Partial Delegation in a Model of Currency Crisis

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Abstract

This article shows that, in a fixed exchange-rate system with an escape clause, a partial delegation of exchange-rate policy to a more inflation-averse central banker reduces the probability of crisis and this, more particularly when private agents expect a devaluation. An increase in the central banker’s degree of inflation aversion strengthens this result.

Keywords: Currency crisis; Multiple equilibria; Credibility; Monetary delegation

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1 Introduction

A well-known result in the literature on currency crisis is that the cost of defending a fixed rate increases when private agents expect a devaluation (Krugman, 1998). In this context, this article considers a partial delegation of exchange-rate policy to a more inflation-averse central banker: the decision as to whether to maintain the peg is left to the government, but the magnitude of any realignment is delegated to the central banker. Looking at the influence of expected devaluation, it shows that, in a fixed exchange-rate system with an escape clause, this partial delegation reduces the probability of crisis. In particular, it underlines the fact that it is more crucial to devolve exchange-rate policy when private agents expect a future realignment as the reduction of the probability of crisis is greater. These results are strengthened by an increase in the central banker’s degree of inflation aversion. When this degree is very high, the probability of self-fulfilling crisis is reduced and the stability of the fixed exchange-rate system considerably increased.

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2 Partial delegation

2.1 The model

The framework is based on a model of currency crisis à la Obstfeld (1994). In a small open economy, log of employment \( n \) can be express by

\[
n = n^* + \rho (\Pi - \Pi^e) \quad n^* = 0, \rho > 0
\]

where \( \Pi \) and \( \Pi^e \) denote actual and expected inflation. The natural employment rate \( n^* \) is assumed to be equal to zero. Inflation expectations are formed in the beginning of the period as private agents sign nominal contracts. Then the demand for labor is determined by firms and policy maker decides whether to maintain the peg.

Purchasing Power Parity (PPP) holds. Foreign prices are exogenous and normalized to 1. Control of exchange-rate variations \( \Delta e \) and of the inflation rate \( \Pi \) are therefore equivalent. The aim of exchange-rate or monetary policy is to minimize deviations of inflation and employment from their target levels. Loss functions of the government and the central banker are respectively

\[
L^G = \frac{1}{2} \Pi^2 + (n - e)^2 \quad \Omega C
\]

\[
L^{CB} = \frac{1}{2} \frac{1}{(1 + \varepsilon)} \Pi^2 + (n - e)^2 \quad \Omega C
\]

The target level of employment \( e \) is above the natural rate, it can then be interpreted as an inflationary bias. The inflation target is zero. \( C \) represents the realignment cost incurred by the policy maker (in terms of credibility for instance) after the abandonment of the peg. Consequently, \( \Omega \) is a binary variable equal to 0 when the policy maker maintains the peg and equal to 1 when he devalues. We assume partial delegation of exchange-rate policy to a central banker who has the same targets as the policy maker but who places greater weight on the costs of higher inflation (\( \varepsilon > 0 \)).\(^1\) There is no cost of realignment to the central banker because it is the government that decides whether realignment occurs. Therefore, when the policy maker decides to devalue, exchange-rate policy is delegated to the central banker and \( \Delta e \) is determined such that

\[
\frac{\partial L^{BC}}{\partial \Delta e} = 0, \text{ that is,}
\]

\[
\Pi = \Delta e = \frac{\rho}{1 + \varepsilon + \rho^2} (\rho \Pi^e + e)
\]

\(^1\)The delegation is partial as there is a cost to the government when a realignment occurs. To take this cost into account, the decision as to whether to maintain the peg is left to the government, but the magnitude of any realignment is delegated to the central banker.
The more the central banker is inflation averse \((\varepsilon \text{ high})\), the more the influence of inflationary expectations and employment target on the devaluation rate is reduced.

Available information for the formation of inflation expectations is the same as that of the policy maker except that private agents do not know \(C\) the realignment cost. Therefore, they cannot perfectly expect the final decision of the policy maker. If economic agents expect the maintenance of the peg, then \(\Pi^e = 0\). If they expect a devaluation, \(\Pi^e = \Pi\), that is,

\[
\Pi^e = \frac{\rho}{1 + \varepsilon} \mathcal{E}
\]

Inflation expectations increase with the inflationary bias \(\mathcal{E}\) while they decrease with the central banker’s degree of inflation aversion.

### 2.2 Realignment condition and effects of partial delegation

When the government defends the peg, it follows that \(\Pi = \Delta e = 0\). When it proceeds to a realignment, \(\Pi\) is expressed by equation (4). Inserting (1) in (2), the government’s loss in the two respective situations is found as

\[
L^G_{FX} = \frac{1}{2} \left( \rho \Pi^e + \mathcal{E} \right)^2
\]

\[
L^G_{FL} = \frac{\rho^2 + (1 + \varepsilon)^2}{2(1 + \varepsilon + \rho^2)^2} \left( \rho \Pi^e + \mathcal{E} \right)^2 + C
\]

This loss depends positively on inflation expectations and the inflationary bias. As a result, the policy maker will decide to devalue if \(L^G_{FX} - L^G_{FL} > 0\), that is,

\[
\frac{\rho^2 (1 + 2 \varepsilon + \rho^2 \mathcal{E})}{2(1 + \varepsilon + \rho^2)^2} \left( \rho \Pi^e + \mathcal{E} \right)^2 > C
\]

This inequality indicates that the probability of realignment increases when expected inflation and the inflationary bias are higher and when the realignment cost \(C\) is smaller.

Taking into account inflation expectations, thresholds under which the government will decide to devalue are equal to

\[
\mathcal{C}_{WD}^{\Pi} = \frac{\rho^2 (1 + 2 \varepsilon + \rho^2 \mathcal{E})}{2(1 + \varepsilon + \rho^2)^2} \mathcal{E}^2
\]

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\]

\(\mathcal{C}_{WD}^{\Pi}\) is the threshold which prevails when private agents expect no devaluation \((\Pi^e = 0)\), while \(\mathcal{C}_{WD}^{\Pi}\) is the threshold which prevails when private agents expect a realignment \((\Pi^e = \Pi)\). Note
that $C_{WD}^1$ and $C_{WD}^2$ are both positive and that $C_{WD}^1$ is lower than $C_{WD}^2$. At one threshold $C_{WD}^2$, as inflationary expectations are high, competitiveness and unemployment problems are so painful that a devaluation occurs unless the realignment cost is very high. At the other threshold $C_{WD}^1$, the policy maker will maintain the peg even if the realignment cost is lower. These results are illustrated in Figure 1. We write 1 when the government devalues and 0 when it defends the peg.

Figure 1

We consider here the delegation to a more inflation-averse central banker. $\varepsilon = 0$ can represent the case of no delegation as then government and central banker have exactly the same preferences and targets. Let $C_{ND}^i$ where $i = 1, 2$ denote thresholds obtained when the government does not delegate exchange-rate policy.

\begin{align*}
C_{ND}^1 &= \frac{\rho^2}{2(1 + \rho^2)} \xi^2 \\
C_{ND}^2 &= \frac{\rho^2}{2(1 + \rho^2)} \xi^2
\end{align*}

Note that $C_{ND}^1$ and $C_{ND}^2$ are both positive and that for the same reasons as previously $C_{ND}^1$ is lower than $C_{ND}^2$. The comparison of these different thresholds leads to the following proposition.

**Proposition 1.** Partial delegation of exchange-rate policy to a more inflation-averse central banker reduces the level of the thresholds.

This proposition is confirmed by the following inequality.

\[ C_{WD}^i < C_{ND}^i \quad \text{where } i = 1, 2 \]

So, whatever private agents expectations, with partial delegation to a more inflation-averse central banker, the probability of crisis is reduced. The policy maker maintains the peg while the cost of realignment is smaller. This result can be explained by the negative (downward) influence of partial delegation on expected inflation. As the cost of defending a fixed rate decreases when private agents expect its maintenance, the probability of crisis is reduced. This implies that effect of partial delegation on the probability of crisis should be more important when private agents expect a future realignment. This idea is confirmed by the proposition below.

**Proposition 2.** Partial delegation of exchange-rate policy to a more inflation-averse central banker decreases the gap between the two thresholds.
This proposition gives additional information concerning the evolution of thresholds. Proposition 1 indicates that, with partial delegation, the probability of crisis is reduced at each threshold. Proposition 2 specifies that the probability of crisis is more reduced at $C^{WD}_{D}$ than at $C^{WD}_{1}$. Therefore, as the peg is more fragile at $C^{WD}_{D}$ and the strategy of partial delegation more efficient, expectations of devaluation strengthens the need of implementing this strategy. It is confirmed by the following inequality.

$$C^{WD}_{D} - C^{WD}_{1} < C^{ND}_{D} - C^{ND}_{1}$$  \hspace{1cm} (14)

As illustrated in Figure 2, the area of multiple equilibria is reduced. The first number indicates policy maker’s decision in the case of no delegation and the second number policy maker’s decision when exchange-rate policy is partially delegated to a more inflation-averse central banker.

Figure 2

Whether $C^{WD}_{D}$ is smaller than or greater than $C^{ND}_{1}$ depends on the value of $\varepsilon$. The last proposition gives additional elements.

**Proposition 3.** The more the central banker is inflation averse,

i) the more the level of thresholds decreases;

ii) the more the gap between the two thresholds is reduced.

Using (9) and (10), Proposition 3 is confirmed by the following derivatives,

$$\frac{\partial C^{WD}_{i}}{\partial \varepsilon} < 0 \quad \text{where } i = 1, 2$$ \hspace{1cm} (15)

$$\frac{\partial (C^{WD}_{2} - C^{WD}_{1})}{\partial \varepsilon} < 0$$ \hspace{1cm} (16)

Equation (15) means that, whatever inflation expectations, the probability of crisis decreases with the central banker’s degree of inflation aversion and equation (16) that the magnitude of this reduction is higher when private agents expect a devaluation (higher thresholds $C^{WD}_{D}$). If $\varepsilon$ is very high, expected inflation (equation 5) is close to zero. Then, $C^{WD}_{1}$ is reduced and the interval between $C^{WD}_{D}$ and $C^{WD}_{1}$ substantially decreases. At the extreme, $C^{WD}_{1}$ is close to zero and $C^{WD}_{D}$ close to $C^{WD}_{1}$. $C^{WD}_{D}$ becomes then smaller than $C^{ND}_{1}$. Self-fulfilling crises are avoid. One threshold remains at which the probability of crisis is considerably reduced.
References


Figure 1

Policy maker’s decision

\[ C_1^{WD} \quad C_2^{WD} \]

(1) (1) (0) (0)

Figure 2

Policy maker’s decision

\[ C_1^{WD} \quad C_1^{ND} \quad C_2^{WD} \quad C_2^{ND} \]

(1,1) (1,1) (1,1) (1,0) (1,0) (0,1) (0,0) (1,0) (0,0) (0,0)