Balance of Payments Crises

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1. Introduction

A simple account of the "generations":

First Generation Basically Krugman (1979), most of the effect comes from unsustainable policies, crisis are in a certain sense predictable and in some cases you can determine the exact timing of the attack (Krugman, 1979; Calvo, 1987 among many others); the cause of the crises is always domestic.

Second Generation Different works by Obstfeld introduced the idea that crises might not be the result of policies that are not sustainable or of changes in fundamentals; he introduces the idea that changes in expectations might lead to different outcomes, policymakers face then a situation where they end up "following" the expectations, leading to self-fulfilling expectations of crises.

Third Generation Krugman (1999), Chang and Velasco (2001), etc. Most of these models emphasize the role played by the financial sector in the crises, in particular the composition of the debt is often mentioned as a key determinant of the vulnerability of a country.

Today we will cover a standard second generation model based on Obstfeld (1994). We will build on the basic model on monetary policy by Barro and Gordon (1983). We will see how the private sector expectations will be a key determinant of the subsequent policymaker's decision regarding the exchange rate.

2. Second Generation Models: Self-fulfilling Crises (Obstfeld, 1994)

We now set up a model of a balance of payment crisis in the spirit of Obstfeld (1991), (1994) and Velasco (1996). Consider an economy populated by a government and a private sector composed of many atomistic agents.

*Based on a handout prepared by Andres Velasco from the Kennedy School of Government, Harvard University.

2.1. Basic economy

The economy is fully characterized by the expectational Phillips curve

$$u_t - u = \theta\left(\varepsilon_t^e - \varepsilon_t\right), \quad \theta > 0 \tag{2.1}$$

where ε is the actual rate of devaluation, ε^e is the expected rate, u_t is actual unemployment and u is steady state unemployment. The term $\theta\left(\varepsilon_t^e - \varepsilon_t\right)$ implies that nominal wage contracts are pre-set, so that whenever actual devaluation is below expected devaluation the real wage rises and output and employment worsen.

2.2. Policymaking

The authorities' objective is to minimize

$$\left(\frac{1}{2}\right)\left(\alpha\varepsilon_t^2 + u_t^2\right), \quad \alpha > 0 \tag{2.2}$$

Objective function (2.2) indicates that the policymaker dislikes both inflation and deviations of unemployment from zero. She sets ε to minimize (2.2) subject to (2.1), the structure of costs, and the public's expectations of devaluation.

2.3. Discretionary solution

The policy maker acting with discretion sets ε_t optimally, taking ε_t^e (which has been already set) as given. The solution to this problem is

$$u_t = \left(\frac{\lambda}{1-\lambda}\right)\theta\varepsilon_t \quad \text{and} \quad \theta\varepsilon_t = (1-\lambda)\left(u + \theta\varepsilon_t^e\right) \tag{2.3}$$

where $\lambda \equiv \frac{\alpha}{\alpha+\theta^2} < 1$. Using (2.3) the loss for the policymaker is

$$L^d = \left(\frac{1}{2}\right)\lambda\left(u + \theta\varepsilon_t^e\right)^2 \tag{2.4}$$

where the superscript d stands for "devaluing." If, in addition, we impose the perfect foresight condition that $\varepsilon_t^e = \varepsilon_t$, we have from (2.3) that

$$\theta\varepsilon_t^e = \left(\frac{1-\lambda}{\lambda}\right)u \tag{2.5}$$

2.4. No devaluation outcome

Consider what happens, on the other hand, if the policymaker has precommited not to devalue, so that $\varepsilon_t = 0$. The expectational Phillips curve dictates that

$$u_t = u + \theta\varepsilon_t^e \tag{2.6}$$

and the corresponding loss is

$$L^f = \left(\frac{1}{2}\right)\left(u + \theta\varepsilon_t^e\right)^2 \tag{2.7}$$

where the superscript stands for "fixing."

2.5. Fixed cost of devaluing

Next follow Obstfeld (1991) and (1994), among many others, in assuming that the policymaker faces a fixed private cost of engineering a surprise devaluation: governments that commit to a peg and then renege on the promise typically face costs –loss of pride, voter disapproval, maybe even removal from office– that need not be proportional to the size of the devaluation or to any other macroeconomic variable. Let $c > 0$ be the cost that the policymaker pays. When will this be enough to prevent devaluations? If devaluation expectations are ε_t^e, the government finds it optimal to devalue if $L^d(u,\ \varepsilon_t^e) + c < L^f(u,\ \varepsilon_t^e)$. Using (2.4) and (2.7) this implies

$$u + \theta\varepsilon_t^e > k \tag{2.8}$$

where $k \equiv (1-\lambda)^{-\frac{1}{2}}(2c)^{\frac{1}{2}} > 0$. Notice that we have not automatically set $\varepsilon_t^e = 0$, because even if the government announces no devaluation, this promise may enjoy little or no credibility. Hence, a devaluation will occur in equilibrium whenever u is high or when expectations of devaluation are high.

2.6. Alternative outcomes

Expectations of devaluation are determined rationally by agents that understand the temptation summarized by (2.8). We want to answer the following questions:

1. When will the government not devalue regardless of ε_t^e?
2. When will the government devalue regardless of ε_t^e?
3. When will the government not devalue if $\varepsilon_t^e = 0$, but devalue if ε_t^e is sufficiently high?

2.7. Rational expectations equilibria

Assume first that agents expect that $\varepsilon_t^e = 0$. When will this be a rational expectations equilibrium? Devaluation condition (2.8) shows that it is rational to set $\varepsilon_t^e = 0$ if

$$u \leq k \tag{2.9}$$

Suppose now that agents expect that the government will devalue by the discretionary amount indicated in (2.5). Using this expression in condition (2.8) yields the result that such expectations will be fulfilled if

$$u > \lambda k \tag{2.10}$$

The ranges determined by conditions (2.9) and (2.10) give rise to the following partition of the state space. Notice that, since $\lambda < 1$, $k > \lambda k$. For levels of u no larger than λk, only one equilibrium (with no expected devaluation) is possible: attaching a positive probability to devaluation cannot be rational, for no devaluation will take place regardless of what agents expected. In this range the fixed exchange rate enjoys full credibility. For levels of u larger than λk, but no larger than k, there are two possible equilibria: if agents expect a devaluation of size $\theta\varepsilon_t^e = \left(\frac{1-\lambda}{\lambda}\right)u$, such expectations will be validated by the government; if agents expect no devaluation, on the other hand, no devaluation will take place *ex post*. Hence the credibility of the fixed exchange rate is partial, and depends on animal spirits. Finally, for levels of u larger than k a devaluation will inevitably take place. The fixed rate regime has no credibility.

2.8. Welfare

Notice also that, if an equilibrium with devaluation does materialize, the corresponding loss for policymakers is

$$L^d\left(u,\ \theta\varepsilon_t^e = \frac{(1-\lambda)}{\lambda}u\right) = \left(\frac{1}{2}\right)\frac{u^2}{\lambda} + c \tag{2.11}$$

By contrast, if an equilibrium with no devaluation materializes, the loss is

$$L^f\left(u,\ \theta\varepsilon_t^e = 0\right) = \left(\frac{1}{2}\right)u^2 \tag{2.12}$$

Clearly, the devaluation outcome provides lower welfare (larger loss).

3. Conclusions

In short, the solution to the one-period problem can yield multiple equilibria. Such multiplicity arises from two features of these models. First, optimizing governments lack access to a precommitment technology, so *ex post* (after expectations have been set) they may not deliver the policies they promised *ex ante*. Second, the incentives to renege depend on expected devaluation, which in turn depends on the government's credibility and its perceived incentives to renege. This circularity opens the door to self-fulfilling outcomes.

This extremely simple model underscores the fact that self-fulfilling outcomes cannot occur at any level of u. Only a natural rate of unemployment that is within a certain range –high enough, but not too high– will prompt the government to tango when called upon to. The intuition is that the government's temptation to devalue is increasing in u and the term $\theta\varepsilon^e$. When expectations of devaluation increase, so does the likelihood a devaluation will indeed take place. Beyond a certain level of u, however, devaluation expectations become irrelevant, because the government will devalue even if $\theta\varepsilon^e = 0$.