily, it consists in a **shortfall in supply in relation to demand**. Income growth is strong, with productivity gains in industry and the convergence in wages towards those prevailing in the rest of Europe, but supply remains weak, especially in services.

This can be denoted by a **decline** in z^* (shortfall in supply in the small country, $z^* < 0$).

It leads, *ex ante*, to a fall in production (see (12)), and a rise in inflation in the small country (see (13)). The optimal reaction of the exchange rate depends on the sign of $B(\beta\theta + \mu) - \beta^2(1-\mu)$.

If the aversion for inflation is high in the small country (B is high), this leads to an appreciation in the exchange rate ($e < 0$). If the preference for full employment is high (B is low) to a depreciation. Undoubtedly, this is where the neighbouring countries of the United States (low B) are different from the CEECs (high B), as we saw above.

If the "small country" has a large aversion for inflation, and if it suffers from an unfavourable supply shock (from a structural shortfall in the supply of goods), it will want to get its currency to appreciate. But this policy, undoubtedly implemented by the CEECs, will obviously weaken growth, and this accounts for the different choices made in Mexico and in Central Europe.

Insufficient flexibility of the goods market (of prices)

If the flexibility of prices is large, $\theta \to +\infty$: the goods market becomes competitive (demand equals supply).

(i) Disturbances in the large country

With $\theta = +\infty$, one has (using the previously defined notations), with flexible exchange rates:

- $\omega_0 = 0$, $\omega_1 = 1$, $\omega_2 = -(1+\gamma)$
- $e = (\varepsilon - (1+\gamma)\eta)(1-\alpha)$
- $y^* = 0$, $p^* = 0$

(ii) Insufficient supply in the small country

With flexible exchange rates:

- $e = 1/\beta z^*$
- $y^* = z^*$, $p^* = 0$

With fixed exchange rates:

$$e = 0, \quad y^* = z^*, \quad p^* = -1/\beta z^*$$

If the main issue is the disturbances arising in the large country, if the goods market of the small country is fully flexible, the exchange rate flexibility permits to maintain the optimal equilibrium in the small country.

If the main issue is the low level of supply in the small country and if the goods market is fully flexible (prices are fully flexible), then flexibility of exchange rates permits to stabilize inflation.

The theoretical model we have developed shows that:

– the flexibility of exchange rates is in all cases favourable in case of supply and demand disturbances affecting the large country;

– an appreciation of the currency in case of insufficient supply in the small country is favourable only if the small country favours the stabilization of inflation;
– the flexibility of the exchange rate is desirable even if the flexibility of the goods and labour markets is large in the small country.

Conclusion

We are dealing with either odd preferences, or a mistaken strategy, or the fear of a financial crisis. The monetary and exchange-rate practice in the CEECs with respect to the euro zone seems to be very different from that of Mexico with the United States.

This can result from:
– a preference for fighting inflation over catching up in terms of growth, and this does not appear reasonable for countries with an intermediate level of income;
– the refusal to apply "beggar-thy-neighbour" policies effectively practised by small countries that depreciate their currency against that of the neighbouring big country;
– or from the will to get the markets to anticipate swift accession to the European Monetary Union to prevent the possible costs (rise in yield spreads, currency crisis) from existing financial (fiscal and external) imbalances.

The problem is that the monetary and exchange rates implemented are in fact the crucial cause of these financial imbalances.

P. A.

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