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Credibility, Cost of Reneging and the Choice of Fixed Exchange Rate Regime*

Bo Sandemann Rasmussen†

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Abstract

The choice of exchange rate regime is considered for a small open economy. Assuming that different forms of fixed exchange rate regimes involve different costs of reneging, it is shown that one potential beneficial aspect of joining a monetary union with a common currency is that it is less likely to be exposed to "speculative attacks" than less formalized fixed exchange rate arrangements.

Keywords: Monetary union, fixed exchange rate, credibility, cost of reneging, multiple equilibria.

JEL: F33, F41.

1. Introduction

One way of establishing monetary credibility in open economies is to fix the nominal exchange rate. Initially in the monetary credibility literature it was merely assumed that the policy-maker could somehow commit to a fixed exchange rate (see e.g. Horn and Persson (1985) and Rasmussen (1993)) whereas the subsequent literature has discussed how credibility can be established. Credibility can either be endogenously determined by the future losses incurred when departure from a fixed exchange rate regime triggers changes in future exchange rate expectations, leading to higher average inflation (see e.g. de Kock and Grilli (1993) and Andersen (1998)), or it can follow from some exogenously specified cost of reneging

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(see e.g. Flood and Isard (1989) and Obstfeld (1996, 1997)). In both cases unexpectedly large shocks can lead to the fixed exchange rate policy being abandoned due to the gains from stabilization against the shock exceeding the cost of losing credibility. In the present paper we extend the literature focusing on credibility arising from costs of reneging by noticing that different institutional settings for fixing the exchange rate carry different costs of reneging such that the monetary authorities in principle through the choice of monetary regime can choose a certain level of the cost of reneging. Our main theoretical finding is that for intermediate levels of the cost of reneging multiple equilibria prevail, rendering fixed exchange rate regimes with such levels of the cost of reneging fundamentally unstable. For higher levels of the cost of reneging, however, a credible fixed exchange rate regime will be an equilibrium. The policy implication is then that since a monetary union with a common currency involves a significantly higher cost of reneging than other fixed exchange rate regimes (due to the costs of reestablishing an independent currency), one possible advantage of a monetary union is that it is more "stable" and less subject to "speculative attacks" than less formalized fixed exchange rate regimes.

2. The Model

Consider the following model for a small open economy producing a single tradable good whose price (in foreign currency) is exogenously given from the world market. Output is determined by

$$y_t = \overline{y} + (\pi_t - \pi_t^e) + z_t, \tag{2.1}$$

where $\overline{y}$ is a constant, π_t is the inflation rate, π_t^e is expected inflation, and z_t is a productivity shock with zero mean and constant variance σ_z^2. To simplify, we consider the case where z_t can take on two values only:[1]

$$z_t = \begin{cases} -Z & with \quad probability\ \frac{1}{2} \\ Z & with \quad probability\ \frac{1}{2} \end{cases}.$$

Obviously, $E(z_t) = 0$ while $\sigma_z^2 = Z^2$. Assuming that the law of one price holds (and that there is no world inflation) the domestic inflation rate is determined by the rate of depreciation of the exchange rate, $\widehat{e}_t$,

$$\pi_t = \widehat{e}_t. \tag{2.2}$$

[1] For the purpose of generating multiple equilibria this simple stochastic structure turns out to be sufficiently general. In fact, using a uniform probability distribution Obstfeld (1996) generates exactly the same number of equilibria as in our model.

Hence, inflation and the rate of depreciation of the exchange rate can be used interchangeably. Inflation expectations, π_t^e, are formed prior to the realization of the productivity shock, and agents form rational expectations.

The loss function of the policy-maker depends on deviations in output and inflation from their desired levels (through a quadratic functional form):

$$\mathcal{L}_t = (y_t - \widetilde{y})^2 + \chi (\pi_t)^2 + C(\widehat{e}_t),$$

where $\widetilde{y} > \overline{y}$ is the output target of the policy-maker, $\chi > 0$ measures the relative weight attached to price stability while the inflation target is set to zero. Defining $k = \widetilde{y} - \overline{y} > 0$ as the excess of the output target over the average output level it is assumed that $k > Z$, implying that commitment to a fixed exchange rate involves a smaller loss than a managed floating exchange rate does.[2] Thus, we concentrate on the case where the incentives for fixing the exchange are relatively strong, but where the ability to keep the exchange rate fixed entirely stems from some "cost of reneging", $C(\widehat{e}_t)$, which are over and above the costs stemming from deviations in output and inflation from their desired levels. This additional cost could be of a political nature (reduced probability of being reelected) or if the fixed exchange rate is implemented through adoption of a common currency, the cost of reestablishing the currency. We take this cost of reneging to be a fixed cost, $c > 0$,[3] such that if a fixed exchange rate is announced

$$C(\widehat{e}_t) = \begin{cases} 0 & if \quad \widehat{e}_t = 0 \\ c & if \quad \widehat{e}_t \neq 0 \end{cases},$$

while $C(\widehat{e}_t) = 0$ for any value of $\widehat{e}_t$ when no fixed exchange rate is announced.

The basic idea is now that different institutional settings for fixing the exchange rate carry different costs of reneging such that the monetary authorities

[2] If we let superscript FIX and MF denote a credibly fixed exchange rate and a managed float, respectively, the relative expected losses are

$$E\left(\mathcal{L}_t^{MF}\right) - E\left(\mathcal{L}_t^{FIX}\right) = \frac{k^2}{\chi} - \frac{Z^2}{1+\chi} > 0, \quad as\ k > Z,\ \chi > 0.$$

Thus, under this assumption a credibly fixed exchange rate regime strictly outperforms a managed float.

[3] If $C(\widehat{e}_t)$ depends on the size of the change in the exchange rate e.g. $C(\widehat{e}_t) = \psi \cdot (\widehat{e}_t)^2$, it is straightforward to show that the implication of announcing a fixed exchange rate is to reduce the inflation bias and the amount of stabilization against the productivity shock (compared to a fully discretionary policy regime). This is technically the same as what is known in the literature as "appointing a conservative central banker" (see Rogoff (1985)). In case the fixed exchange rate is obtained through adoption of a common currency at least part of the cost of reneging - *viz.* the cost of reestablishing the individual currency - must be a fixed cost. It may also be argued that the political cost of renouncing the promise of a fixed exchange rate is a fixed cost independent of the actual change in the exchange rate. This is the view taken here.

can "choose" a level of c through the choice of monetary regime.[4] At least three qualitatively different fixed exchange regimes will be distinguished. At the least ambitious level a country can make a unilateral announcement that it will keep the exchange rate vis-a-vis another currency or a group of other currencies fixed. At a more involving level the country can enter a formalized exchange rate cooperation where the participating countries commit themselves to keep exchange rates between the various currencies fixed (like the former ERM in Europe). At the most involving level a monetary union with a single common currency is created (like the current EMU in Europe). For the first two exchange rate regimes where the independent currencies are maintained the only difference in the cost of reneging comes from differences in the perceived political cost of not sticking to the announced policy. Presumably, it is politically more harmful to realign exchange rate parities in a formalized exchange rate cooperation than under a unilaterally announced fixed exchange rate regime. For a monetary union with a single common currency the exchange rate can only be changed if the country abandons the monetary union and reestablishes its own currency. This should involve rather high political costs as well as the resource losses from reestablishing an independent currency.[5] Hence, we should expect that the cost of reneging is small for a unilaterally announced fixed exchange rate regime, it is at an intermediate level for a formalized fixed exchange rate cooperation while it is considerably higher for a monetary union with a common currency.

3. Exchange Rate Policies

The timing of events is as follows: First, the exchange rate regime is announced followed by the private sector´s formation of expectations. Then the productivity shock is realized and finally the actual change in the exchange rate is chosen. The choice of exchange rate regime is made by comparison of expected losses whereas the actual choice of exchange rate is made discretionary by comparing actual losses emerging from the possible exchange rate choices.

When the exchange rate is actually changed, $\widehat{e}_t \neq 0$, the size of the change must minimize the loss of the policy-maker

$$\min_{\widehat{e}_t} \mathcal{L}_t = \left(-k + \widehat{e}_t - \widehat{e}_t^e + z_t\right)^2 + \chi \left(\widehat{e}_t\right)^2 + c,$$

[4] To be more precise, there is a choice between a limited number of different values of c. That is, c is a discrete and not a continuous variable.

[5] Alesina and Barro (2000) assume that the cost of leaving a currency union is prohibitively high, making the decision to enter a monetary union an irrevocable decision. That is obviously an extreme assumption made for convenience. Their modelling assumption does, however, support our hypothesis that a monetary union with a common currency is rather costly to leave.

leading to the optimal exchange rate response

$$\widehat{e}_t = \frac{k + \widehat{e}_t^e - z_t}{1+\chi}.$$

The associated value of the loss function is (superscript FLEX indicates that $\widehat{e}_t \neq 0$)

$$\mathcal{L}_t^{FLEX} = \frac{\chi}{1+\chi}\left(k + \widehat{e}_t^e - z_t\right)^2 + c.$$

In case the exchange rate remains fixed, $\widehat{e}_t = 0$, the loss of the policy-maker is (superscript FIX indicates that $\widehat{e}_t = 0$)

$$\mathcal{L}_t^{FIX} = \left(k + \widehat{e}_t^e - z_t\right)^2,$$

such that

$$\mathcal{L}_t^{FLEX} - \mathcal{L}_t^{FIX} = c - \frac{1}{1+\chi}\left(k + \widehat{e}_t^e - z_t\right)^2.$$

Thus, for given exchange rate expectations and for some realization of the productivity shock the actual change of the exchange rate is

$$\widehat{e}_t = \begin{cases} 0 \quad for\ c > \frac{1}{1+\chi}\left(k + \widehat{e}_t^e - z_t\right)^2 \\ \frac{k+\widehat{e}_t^e - z_t}{1+\chi} \quad for\ c < \frac{1}{1+\chi}\left(k + \widehat{e}_t^e - z_t\right)^2 \end{cases}.$$

We then have three possible equilibria:[6]

1. $\widehat{e}_t = 0$ for both realizations of the shock (FIX).
2. $\widehat{e}_t \neq 0$ for $z_t = -Z$; $\widehat{e}_t = 0$ for $z_t = Z$ (FLEX/FIX).
3. $\widehat{e}_t \neq 0$ for both realizations of the shock (FLEX).

Case 1.

Since $\widehat{e}_t = 0$ for both realizations of the shock we have that $\widehat{e}_t^e = 0$, implying that the equilibrium exists if

$$c > \frac{1}{1+\chi}\left(k + Z\right)^2 \equiv c_1.$$

Thus, this equilibrium will always exist for a sufficiently large value of c.

[6] By assuming that $k > Z$ we exclude the possibility that the policy-maker only reacts to a favourable productivity shock. Therefore only three possible combinations of reactions exist. Notice, that we have effectively the same number of equilibria as in Obstfeld (1996) even though he assumes a uniform distribution for the productivity shock.

Case 2.

For $z_t = Z$ we have $\hat{e}_t = 0$ while for $z_t = -Z$ we have $\hat{e}_t = \frac{\hat{e}_t^e + k + Z}{1+\chi}$. Hence, the expected change in the exchange rate must satisfy

$$\hat{e}_t^e = \frac{1}{2} \cdot 0 + \frac{1}{2} \cdot \frac{\hat{e}_t^e + k + Z}{1+\chi},$$

implying that

$$\hat{e}_t^e = \frac{k+Z}{1+2\chi}.$$

For this equilibrium to exist c must lie in the interval

$$c_2^L \equiv \frac{1}{1+\chi}\left(\frac{k+Z}{1+2\chi} + k - Z\right)^2 < c < \frac{1}{1+\chi}\left(\frac{k+Z}{1+2\chi} + k + Z\right)^2 \equiv c_2^H.$$

This interval always exists, implying that this "fixed but adjustable" exchange rate regime does exist for a range of values of c.

Case 3.

Although a policy-maker would never choose to announce a fixed exchange rate regime if she knew that the exchange rate would be changed in both states of nature, we cannot rule out multiple equilibria where more than one set of moves of the policy-maker is consistent with private sector expectations. Now $\hat{e}_t \neq 0$ for both realizations of the shock and we have that the expected change of the exchange rate is

$$\hat{e}_t^e = \frac{1}{2} \cdot \frac{\hat{e}_t^e + k - Z}{1+\chi} + \frac{1}{2} \cdot \frac{\hat{e}_t^e + k + Z}{1+\chi},$$

such that

$$\hat{e}_t^e = \frac{k}{\chi},$$

(which, of course, is the same value as in a managed float). Just as in case 1 this imposes an single condition on c, viz.

$$c < \frac{1}{1+\chi}\left(\frac{k}{\chi} + k - Z\right)^2 \equiv c_3,$$

implying that this equilibrium always exists for a sufficiently small value of c.

For future references it should be noted that when in cases 2 and 3 the exchange rate is actually changed, a depreciation of the exchange rate (an increase in e_t) will result. Following an adverse supply shock, $z_t < 0$, a depreciation of the exchange rate is the obvious policy response, but also a favourable supply shock, $z_t > 0$, (in case 3) will lead to a depreciation of the exchange rate as for $z_t = Z$

$$\widehat{e}_t = \frac{k}{\chi} - \frac{Z}{1+\chi} > 0,$$

since $k > Z$ and $\chi > 0$.

4. Exchange Rate Equilibria

Since we generally have that

$$\begin{aligned} c_1 &< c_2^H \\ c_2^L &< c_2^H, \end{aligned}$$

there always exists an interval for c for which both FIX and FLEX/FIX are equilibria. Hence, multiple equilibria generally exist in this model (see also Obstfeld (1996)), but the number of equilibria depends on the size of the cost of reneging. The characterization of these equilibria and their dependence on the cost of reneging is given in the following propositions.

Proposition 1. *For $c < \min\left\{c_1, c_2^L, c_3\right\}$ FLEX is the unique equilibrium.*
Proof. *$c < c_1$ implies that FIX is not an equilibrium. $c < c_2^L$ implies that FLEX/FIX is not an equilibrium. $c < c_3$ implies that FLEX is an equilibrium. Hence, when all three inequalities are satisfied FLEX is the unique equilibrium.* ■

Thus, fixed exchange rate regimes with small costs of reneging cannot survive, implying that such exchange rate regimes should never be announced in the first place.

Proposition 2. *For $\min\left\{c_1, c_2^L\right\} < c < c_2^H$ multiple equilibria exist.*
Proof. *$c > c_1$ implies that FIX is an equilibrium. $c_2^L < c < c_2^H$ implies that FLEX/FIX is an equilibrium. Hence, multiple equilibria exist.* ■

Fixed exchange rate regimes with intermediate levels of c will be subject to multiple equilibria in the sense that the actual exchange rate policy will validate the expectations of the private sector.[7] Hence, if the private sector expects that the exchange rate will be kept fixed for any realization of the supply shock, $\widehat{e}_t^e =$

[7] Moreover, there may exist a range of values of c for which any of the three exchange rate responses is an equilibrium.

0, the policy-maker will indeed keep the exchange rate fixed, $\widehat{e}_t = 0$. On the other hand, if the private sector believes that the policy-maker will devaluate the exchange rate in case an unfavourable supply shock hits the economy, such that $\widehat{e}_t^e = \frac{k+Z}{1+2\chi}$, it will be in the interest of the policy-maker to do so. In this case the actual equilibrium will be determined by the expectations of the private sector, and if for some reason these expectations should suddenly change the exchange rate will change as well. The occurrence of sudden changes in the exchange rate purely based on changed perceptions in the private sector may look very much like a "speculative attack" on the exchange rate, where the speculative attack is successful in generating a devaluation of the exchange rate.

In this case it is not obvious whether it is a good idea to announce a fixed exchange rate regime, since it is impossible to attach probabilities to the occurrence of the various exchange rate policies (we return to this point in the next section).

Proposition 3. *For* $c > \max\left\{c_2^H, c_3\right\}$ *FIX is the unique equilibrium.*
Proof. $c > c_2^H$ *implies that FLEX/FIX is not an equilibrium.* $c > c_3$ *implies that FLEX is not an equilibrium. Since* $c_2^H > c_1$, *and* $c > c_1$ *implies that FIX is an equilibrium, it follows that FIX is the unique equilibrium.* ■

Fixed exchange rate regimes with high levels of c will be able to sustain a credible fixed exchange rate policy since the gains from stabilization cannot outweigh the cost of reneging. In this case the fixed exchange rate regime should be announced as the expected loss is less than under a managed float (due to our assumption of $k > Z$).

5. Choice of Exchange Rate Regime

To determine which exchange rate regime should be adopted by the policy-maker we need to evaluate the expected losses associated with the various announced fixed exchange rate regimes. The important point to notice is that the various announced fixed exchange rate regimes are associated with a particular cost of reneging. Hence, for a fixed exchange rate regime where $c < \min\left\{c_1, c_2^L, c_3\right\}$ the decision rule is simple: Never announce such an exchange rate regime since the actual exchange rate policy will be made discretionary in all states of nature. For a fixed exchange rate regime with $c > \max\left\{c_2^H, c_3\right\}$ the decision rule is equally simple: Due to our assumption that $k > Z$ the expected loss of a credibly fixed exchange rate regime is strictly lower than the expected loss under a managed float, and a fixed exchange rate regime should be announced.[8] For intermediate

[8] In the more general case where the credibly fixed exchange rate and the managed float cannot be ranked unambiguously the policy-maker should make the comparison of expected losses under the two exchange rate regimes and choose the one with the lowest expected loss.

levels of c (i.e. for $\min\left\{c_1, c_2^L\right\} < c < c_2^H$) multiple equilibria prevail, and the problem for the monetary authorities is to calculate the expected loss under an announced fixed exchange rate regime, since it is impossible to attach probabilities to the occurrence of the various equilibria. Of course, it is possible to calculate a range of expected losses for the fixed exchange regime but only if the expected loss under a managed float lies outside this interval will it be possible to provide an unambiguous recommendation on the choice of exchange rate regime. This kind of ambiguity is not present for fixed exchange rate regimes with a high cost of reneging, implying that a monetary union with a common currency may have an edge over less formalized fixed exchange rate regimes due to the higher cost of reneging in the monetary union. This may be one explanation for why (most of) the EU countries have adopted the EURO in the EMU.

6. Concluding Remarks

When the credibility of a fixed exchange rate regime stems from costs of reneging on the promise to keep the exchange rate unchanged, it is quite likely that multiplicity of equilibria may render some fixed exchange rate regimes unstable, as exogenous shifts in expectations will be validated by the discretionary exchange rate decisions of the monetary authorities. However, since multiple equilibria tend to occur for intermediate levels of the cost of reneging, a monetary union with a common currency with its relatively high level of reneging costs may well overcome these instabilities compared to less formalized fixed exchange rate regimes. Thus, if fixing the exchange rate is good for the economy adopting a common currency may be the appropriate way to accomplish that.

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