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Credibility Gains and Output Losses: A Model of Exchange Rate Anchors

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Abstract

Exchange-rate-based stabilisations, even if successful, usually lack credibility initially. This is reflected in high (ex post) real interest rates and some degree of real exchange rate appreciation. In this paper the success of a stabilisation attempt is modelled as the outcome of a race between increasing credibility and falling output. The model shows how the stabilisation attempt may succumb to a currency crisis even after a long period of credibility gains. The paper also examines the issue of the optimal date for a return to exchange rate flexibility.

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Keywords: credibility, currency crisis, exchange rate, stabilisation

1 Introduction

A feature of exchange-rate-based stabilisations is that, even if successful, success is not immediate. Agents in financial and labour markets are often sceptical initially, and this is reflected in real exchange rate appreciation and high nominal interest rates relative to the realised inflation rate (Edwards, 1993; Kaminsky and Leiderman, 1998). Most stabilisation attempts show evidence of increasing credibility over time (provided that they do not collapse), with declining nominal interest rates and inflation. In the unsuccessful cases, however, these gains do not accrue fast enough: the race between the acquisition of credibility and the deterioration of the fundamentals through real exchange rate appreciation is lost.

In addition, a pegged exchange rate regime may not be regarded as desirable in the long run. A floating rate provides greater flexibility in responding to terms-of-trade shocks.[1] Pegging the exchange rate may be a temporary expedient designed to stabilise prices whilst other mechanisms, such as increased central bank independence, are put in place to keep prices stable, once the peg is abandoned. The question of exactly when to abandon the peg in this case has become known as "the exit problem". Real exchange

[1] Edwards (1993) and Fielding and Bleaney (2000) provide evidence that pegged exchange rates are associated with lower inflation in developing countries.

rate appreciation under the peg gives an additional twist to the exit problem, because of the probable initial depreciation once the exchange rate is floated.

Since the crises in the Exchange Rate Mechanism (ERM) of the European Monetary System in 1992/3, the theory of currency crises has recognised the potential for deteriorating fundamentals to trigger the abandonment of an exchange rate peg. In second-generation models, governments abandon the peg if it is too painful to defend (Jeanne, 1997; Masson, 1995; Obstfeld, 1996). In these models, the fundamentals are usually specified as a stochastic element that influences the shortfall of output below the authorities' target level. A bad realisation of the fundamentals triggers a crisis, if it is combined with unfavourable private sector expectations. In this sense, expectations are self-fulfilling.

We extend this type of model to allow the fundamentals to be influenced by beliefs about the likely success of the stabilisation. This specification captures the link between lack of credibility and real exchange rate appreciation. A second modification which we make to the canonical second-generation crises model is that we specify the time path of the probability that the peg is abandoned, as perceived by the private sector. This allows us to incorporate the feature of increasing credibility over time. Because the model is deterministic, self-fulfilling crises cannot occur. This simplifies the exposition. The possibility of self-fulfilling crises can easily be incorporated into the model by adding a stochastic element to expectations. We show how, in spite of gaining credibility over time, a pegged exchange rate regime may eventually collapse.

2 Background

The tendency for exchange-rate-based stabilisations to be accompanied by real exchange rate appreciation is illustrated in Tables 1 and 2. Table 1 gives data for Mexico, which pegged its exchange rate in 1988, but was forced to abandon the peg in the crisis of December 1994. Table 2 gives data for Argentina, which adopted a currency board in 1991 and has thus far succeeded in maintaining it. In Mexico the nominal exchange rate was never completely stabilised vis-à-vis the United States dollar. Even by 1994, however, the crawling peg never quite compensated for the inflation differential and the cumulative real appreciation from 1988 to 1994 was over 29%. In Argentina the inflation differential was eliminated by 1994 and the cumulative real appreciation was smaller(23 %).

The same phenomenon occurred in the European Monetary System from 1979 to 1992, especially after the reforms of 1987. Higher-inflation countries such as Italy experienced real exchange rate appreciation within the system. In all of these cases interest rate differentials tended to decline over time, suggesting that credibility was gained simply by persisting with the peg.[2]

[2]The critical issue is the probability of abandoning the peg *per unit of time*. It is plausible that this probability falls, the longer the peg lasts. Real exchange rate appreciation

3 The Model

The government minimises a loss function which depends positively on the square of deviations of output from its target value and on the square of the rate of change of the exchange rate, plus a fixed cost of abandoning a pegged exchange rate. This is essentially a Barro-Gordon (1983) model with an assumption of constant foreign prices together with purchasing power parity, so that exchange rate depreciation is identified with inflation. Thus the government minimises L_t:

$$L_t = (y_t - y^*)^2 + \beta\varepsilon_t^2 + \phi C; \tag{1}$$

where y_t is output in period t, y^* is the output target value, ε_t is the change in the log of the exchange rate (domestic currency units per unit of foreign currency) since period t-1, β (> 0) is the weight on the inflation goal relative to the output goal, C (> 0) is the cost of abandoning a pegged exchange rate without pre-announcement, and ϕ is a binary variable that takes the value 1 if the peg is abandoned and 0 otherwise.

The second equation defines the trade-off between output and unexpected inflation. Output is equal to its "natural" level, plus the expanding

under the peg is not equivalent to overvaluation, if the exchange rate is undervalued initially, or if accompanying reforms raise the return on capital and increase capital inflows, raising the equilibrium real exchange rate. The latter issue is particular relevant to the Mexican case.

effect of unexpected exchange rate depreciation:

$$y_t = \bar{y}_t + \alpha(\varepsilon_t - \varepsilon_t^e); \tag{2}$$

where $\alpha > 0$ and $\bar{y}_t =$ natural output level at time t.

A standard approach is to model the natural rate of output as a stochastic variable with a mean that is independent of time: $\bar{y}_t = \bar{y} + u$ (e.g. Obstfeld, 1996). In the face of an unfavourable draw of u, the government may prefer to abandon the peg despite incurring the regime change cost, C. This turns out to be more likely if ε^e is higher, or in other words, if this course of action is viewed as more probable. Hence the model has multiple equilibria in which agents' expectations tend to be self-fulfilling.

In order to capture the real appreciation that tends to occur in practice when an exchange rate peg lacks credibility, we model the dynamics of the natural rate of output as a deterministic process related to past exchange rate expectations:

$$\bar{y}_t = \bar{y}_{t-1} - \phi\alpha\varepsilon_t^e \quad \text{(pegging)} \tag{3}$$

$$(\bar{y}_t - \bar{y}_0) = \psi\left(\bar{y}_{t-1} - \bar{y}_0\right) \quad \text{(floating)}\ ; \tag{4}$$

where $\phi > 0$, and $0 \leq \psi < 1$. The inclusion of α in equation 3 simplifies the algebra.

Equation (3) says that, under a peg, the natural rate of output falls in proportion to the expected rate of depreciation in the previous period. The idea is that non-zero depreciation expectations reflect the lack of credibility of the peg. This lack of credibility is reflected in higher nominal wage settlements, putting pressure on international competitiveness. This effect cannot be represented directly in the model because of the assumption of purchasing power parity, so instead we assume that it impacts on the equilibrium level of output. The strength of the effect is denoted by the parameter ϕ.

Equation 4 says that, if the exchange rate is floated, the natural rate of output returns gradually to its initial level. This aspect will become relevant when we consider the exit problem.

The model works as follows. At time zero $\bar{y}_t$ is equal to $\bar{y}_0$ and the government announces a peg of the exchange rate. The private sector then sets its expectations of the time zero exchange rate. It believes that the exchange rate will be floated with probability μ and will remain pegged with probability 1-μ. The parameter μ therefore measures initial scepticism or lack of credibility of the peg. It is likely to reflect factors such as the consistency between fiscal and monetary policy, the level of foreign exchange reserves and the government's political position. The expected size of the devaluation, should one occur (ε_0^*), is derived as the solution to the minimisation of (1) on the assumption that the peg is abandoned. Thus the expected rate of devaluation is:

$$\varepsilon_0^e = \mu\, \varepsilon_0^*; \tag{5}$$

Finally, the government decides whether to abandon the peg ($\varepsilon_0 = \varepsilon_0^*$) or not ($\varepsilon_0 = 0$).

If the peg is maintained in period 0, then in period 1 and all subsequent periods until the peg is abandoned, the peg is assumed to acquire credibility at a rate (1 - λ), where $0 < \lambda < 1$, and the game is repeated. More precisely, the perceived probability of a devaluation in period t is $\mu\lambda^t$. We conceive λ as reflecting the gains in credibility simply from being able to sustain the peg over time. If λ is low, credibility is gained quickly; if λ is high, it only accrues slowly. As is shown below, this acquisition of credibility is favourable to the maintenance of the peg. On the other hand, past lack of credibility drives equilibrium output further from the government's target, according to equation 3. This effect works in the opposite direction, because it increases the losses from the output element of equation (1).

This straightforward adjustment of probabilities in each period can also be motivated by looking at the incentives agents face in the labour market. Analogously to the way Lux (1995) explains herd behaviour in the financial markets, it can be argued that agents will maximise their expected future income, which is future real wage income times the probability of employment, by following the majority. If agents are more pessimistic than the majority about the sustainability of the fixed peg policy and consequently demand higher nominal wages, their probability of employment will fall significantly, with the increase in their demanded relative real wage. However, if agents are more optimistic, they will demand a lower relative real wage and have less income. Assuming that their last-period wage income, relative to its corresponding employment probability, was optimal[3], agents will maximise expected future income by demanding exactly the same proportionate increase in nominal wages as the majority of agents in the market. It pays therefore to act according to the market consensus. As the consensus becomes more optimistic over time, agents adapt accordingly.

If the peg has lasted for t periods (0 to t-1), then we have for period t the following equations, by substitution from (2) into (1):

$$L_t = [\bar{y}_t + \alpha (\varepsilon_t - \varepsilon_t^e) - y^*]^2 + \beta \varepsilon_t^2 + \phi C \tag{6}$$

This is maximised when $\varepsilon_t = \varepsilon_t^*$, where

$$\varepsilon_t^* = \frac{\alpha}{\alpha^2 + \beta} [y^* - \bar{y}_t + a\varepsilon_t^e] \tag{7}$$

provided that the authorities do not do better to maintain the peg ($\varepsilon_t = 0$), thereby avoiding the cost C. Thus ε_t^* is the optimal rate of devaluation,

[3]To be more precise, it also has to be assumed that this is an efficiency wage labour market. Offering lower wages does not significantly improve the individual employment probability, but demanding more than the efficiency wage will significantly lower the individual employment probability.

if a devaluation occurs. Note that ε_t^* depends on private sector expectations (ε_t^e). Assuming rational expectations and combining 6 with

$$\varepsilon_t^e = \lambda^t \mu \varepsilon_t^* \tag{8}$$

yields the solution:

$$\varepsilon_t^* = \frac{\alpha}{\alpha^2 \left(1 - \mu\lambda^t\right) + \beta} \left[y^* - \bar{y}_t\right] \tag{9}$$

This equation expresses the optimal rate of devaluation in terms of the deviation of equilibrium output at time t from the target level. It can be shown that the optimal devaluation rate increases over time, but at a decreasing rate.

Using 3, 7 and 9, the evolution of $\bar{y}_t$ over time is given by

$$(y^* - \bar{y}_t) = \frac{\alpha^2 \left(1 + (\phi - 1)\mu\lambda^{t-1}\right) + \beta}{\alpha^2 \left(1 - \mu\lambda^{t-1}\right) + \beta} (y^* - \bar{y}_{t-1}) \tag{10}$$

so that natural output shrinks, but at a rate that decreases with time, until scepticism is completely eliminated, whilst the relationship between ε_t^* and ε_{t-1}^* is given by:

$$\varepsilon_t^* = \varepsilon_{t-1}^* * \frac{\alpha^2 \left(1 + (\phi - 1)\mu\lambda^{t-1}\right) + \beta}{\alpha^2 \left(1 - \mu\lambda^t\right) + \beta}; \tag{11}$$

which implies that $\varepsilon_t^* > \varepsilon_{t-1}^*$ if $\phi > 1 - \lambda$, and $\varepsilon_t^* < \varepsilon_{t-1}^*$if $\phi < 1 - \lambda$.

However, the expected devaluation rate, as given by 9, will increase with ε_t^*, but decrease with $\lambda^t \mu$. Its evolution over time is given by:

$$\varepsilon_t^e = \varepsilon_{t-1}^e * \frac{\lambda\left(\alpha^2\left(1 + (\phi - 1)\,\mu\lambda^{t-1}\right) + \beta\right)}{\alpha^2\left(1 - \mu\lambda^t\right) + \beta}; \tag{12}$$

$\varepsilon_t^e > \varepsilon_{t-1}^e$ if $\phi > \frac{(1-\lambda)\left(\alpha^2+\beta\right)}{\lambda^t \mu \alpha^2}$. There will always be a value of t above which this condition is not met. If μ is sufficiently low (initial credibility is sufficiently high), ε_t^e may be decreasing from t=0.

To see whether the peg is abandoned or not, we compare the losses from continuing the peg ($\varepsilon_t = 0$) with the losses from abandoning it ($\varepsilon_t = \varepsilon_t^*$). From 6, the losses from pegging (L^{fix}) are given by:

$$L^{fix} = \left[\frac{\alpha^2 + \beta}{\alpha^2\left(1 - \mu\lambda^t\right) + \beta}\left(\bar{y}_t - y^*\right)\right]^2 \tag{13}$$

L^{fix} increases over time, but eventually stabilises as $\lambda^t \mu$ tends to zero.

If the commitment is ended, losses are:

$$L^{flex} = \frac{\beta^2 + \alpha^2\beta}{\left(\alpha^2\left(1 - \mu\lambda^t\right) + \beta\right)^2}\left(\bar{y}_t - y^*\right)^2 + C \tag{14}$$

Like L^{fix}, L^{flex} stabilises as $\mu\lambda^t$ tends to zero.

The condition for abandonment of the peg is that $L^{fix} - L^{flex}$ is positive, which is equivalent to:

$$\frac{\alpha^2\left(\alpha^2+\beta\right)}{\left(\alpha^2\left(1-\mu\lambda^t\right)+\beta\right)^2}\left(\bar{y}_t-y^*\right)^2>C \tag{15}$$

If L^{fix} increases faster over time than L^{flex}, a crisis may occur at time t even though the peg was maintained in period t-1. This requires that the left-hand side of 15 increases with t. To explore this question, recall equation 10:

$$\left(y^*-\bar{y}_t\right)=\frac{\alpha^2\left(1+(\phi-1)\,\mu\lambda^{t-1}\right)+\beta}{\alpha^2\left(1-\mu\lambda^{t-1}\right)+\beta}\left(y^*-\bar{y}_{t-1}\right) \tag{10}$$

Equation 15 can therefore be written as:

$$\frac{\alpha^2\left(\alpha^2+\beta\right)}{\left(\alpha^2\left(1-\mu\lambda^t\right)+\beta\right)^2}\frac{\left(\alpha^2\left(1+(\phi-1)\,\mu\lambda^{t-1}\right)+\beta\right)^2}{\left(\alpha^2\left(1-\mu\lambda^{t-1}\right)+\beta\right)^2}\left(y^*-\bar{y}_{t-1}\right)^2>C \tag{16}$$

But 15 also implies that

$$(L^{fix}-\Big(L^{flex}-C\Big))_{t-1}=\frac{\alpha^2\left(\alpha^2+\beta\right)}{\left(\alpha^2\left(1-\mu\lambda^{t-1}\right)+\beta\right)^2}\left(y^*-\bar{y}_{t-1}\right)^2, \tag{17}$$

and so $(L^{fix}-\left(L^{flex}-C\right))_t$ is consequently equal to

$$(L^{fix}-L^{flex}-C)_{t-1}*\frac{\left(\alpha^2\left(1+(\phi-1)\,\mu\lambda^{t-1}\right)+\beta\right)^2}{\left(\alpha^2\left(1-\mu\lambda^t\right)+\beta\right)^2} \tag{18}$$

So $(L^{fix} - L^{flex} - C)_t > \left(L^{fix} - L^{flex} - C\right)_{t-1}$, if $\phi > 1 - \lambda$. Since C is a constant, $\phi > 1 - \lambda$ implies that $\frac{dL^{fix}}{dt} > \frac{dL^{flex}}{dt}$ and the left-hand side of 15 increases over time, and can reach the critical value of C at any date or not at all. If the critical value is reached, a crisis occurs at some date as shown in Figure 1. If this critical value is never reached, as in Figure 2, the stabilisation succeeds.

In the opposite case ($\phi < 1 - \lambda$), a crisis either never occurs (Fig. 3) or occurs immediately (Fig. 4). A delayed crisis is not possible, because L^{fix} increases more slowly than L^{flex}. The reason for this is that if ϕ is sufficiently low, the deterioration of the fundamentals is outweighed by the acquisition of credibility over time. An interesting feature is that the critical value of ϕ, above which a delayed crisis is possible, depends only on λ and not on the initial lack of credibility (μ).

The above analysis shows how it may be beneficial for a stabilisation programme to include direct controls on wages designed to reduce ϕ. Such a "heterodox" approach may succeed in eliminating the possibility of a delayed collapse of the stabilisation if it keeps ϕ below $1 - \lambda$.

4 Are all stabilisation attempts worthwhile?

Instead of considering a government that has already announced a stabilisation attempt in period zero, and therefore incurs a cost from departing from

Figure 1: crisis occurs at t*, $\phi > 1$ - λ

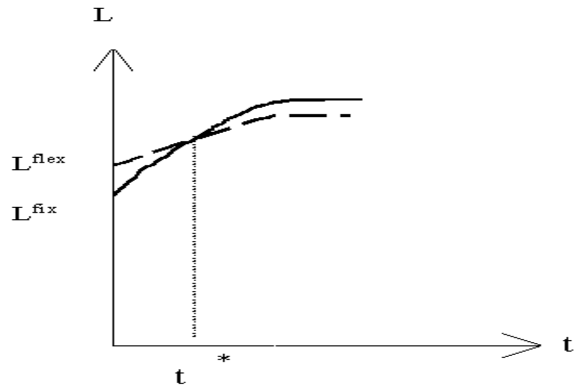


Figure 2: no crisis occurs, $\phi > 1$ - λ

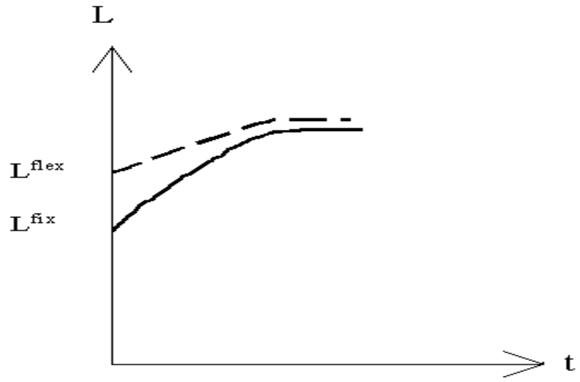


Figure 3: no crisis, $\phi < 1 - \lambda$

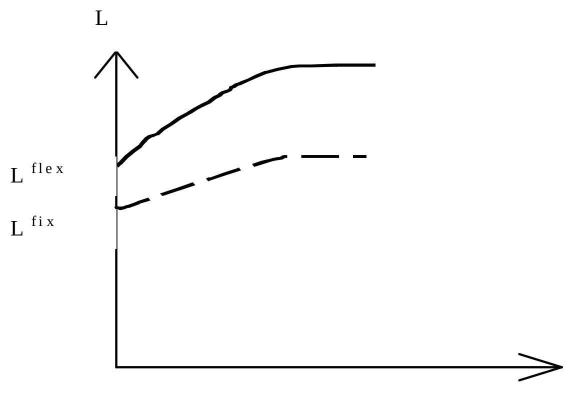
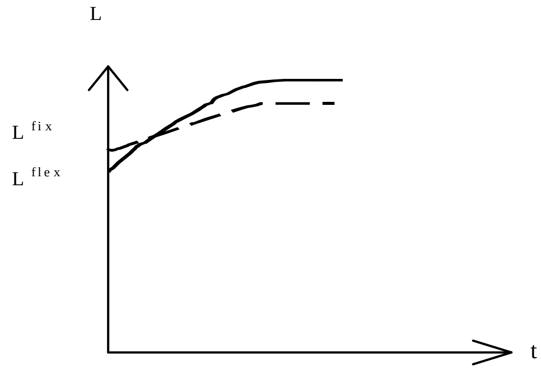


Figure 4: immediate crisis, $\phi < 1 - \lambda$



the peg, we now turn to the case of a government which has not yet made such an announcement. Under what conditions is it optimal to attempt a stabilisation?

To keep things simple we assume that C is sufficiently large that the stabilisation attempt is never abandoned. The issue is therefore whether to continue floating or to peg, assuming that the peg lasts for ever. Let the government's discount factor be ρ (<1). If V is the present value of the government's loss function L over all future periods, then

$$V^{float} = (1-\rho)^{-1}\left(1+\frac{\alpha^2}{\beta}\right)(y^* - \bar{y}_0)^2 \tag{19}$$

whereas, taking the simple case of $\phi = 1$,

$$V^{fix} = \frac{\left(\alpha^2+\beta\right)^2}{\left(\alpha^2\left(1-\mu\right)+\beta\right)^2} *$$

$$\left[1+\frac{\left(\alpha^2+\beta\right)^2\rho}{\left(\alpha^2\left(1-\lambda\mu\right)+\beta\right)^2}+\frac{\left(\alpha^2+\beta\right)^4\rho^2}{\left(\alpha^2\left(1-\lambda\mu\right)+\beta\right)^2\left(\alpha^2\left(1-\lambda^2\mu\right)+\beta\right)^2}+...\right] *$$

$$\left(y^*-\bar{y}_0\right)^2 \quad (20)$$

It is optimal for the government to peg only if $V^{fix} < V^{flex}$. This condition is clearly fulfilled for sufficiently low μ and λ. For $\lambda = \mu = 0$, we have

$$V^{fix}\left(\lambda,\mu=0\right)=\left(1-\rho\right)^{-1}\left(y^*-\bar{y}_0\right)^2 < V^{float} \quad (21)$$

We now show that, even in the most favourable case of $\lambda = 0$, there is a value of $\mu = \mu^* < 1$ for which, if $\mu > \mu^*$, then $V^{fix} > V^{float}$. When $\lambda = 0$, then V^{fix} reduces to

$$V^{fix}\left(\lambda=0\right)=\left(1-\rho\right)^{-1}\left(\frac{\alpha^2+\beta}{\alpha^2-\mu\alpha^2+\beta}\right)^2\left(y^*-\bar{y}_0\right)^2$$

It can be seen that $V^{fix}\left(\lambda=0\right) > V^{float}$, if

$$\beta(\alpha^2+\beta) > (\alpha^2-\mu\alpha^2+\beta)^2$$

which implies

$$\mu^* = 1-\frac{1}{\alpha^2}\left(\sqrt{\alpha^2\beta+\beta^2}-\beta\right).$$

Thus, even in the case where the stabilisation has 100% credibility in the second period (because $\lambda = 0$), the permanent loss of output from lack of credibility in the first period can be high enough to make the stabilisation attempt unattractive. If $\lambda > 0$, then V^{fix} is even greater for a given μ, and consequently μ^* is smaller. This implies that stabilisation attempts need to be well enough designed to bring μ below $\mu^*(\lambda, \alpha, \beta, \phi)$ to make the attempt worthwhile. If, for example, the government is too reliant on seigniorage revenue and cannot undertake the fiscal reforms necessary to reduce μ below μ^*, it would do better to postpone the stabilisation attempt.

5 The Exit Problem

Suppose that, while the exchange rate is pegged, the authorities put in place institutional arrangements intended to keep inflation at zero once the peg is abandoned. At a certain date T, a return to floating is announced and implemented. Because the float was pre-announced, the cost C of an unannounced end to the peg is not incurred. After date T, natural output gradually reverts to $\bar{y}_0$ as specified in equation (4). What happens to inflation? We assume that post-float inflation stays at zero with probability 1-$\gamma\mu\lambda^T$, and with probability $\gamma\mu\lambda^T$ it is set at the value that maximises (1), assuming C=0. Thus the probability of failure is equal to the probability that the peg would have been abandoned anyway in period T ($\mu\lambda^T$), multiplied by a factor γ (>1) that represents exit risk and is assumed to reflect the quality of the institutional reforms (the better the reforms, the closer γ is to one).

What determines the optimal exit date? Delaying exit by one period reduces the probability of failure by a factor λ, but also keeps output low for one further period and causes the natural rate of output to move further from the target level. Assume for simplicity that $\psi = 0$ (i.e. that natural output returns instantaneously to $\bar{y}_0$ after exit). Then, with a discount factor of ρ, the multi-period losses from exit at time T are:

$$V = (1-\rho)^{-1}\left(1+\gamma\mu\lambda^T\frac{\alpha^2}{\beta}\right)(y^*-\bar{y}_0)^2 \tag{22}$$

whereas if exit is delayed to time T+1 the losses are:

$$V = L_T^{fix} + \frac{\rho}{1-\rho}\left(1+\gamma\mu\lambda^{T+1}\frac{\alpha^2}{\beta}\right)(y^*-\bar{y}_0)^2 \tag{23}$$

where L_T^{fix} is given by equation 13.

It pays to exit at time T rather than to delay further if

$$L_T^{fix} > \left(1+\gamma\mu\lambda^T\frac{\alpha^2}{\beta}\right)(y^*-\bar{y}_0)^2 + \frac{\rho}{1-\rho}\left((1-\lambda)\gamma\mu\lambda^T\frac{\alpha^2}{\beta}\right)(y^*-\bar{y}_0)^2 \tag{24}$$

This condition is more likely to be fulfilled if (a) ρ is smaller (the future is discounted more heavily), (b) γ is smaller (post-exit anti-inflation strategy is better designed), and (c) μ and λ are smaller (initial scepticism is smaller and declines more rapidly). This implies that smaller values of these parameters make it optimal to exit earlier. Higher credibility, more rapid credibility gains, and greater credibility of post-exit institutional arrangements bring forward the optimal exit date. Since L_T^{fix} is increasing in ϕ, a higher value of ϕ also implies an earlier exit date. Equation 24 assumes that $\psi = 0$. With $\psi > 0$, the optimal exit date will be earlier, because postponing exit puts output on a lower path as it returns gradually to $\bar{y}_0$. An earlier exit, if successful, is of course desirable because it allows output to recover.

6 Conclusions

We have constructed a model that captures an important feature of exchange-rate-based stabilisations: that if their credibility is in doubt, unemployment tends to increase over time as the real exchange rate appreciates. In this model stabilisation is successful only if the gradual gain in credibility outweighs the increasingly painful output losses. The model shows how a delayed exchange rate crisis can occur even though the probability of collapse falls over time. This is not the result of agents suddenly coordinating on an unfavourable equilibrium, as in models of self-fulfilling crises, because we specify the time-path of crisis probabilities. It is simply that the costs of past credibility deficits accumulate and may cause the government to abandon the peg, despite agents' increasingly optimistic expectations. For a delayed crisis of this kind to be possible requires that the impact of the lack of credibility on the real exchange rate is above a threshold level that depends on the rate at which credibility is gained. Below this level, a crisis either occurs immediately or not at all.

The model suggests that a poorly designed stabilisation attempt, for example because fiscal and monetary policy are mutually inconsistent, is worse than no attempt at all. Although the stabilisation attempt must eventually be successful (provided the costs of abandoning it are sufficiently great), the costs in lost output outweigh the inflation gains, if credibility is too low. This is particularly true, if credibility gains are slow (λ is high) and if the lack of credibility causes greater exchange rate appreciation (ϕ is high).

We also briefly examine the "exit problem": when to abandon the peg and unwind the real appreciation without losing the inflation gains achieved by the stabilisation. We assumed that the probability of a successful exit depends on the credibility of the peg and the quality of the arrangements for post-exit monetary policy. More effective monetary reforms, such as greater central bank independence, bring forward the optimal exit date and reduce the costs of the stabilisation.

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TABLE 1: MEXICO

Year	Exchange rate (peso per 1 US-$)	Inflation rate	US inflation rate	Real exchange rate appreciation
1988	2.27	113.87	4.02	19.99
1989	2.46	20.14	4.90	5.38
1990	2.81	26.42	5.28	4.87
1991	3.02	22.70	4.32	8.63
1992	3.09	15.57	3.02	8.79
1993	3.12	9.83	2.93	5.37
% Δ 1988-1993	37.45	136.52	22.16	29.01
1994	3.38	6.93	2.64	-3.99

TABLE 2: ARGENTINA

Year	Inflation rate	US inflation rate	Real exchange rate appreciation
1991	168	4.32	61.08
1992	25.37	3.02	17.83
1993	10.71	2.93	7.03
1994	4.30	2.64	1.60
1995	3.09	2.77	0.31
1996	0.00	2.9	-2.90
% Δ 1991-1996	49.25	15.10	22.88