Policy Uncertainty and the Current Account

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Introduction

Understanding the factors that influence movements in the current account is of considerable interest in international macroeconomics. Typically, the analysis occurs in a perfect foresight environment, and the role of uncertainty in determining external balances is largely ignored.[1] In the developing world, the degree of economic uncertainty is often more acute than in developed countries, especially in the form of policy uncertainty. Policy uncertainty arises when economic policy lacks full credibility, and as a consequence, the public forms expectations that the policy will be abandoned at some point in the future. The public does not know initially the exact date of such a reversal, and thus, the policy's duration is uncertain.

Drazen and Helpman (1988), Calvo and Drazen (1998), and Lahiri (2000) have examined stabilization and reform policy characterized by uncertain duration. These studies have shown that uncertain duration of policy influences the outcome of macroeconomic dynamics, including the current account. However, public expectations are biased towards pessimism in these studies regardless of the success of the policy.[2] The public always believes policy to be less than fully credible. In fact, public expectations of the duration of policy are assumed time invariant. These assumptions are in sharp contrast to the view that the degree of credibility does often change during stabilization or reform. Moreover, it is not uncommon for the public to start out by having doubts about the credibility of policy, but initial success of the policy removes this doubt over time and full credibility is achieved at least temporarily.

The primary goal of this paper is to analyze how public expectations of the duration of stabilization impacts the current account. I extend Obstfeld's (1985) model of a credible stabilization program via exchange rate management to include uncertain duration of policy. A key assumption of the model is a pre-announced, phased reduction in the rate of devaluation, rather than a once and for all reduction normally assumed in the above cited literature. The model developed below allows individuals' expectations of a future policy collapse to adjust over time. The growth rate of domestic credit relative to the growth rate of money demand is assumed to be the key relationship determining the long-run feasibility of stabilization. Individuals do not know ex ante whether the government implements a domestic credit policy consistent with the new exchange rate regime. Individuals are assumed to learn about domestic credit policy and use Bayesian techniques to calculate the probability that the policy is consistent. Thus, credibility is defined as the public's subjective probability that a consistent domestic credit policy has been put into effect. Each period the public uses this information to update their expectations regarding the probability that stabilization will collapse in the following period.[3]

The remainder of the paper is organized as follows. Section one sets up a discrete time version of Obstfeld's (1985) model of credible disinflation. Section two extends the model to include uncertain duration of policy. Section three develops a specific mechanism regarding the formation of expectations of policy collapse. Section four concludes.

[1] The exception is Ghosh and Ostry (1994, 1997), who examine how export uncertainty in developing countries and general macroeconomic uncertainty in developed countries affect external balances.
[2] This complaint is also true in models that assume perfect foresight of an impending collapse in stabilization. See Calvo (1986) and Calvo and Vegh (1993).
[3] This concept of how agents' form expectations about a possible, future policy shift is similar to the one proposed by Flood and Garber (1980).

1. Credible Disinflation

A small open economy is studied which consists of a representative agent. The agent consumes a single tradable good, which is supplied exogenously and fixed at y. The main feature of the economy's environment is that the government is initiating an economic stabilization program via exchange rate management.

The representative agent may hold wealth in the form of domestic money and internationally tradable bonds. Bonds are denominated in terms of the traded good, and their real return is determined in the world capital market and is constant at the level r. All money is taken to be high-powered and the domestic banking system is ignored. In this single good world, purchasing power parity holds,

$$P_t = S_t P_t^* , \tag{1.1}$$

where P is the domestic price level, S is the domestic-currency price of foreign money, and P* is the foreign price level. It is assumed that $P^* = 1$ which implies that we can identify the domestic price level with the exchange rate. Additionally, the exchange rate is assumed pegged, but it need not be constant. The exchange rate may instead follow any path chosen by the monetary authority. The central bank undertakes whatever foreign-exchange market intervention is necessary to enforce the current pegged rate.

The agent maximizes an intertemporal utility function of the form

$$U = \sum_{t=0}^{\infty} \boldsymbol{b}^t u(c_t, m_t) , \tag{1.2}$$

where $\boldsymbol{b}$ is the subjective discount rate. The instantaneous utility function depends on consumption (c) and real money balances (m), defined as nominal money balances (M) deflated by the domestic price level (P).

Real wealth at time t is given by

$$a_t = m_t + b_t , \tag{1.3}$$

where b is international bond holdings held by the agent. Real wealth evolves as

$$a_{t+1} - a_t = rb_t + y + \boldsymbol{t}_t - \boldsymbol{e}_t m_t - c_t , \tag{1.4}$$

where $\boldsymbol{t}$ is government lump-sum transfers, and $\boldsymbol{e}$ is the domestic inflation rate. Given the assumption of purchasing power parity, $\boldsymbol{e}$ can also be identified with the rate of devaluation. Combining (1.3) with (1.4) yields

$$a_{t+1} = (1+r)a_t + y + \boldsymbol{t}_t - (r + \boldsymbol{e}_t)m_t - c_t . \tag{1.5}$$

Solving (1.5) forward, the agent's intertemporal budget constraint is

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^{t}\left(c_t+(r+\varepsilon_t)m_t\right)=a_0+\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^{t}\left(y+\tau_t\right), \tag{1.6}$$

where the transversality condition $\lim_{t\to\infty}\left(1/(1+r)\right)^t B_t = 0$ has been imposed. Constraint (1.6) states that the present value of spending on consumption and liquidity services must equal the present value of the agent's total wealth.

The agent's problem is to maximize (1.2) subject to (1.6). The associated Lagrangian is

$$L = \sum_{t=0}^{\infty}\beta^t u(c_t,m_t)+\lambda\left[a_0+\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^{t}\left(y+\tau_t\right)-\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^{t}\left(c_t+(r+\varepsilon_t)m_t\right)\right], \tag{1.7}$$

where λ is a Lagrange multiplier interpreted as the shadow value of wealth. Differentiating with respect to consumption and real money balances, the first-order conditions are

$$u_c(c_t,m_t)=\lambda, \tag{1.8}$$
$$u_m(c_t,m_t)=\lambda(r+\varepsilon_t), \tag{1.9}$$

where I have assumed for convenience that the agent's subjective discount rate and the world discount rate are equal. I also assume that the instantaneous utility function takes the form

$$u(c,m)=\left(c^{\alpha}m^{1-\alpha}\right)^{1-\sigma}/1-\sigma, \tag{1.10}$$

where $\sigma>0$ and $0<\alpha<1$. According to (1.10), the intertemporal elasticity of substitution is defined as $\gamma=1/\sigma$. Equations (1.8) - (1.10) yield the following demand functions:

$$c_t=\left(\alpha/\lambda\right)^{1/\sigma}\left[\alpha(r+\varepsilon_t)/(1-\alpha)\right]^{-(1-\alpha)(1-\sigma)/\sigma}, \tag{1.11}$$
$$m_t=\left(\alpha/\lambda\right)^{1/\sigma}\left[\alpha(r+\varepsilon_t)/(1-\alpha)\right]^{\alpha(1-\sigma)-1/\sigma}. \tag{1.12}$$

In analyzing the public sector, it is convenient to consolidate the budgets of the central bank and the fiscal authority. The following description follows Obstfeld (1986). The government's objective is to finance a path of exogenous spending g_t and a path of real lump-sum transfers. It finances this objective by interest earnings on its foreign exchange reserves and through the expansion of domestic credit. Thus, the budget constraint of the government is given by

$$\tau_t=r_t f_{t-1}+\mu_t d_t-g_t, \tag{1.13}$$

where f is the real level of reserves, d is the real level of domestic credit, and μ is the growth rate of domestic credit. Equation (1.13) implies that the fiscal authority itself does not issue debt.

The change in the money supply (in real terms) based on the central bank's balance sheet is

$$m_t^s - m_{t-1}^s = d_t - d_{t-1} + f_t - f_{t-1} \,. \tag{1.14}$$

Equating m^s with m^d and substituting (1.14) into (1.13) produces

$$\tau_t = r_t f_{t-1} + \left(m_t^d - m_{t-1}^d\right) - \left(f_t - f_{t-1}\right) - g_t \,. \tag{1.15}$$

Equation (1.15) illustrates that lump-sum transfers and government spending can be financed through expansion of domestic credit in so far as the demand for money is increasing. This implies that real money demand growth limits the available revenue from seigniorage. Money creation in excess of this limit will lead to reserve losses. To ensure consistency between the exchange rate policy and the domestic credit supply, it is assumed that this limit is not violated. Therefore, domestic credit grows at the same rate as real money demand and (1.15) is rewritten as

$$\tau_t = r_t f_{t-1} + \upsilon_t m_t - \left(f_t - f_{t-1}\right) - g_t \,. \tag{1.16}$$

Solving (1.16) forward and assuming that the government does not hold net foreign reserves asymptotically, I obtain the government's intertemporal budget constraint:

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t \left(g_t + \tau_t\right) = f_0 + \sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t \left(\Delta m_t + \varepsilon_t m_t\right) . \tag{1.17}$$

The present value of government spending and transfers is equal to initial government assets plus the present value of seigniorage. The government collects seigniorage by accommodating increases in desired real balances and compensating the agent for the real depreciation of her money holdings.

It is assumed that at time $t = 0$ the government announces a new exchange rate policy. Prior to the announcement, the rate of devaluation was expected to remain constant at $\bar{\varepsilon}$ forever. The policy specifies a new path $\{\varepsilon_t\}_{t=0}^{\infty}$ that declines gradually over time from an initial level of $\varepsilon_0 = \bar{\varepsilon}$. To evaluate the immediate impact of this new policy and its effects over time on consumption and the current account, the economy's equilibrium must be derived.

The economy wide intertemporal budget constraint is obtained by combining the agent's intertemporal budget constraint (1.6) and the government's intertemporal budget constraint (1.17):

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t c_t = h_0 + \sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t \left(y - g_t\right) , \tag{1.18}$$

where $h_0 = b_0 + f_0$ denotes total bond holdings in the economy. Substitution of (1.11) into (1.18) yields the equilibrium shadow value of wealth:

$$
l = a \left[\frac{\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^{t} \left[a(r + e_t)/(1-a) \right]^{-(1-a)(1-s)/s}}{h_0 + \sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^{t} (y - g_t)} \right]^{s} . \tag{1.19}
$$

In the absence of any future unanticipated shocks, the multiplier l remains constant.

I examine the effects of the new devaluation rate by considering two cases: 1) when the intertemporal elasticity of substitution is less than one, and 2) when the intertemporal elasticity of substitution is greater than one.[4] For the case of $s > 1$, the shadow value of wealth falls from its pre-announcement level to its new equilibrium level at $t = 0$. This is evident by replacing in (1.19) the old devaluation path $\{\bar{e}\}_{t=0}^{\infty}$ for the new devaluation path $\{e_t\}_{t=0}^{\infty}$. Since $e_0 = \bar{e}$, equation (1.11) shows that a decrease in l causes consumption to rise on impact. After the initial period, consumption falls while the devaluation rate transits to a lower rate. Looking at (1.11) again, this is so because l is constant, but e is falling. Once the devaluation rate reaches its long-run value, the level of consumption becomes constant. These consumption dynamics indicate that the current account records a deficit on impact and improves afterwards. More specifically, equation (1.19) reveals that current account deficits persist while inflation is falling. The multiplier remains constant while inflation is falling only if the level of economy-wide foreign assets decline over time. Since consumption falls and income is assumed constant, these deficits must be decreasing in magnitude over time. Finally, the current account runs surpluses after the devaluation rate stops declining so that intertemporal budget constraints are not violated.

For the case of $s < 1$, consumption and current account dynamics are the opposite. The shadow value of wealth increases immediately upon announcement of the new exchange rate regime. This is because when $s < 1$, the exponent $-(1-a)(1-s)/s$ is negative. The result is that a decreasing path of e_t means an increase in the numerator of (1.19) and the multiplier rises. According to (1.11), consumption decreases on impact and then increases during the transition to a lower devaluation rate. This implies that the current account records a surplus on impact, which deteriorates over time, eventually giving way to deficits.

2. Uncertain Duration of Policy and Stabilization

In this section, the model outlined above is extended to incorporate uncertain duration of policy. I assume that at the outset of stabilization, domestic agents do not believe that the stabilization policy is fully credible. Even though the government might present the policy as permanent, the public believes that there is a possibility of the policy being abandoned at some

[4] When $s = 1$, the utility function becomes logarithmic, $a \ln(c) + (1-a)\ln(m)$. This implies that consumption behavior is independent of exchange rate policy, given the separation of consumption and real balances. Thus, when the new devaluation policy is implemented, consumption remains constant and there is no change in the current account as well.

time in the future. It is assumed that the exact timing of such a future policy reversal is unknown to domestic agents. Let date T denote the timing of the policy switch if it occurs.

There are two possible states of nature. The first is when stabilization policy is in place, which will be referred to as the reform regime. The second is after stabilization has been abandoned and the old exchange rate policy is reinstated. This will be labeled the non-reform regime. Since the behavior of domestic agents while stabilization policy is in place is the main focus, I assume that the non-reform regime is an *absorbing* state. Once the non-reform regime is entered, there is no possibility of ever returning to the reform regime. Each period domestic agents must formulate probabilities of whether the stabilization policy will exist or not in the next period. Formally, these subjective probabilities of policy collapse are listed as

$$\text{Prob}(s_{t+1} = r \mid s_t = r) = p_t, \tag{2.1}$$

$$\text{Prob}(s_{t+1} = n \mid s_t = r) = 1 - p_t, \tag{2.2}$$

where s denotes the state with r corresponding to the reform regime and n to the non-reform regime. Equations (2.1) and (2.2) state that in any given period while the stabilization policy is in place, there is a probability p that the policy will continue to exist in the next period and a probability $1-p$ that the policy will be abandoned. Finally, it is assumed that the government announces publicly at the end of each reform regime period whether the new policy will continue or not into the next period.

The agent still derives utility from consumption of a single good and from holding real money balances. If there were no uncertainty regarding date T, the representative agent's lifetime utility would be of the form

$$U = \sum_{t=o}^{T-1} \beta^t u(c_{t,r}, m_{t,r}) + \sum_{t=T}^{\infty} \beta^t u(c_{t,n}, m_{t,n}). \tag{2.3}$$

However, the presence of uncertain duration of policy forces the agent to take into account that date T is random. In essence, the agent's utility function needs to comprise the likelihood of all possible future states of nature. Using the probabilities p and 1-p as weights, each possible configuration of the agent's lifetime utility is weighted according to the likelihood of that configuration occurring from the perspective of date zero. For example, the first three possible configurations are

$$\begin{aligned} E_0 U = (1-p_0)\left[u(c_{0,r}, m_{0,r}) + \sum_{t=1}^{\infty} \beta^t u(c_{t,n}, m_{t,n})\right] \\ + p_1(1-p_0)\left[u(c_{0,r}, m_{0,r}) + \beta u(c_{1,r}, m_{1,r}) + \sum_{t=2}^{\infty} \beta^t u(c_{t,n}, m_{t,n})\right] \\ + p_2 p_1(1-p_0)\left[u(c_{0,r}, m_{0,r}) + \beta u(c_{1,r}, m_{1,r}) + \beta^2 u(c_{2,r}, m_{t,r}) + \sum_{t=3}^{\infty} \beta^t u(c_{t,n}, m_{t,n})\right]. \end{aligned} \tag{2.4}$$

Therefore, if one continues with the above formulation for the remaining possible configurations and collects terms in the resulting expression, the representative agent's utility function takes the form

$$E_0 U = u(c_{0,r}, m_{0,r}) + \sum_{t=1}^{\infty}\left[\beta^t \left(\prod_{j=1}^{t} p_{j-1} \right) u(c_{t,r}, m_{t,n}) \right] + \sum_{t=1}^{\infty}\left[\beta^t \left(1 - \prod_{j=1}^{t} p_{j-1} \right) u(c_{t,n}, m_{t,n}) \right]. \tag{2.5}$$

The next step is to derive the agent's intertemporal budget constraint. Just as in the case of the agent's lifetime utility function, her intertemporal budget constraint can potentially take many forms depending on when date T occurs. For example, there is a probability of $(1 - p_0)$ that the constraint would be:

$$a_0 = \left[c_{0,r} + (r + \varepsilon_{0,r}) m_{0,r} - y - \tau_{0,r} \right] + \sum_{t=1}^{\infty} \left(\frac{1}{1+r} \right)^t \left(c_{t,n} + (r + \varepsilon_{t,n}) m_{t,n} - y - \tau_{t,n} \right), \tag{2.6}$$

that is, the new stabilization policy last only one period. There is also a probability of $p_1(1 - p_0)$ that the constraint would be:

$$\begin{aligned} a_0 = &\left[c_{0,r} + (r + \varepsilon_{0,r}) m_{0,r} - y - \tau_{0,r} + c_{1,r} + (r + \varepsilon_{1,r}) m_{1,r} - y - \tau_{1,r} \right] \\ &+ \sum_{t=2}^{\infty} \left(\frac{1}{1+r} \right)^t \left(c_{t,n} + (r + \varepsilon_{t,n}) m_{t,n} - y - \tau_{t,n} \right), \end{aligned} \tag{2.7}$$

that is, the stabilization policy last for only the first two periods. If the above formulation is carried out taking into account all remaining possible configurations and then grouping similar terms, the agent's *expected* value intertemporal budget constraint then takes the form:

$$\begin{aligned} &\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t \left(\prod_{j=0}^{t} p_{j-1} \right) \left(c_{t,r} + (r + \varepsilon_{t,r}) m_{t,r} \right) + \sum_{t=1}^{\infty} \left(\frac{1}{1+r} \right)^t \left(1 - \prod_{j=1}^{t} p_{j-1} \right) \left(c_{t,n} + (r + \varepsilon_{t,n}) m_{t,n} \right) \\ &= a_0 + \sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t \left(\prod_{j=0}^{t} p_{j-1} \right) \left(y + \tau_{t,r} \right) + \sum_{t=1}^{\infty} \left(\frac{1}{1+r} \right)^t \left(1 - \prod_{j=1}^{t} p_{j-1} \right) \left(y + \tau_{t,n} \right). \end{aligned} \tag{2.8}$$

The agent's problem is to maximize (2.5) subject to (2.8). As in the previous section, a Lagrangian can be set up based on (2.5) and (2.8). The resulting first-order conditions are

$$u_c(c_{t,r}, m_{t,r}) = \lambda_t , \tag{2.9}$$

$$u_m(c_{t,r}, m_{t,r}) = \lambda_t (r + \varepsilon_{t,r}), \tag{2.10}$$

$$u_c(c_{t,n}, m_{t,n}) = \lambda_t , \tag{2.11}$$

$$u_m(c_{t,n}, m_{t,n}) = \lambda_t (r + \varepsilon_{t,n}). \tag{2.12}$$

Using the same isoelastic functional form as before, the following demand functions are attained:

$$c_{t,r} = \left(a / l_t\right)^{1/s} \left[a(r + e_{t,r})/(1-a)\right]^{-(1-a)(1-s)/s}, \tag{2.13}$$

$$m_{t,r} = \left(a / l_t\right)^{1/s} \left[a(r + e_{t,r})/(1-a)\right]^{a(1-s)-1/s}, \tag{2.14}$$

$$c_{t,n} = \left(a / l_t\right)^{1/s} \left[a(r + e_{t,n})/(1-a)\right]^{-(1-a)(1-s)/s}, \tag{2.15}$$

$$m_{t,n} = \left(a / l_t\right)^{1/s} \left[a(r + e_{t,n})/(1-a)\right]^{a(1-s)-1/s}. \tag{2.16}$$

In analyzing the public sector, the same conditions hold as in the previous section. The government's budget constraint is[5]

$$t_{t,r} = r_t f_{t-1} + u_{t,r} m_{t,r} - \left(f_t - f_{t-1}\right) - g, \qquad \text{for } 0 \le t < T, \tag{2.17}$$

and

$$t_{t,n} = r_t f_{t-1} + u_{t,n} m_{t,n} - \left(f_t - f_{t-1}\right) - g, \qquad \text{for } T \le t < \infty. \tag{2.18}$$

Taking into account that date T is random, the government's intertemporal budget constraint becomes

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t\left(\prod_{j=0}^{t} p_{j-1}\right)\left(t_{t,r}+g\right)+\sum_{t=1}^{\infty}\left(\frac{1}{1+r}\right)^t\left(1-\prod_{j=1}^{t} p_{j-1}\right)\left(t_{t,n}+g\right)$$

$$= f_0 + \sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t\left(\prod_{j=0}^{t} p_{j-1}\right)\left(\Delta m_{t,r} + e_{t,r} m_{t,r}\right)+\sum_{t=1}^{\infty}\left(\frac{1}{1+r}\right)^t\left(1-\prod_{j=1}^{t} p_{j-1}\right)\left(\Delta m_{t,n} + e_{t,n} m_{t,n}\right) \tag{2.19}$$

Once again, it is assumed that at time $t = 0$ the government announces a new exchange rate policy. Prior to the announcement, the rate of devaluation was expected to remain constant at $\bar{e}$ forever. The new policy specifies a path $\{e_t\}_{t=0}^{\infty}$ that declines gradually over time from the initial rate of $e_0 = \bar{e}$. If the new exchange rate policy is abandoned, the rate of devaluation returns to its previous rate of $\bar{e}$ for all remaining time. To evaluate the effect of this new policy, I proceed in the same fashion as before.

The economy wide intertemporal budget constraint is obtained by combining the agent's intertemporal budget constraint (2.8) and the government's intertemporal budget constraint (2.19):

$$\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t\left(\prod_{j=0}^{t} p_{j-1}\right)\left(c_{t,r}\right)+\sum_{t=1}^{\infty}\left(\frac{1}{1+r}\right)^t\left(1-\prod_{j=1}^{t} p_{j-1}\right)\left(c_{t,n}\right) = h_0 + \frac{1+r}{r}\left(y-g\right). \tag{2.20}$$

Substitution of (2.13) and (2.15) into (2.20) yields the initial equilibrium shadow value of wealth:

[5] For ease of exposition, I assume from here on out that government expenditures are constant across the reform and non-reform regimes.

$$\lambda_0 = \alpha\left[\frac{\sum_{t=0}^{\infty}\left(\frac{1}{1+r}\right)^t\left(\prod_{j=0}^{t}p_{j-1}\right)\left[\frac{\alpha(r+\varepsilon_t)}{1-\alpha}\right]^{\frac{-(1-\alpha)(1-\sigma)}{\sigma}}+\sum_{t=1}^{\infty}\left(\frac{1}{1+r}\right)^t\left(1-\prod_{j=1}^{t}p_{j-1}\right)\left[\frac{\alpha(r+\bar{\varepsilon})}{1-\alpha}\right]^{\frac{-(1-\alpha)(1-\sigma)}{\sigma}}}{h_0+\frac{1+r}{r}(y-g)}\right]^{\sigma}. \quad (2.21)$$

Since I have not yet specified a mechanism for how the probability of policy collapse changes over time, I consider the case of constant probabilities in this section. Equation (2.21) with time invariant probabilities and for any $t \geq 0$ becomes

$$\lambda_t = \alpha\left[\frac{\sum_{s=0}^{\infty}\left(\frac{p}{1+r}\right)^s\left[\frac{\alpha(r+\varepsilon_{t+s})}{1-\alpha}\right]^{\frac{-(1-\alpha)(1-\sigma)}{\sigma}}+\sum_{s=1}^{\infty}\left(\frac{1}{1+r}\right)^s\left(1-p^s\right)\left[\frac{\alpha(r+\bar{\varepsilon})}{1-\alpha}\right]^{\frac{-(1-\alpha)(1-\sigma)}{\sigma}}}{h_t+\frac{1+r}{r}(y-g)}\right]^{\sigma}. \quad (2.22)$$

Equation (2.22) is also conditional on stabilization not having been abandoned as of time t.

With the inclusion of uncertain duration of policy, the effects of the new devaluation rate again depend on whether the intertemporal elasticity of substitution is larger or smaller than one, but the probability of no policy collapse *p* also plays a role.

For the case of $\sigma > 1$, the shadow value of wealth still decreases from its pre-announcement level to its new level at $t = 0$. The value of p determines by how far it falls. In general, the larger is *p*, the further the multiplier falls. This is true because the numerator in (2.22) can be thought of as the expected future level of the devaluation rate. The new path of the devaluation rate and the old devaluation rate are weighted by the probability of no collapse and collapse. If the agent believes it is more likely that the stabilization policy will not be abandoned, she places more weight on the new exchange rate path and thus, the numerator of (2.22) increases.

Consumption still rises on impact, but what happens during the transition to a lower devaluation rate? In the case of perfect credibility, consumption fell over this interval because ε_t declined gradually and the multiplier remained constant. With uncertain duration of policy, λ_t does not necessarily remain fixed over time. The value of the multiplier remains constant only if expected values equal actual values. Given the current value of p, the agent calculates what she expects the devaluation rate to be in the next and coming periods. When she reaches the next period and discovers that the new exchange rate policy has not collapsed, the actual rate of devaluation is less than what she expected it to be. The outcome in the first period is that $\lambda_0 > \lambda_1$. According to (2.13), the decrease in the multiplier tends to raise consumption while the actual decline in the devaluation rate tends to decrease consumption. Therefore, the net effect on consumption in the first period is ambiguous. As long as stabilization policy is not reversed, consumption could either increase or decrease over time depending on the magnitudes of $\Delta\lambda_t$ and $\Delta\varepsilon_t$. These consumption dynamics imply that the current account records a deficit on impact, and the path of external balances could either continue to deteriorate or improve.

For the $\sigma < 1$ case, the dynamics are the opposite. λ_t rises when the stabilization policy is announced, but again the value of p dictates by how much the multiplier increases. Consumption decreases on impact of the announcement, but after the initial period, consumption behavior exhibits the same ambiguity as above. The expected level of the devaluation rate in period one is greater than the actual devaluation rate. However, the numerator of equation (2.22) decreases in this case. This causes $l_0 < l_1$, which tends to decrease consumption. On the other hand, the decrease in the actual devaluation rate tends to increase consumption. Consumption could either decrease or increase over time depending on these magnitudes. Likewise, the current account records a surplus on impact and either continues to improve or deteriorates.

Given this ambiguous result, I undertake a simple numerical exercise to illuminate consumption and current account dynamics (see Figures 1-4). This exercise assumes that the old devaluation rate is set at 20 percent, while the new devaluation rate declines by 4 percent in the first four periods and remains at 4 percent thereafter. The parameter values used are $r = .05$ and $a = .6$. Since most studies show that the intertemporal elasticity of substitution is less than one for developing countries, I consider the values of $s = 1.25$ and $s = 5$, which correspond to the lower and upper-bound estimates of .2 and .8 cited in the literature (see Ostry and Reinhart, 1992). Figure 1 illustrates consumption behavior for the case of $s = 1.25$ and for three different values of *p*. This figure shows that consumption does rise in period zero and after that falls as predicted by the model. The value of *p* determines the extent to which the agent responds to changes in the devaluation rate. A lower value of *p* results in smaller changes in consumption. This behavior suggests that the presence of uncertain duration of policy functions like a precautionary saving motive: a higher degree of uncertainty causes the agent to be more prudent in regards to consumption choices. In Figure 2, the corresponding current account dynamics are shown. The current account registers a deficit in period zero and improves over time for all three values of *p*. The value of *p* here determines the magnitude of the deficit in period zero. A smaller probability of no policy collapse results in a smaller initial deficit. Figures 3 and 4 show the results of the same simulation exercise except that $s = 5$. The dynamics are virtually identical apart from the fact that the larger intertemporal substitution of elasticity naturally causes consumption to respond more to the changes in the rate of devaluation.

Policy uncertainty cannot continue to exist indefinitely. At some point in time, it is realistic to assume that the uncertainty surrounding the duration of policy must be resolved. If stabilization is reversed at any time after period one and the agent does not fully anticipate this event, consumption should increase as a result. The multiplier and the devaluation rate increase when stabilization is abandoned unexpectedly. These actions imply that the change in consumption is indeterminate. The above numerical exercise, however, suggests that the effect of a change in the devaluation rate is greater than the effect generated by the change in the multiplier. Thus, consumption rises and the current account deteriorates.

Policy uncertainty does not have to be resolved solely because stabilization fails. It can also be resolved due to the success of stabilization, which is taken up in the next section.

3. Uncertain Duration of Policy, Learning, and Stabilization

In the last section, it was assumed that domestic agents believed that stabilization policy announced at time $t = 0$ lacked full credibility. Consequently, agents formed a subjective probability regarding the likelihood of collapse of the new policy in the next period. What was

Figure 1
ó=1.25

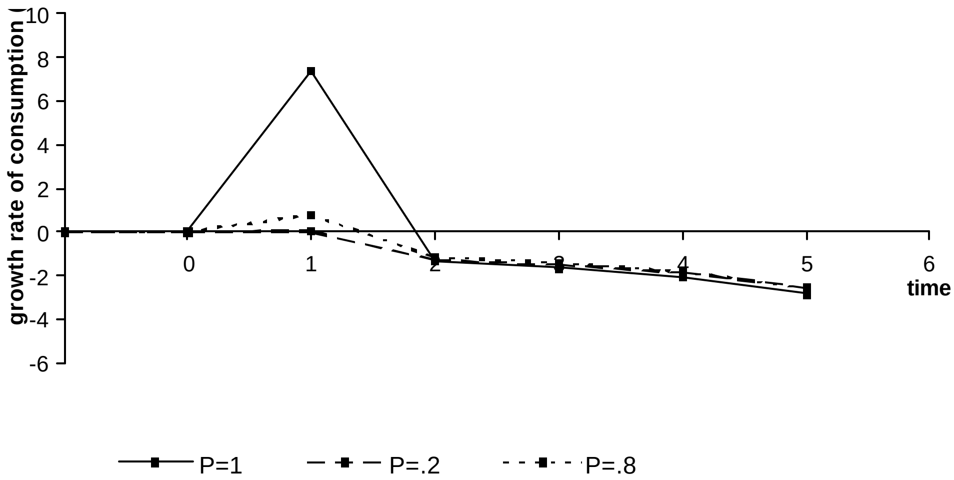


Figure 2
ó =1.25

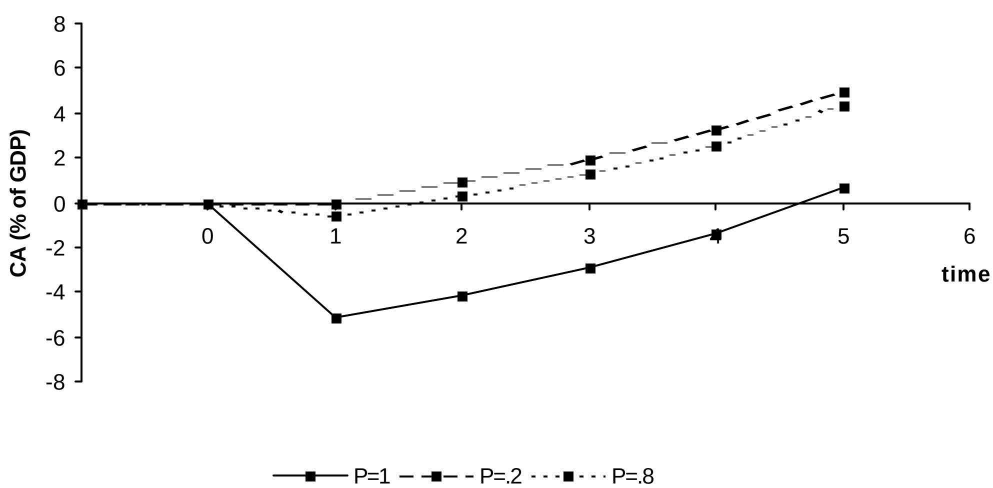


Figure 3
ó=5

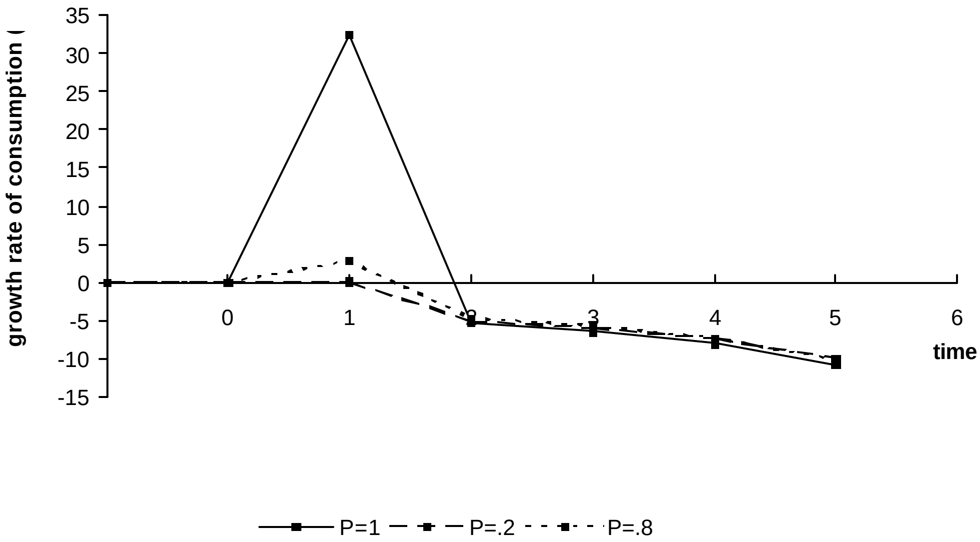
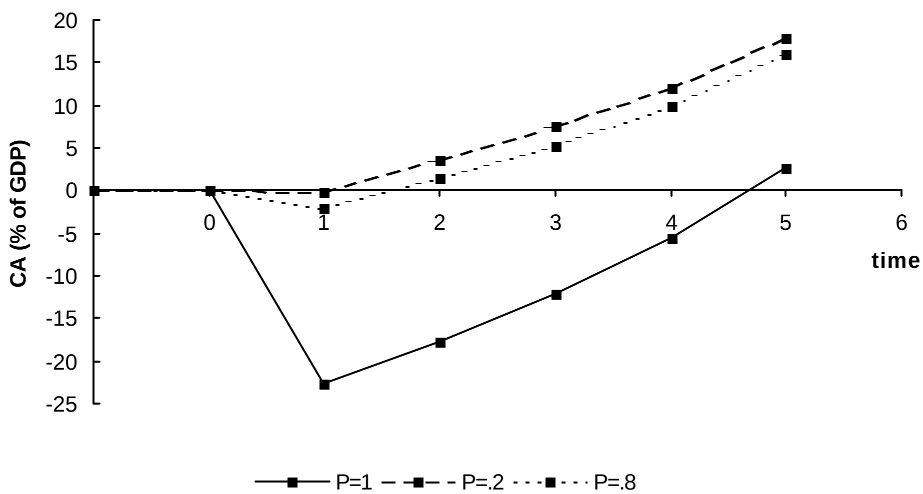


Figure 4
ó=5



missing from the analysis, however, was a specific mechanism relating how these expectations are formed and how they might change over time.

Up to this point, the credibility of the new exchange rate regime rested heavily on the assumption that the growth rate of the domestic credit supply was equal to the growth rate of real money demand. If the rate of growth of domestic credit outpaced that of the real money demand, the result was shown to be a loss of reserves. Assuming that the central bank cannot or will not defend the current peg after its reserves reach a lower bound, a continued reserve loss over time would result in the eventual collapse of the new exchange rate policy.

I assume in this section that agents' beliefs about the duration of stabilization policy depend upon their assessment of the probability that the current domestic credit process is "consistent" with the new exchange rate regime. I define a consistent domestic credit process to be one that does not imply a loss of reserves and a non-consistent domestic credit process to be one, which does imply a loss of reserves. At the outset of stabilization, domestic agents are uncertain as to which type of domestic credit process the government will implement. The public believes that domestic credit either follows a non-consistent process defined as

$$D_t = D_{t-1}\exp\left(\bar{m}t\right), \tag{3.1}$$

or a consistent process defined as

$$D_t = D_{t-1}\exp\left(\tilde{m}t\right), \tag{3.2}$$

where $\bar{m} > \tilde{m}$. The expected level of domestic credit at time t will be a probability-weighted average of the two processes:

$$E_t D_t = q_t D_{t-1}\exp\left(\bar{m}t\right) + \left(1-q_t\right) D_{t-1}\exp\left(\tilde{m}t\right)., \tag{3.3}$$

where q_t is the agent's subjective probability that the domestic credit process is non-consistent and $1-q_t$ is her subjective probability that the domestic credit process is consistent. The problem facing agents is to assign a value to q_t each period.

It is assumed that agents learn about the true process over time by Bayesian updating. In every period, agents have a prior belief about the value of q. They combine this prior with current observations of D_t each period to update their posterior probability according to Bayes law. Thus,

$$q_t = \frac{q_{t-1}L\left(D_t \mid \bar{m}\right)}{\left(1-q_{t-1}\right)L\left(D_t \mid \tilde{m}\right) + q_{t-1}L\left(D_t \mid \bar{m}\right)}, \tag{3.4}$$

where $L\left(D_t \mid \bar{m}\right)$ and $L\left(D_t \mid \tilde{m}\right)$ is the likelihood of observing the variable D_t given that the growth rate of domestic credit is non-consistent and consistent, respectively. If in fact the new domestic credit process is non-consistent, the probability q_t converges, asymptotically, to one and if the process is consistent, it converges to zero.

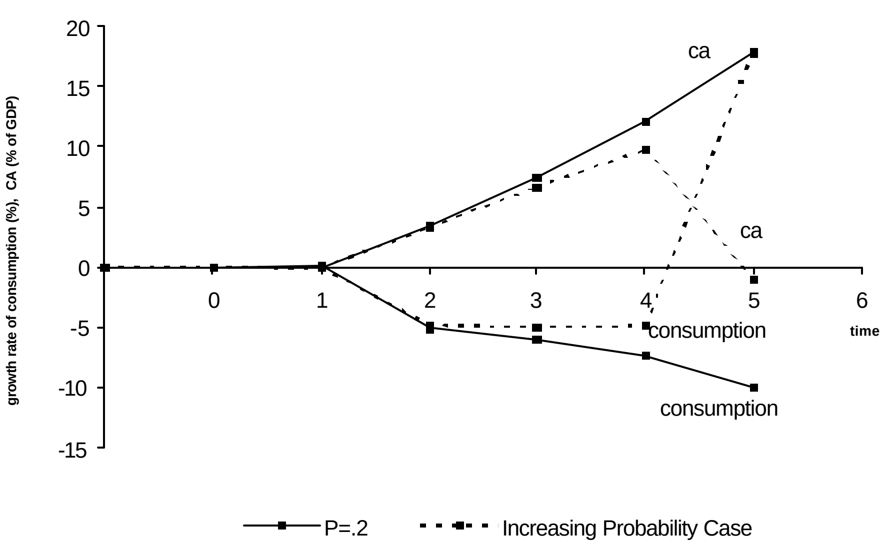
As agents learn about the true domestic credit process, they will be able to assess more accurately whether or not stabilization policy will collapse at some point in the future. Once the agent has updated her subjective probability q_t, she next updates her subjective probability of policy collapse according to the simple relationship

$$p_t = 1 - q_t . \qquad (3.5)$$

The agent's subjective probability of no policy collapse is a monotonically increasing function of the agent's subjective probability that the current domestic credit process is consistent.

When the agent's subjective probability of no policy collapse changes, how does this impact current account balances? For the case of $s > 1$ and assuming that the true domestic credit process is consistent, the immediate impact of stabilization is the same as before. Consumption rises in period zero. When the agent reaches the next period and stabilization policy is still in effect, there are now two sources of information for her to process. First, the agent realizes as before that she has overestimated the devaluation rate at time $t = 1$. This information causes her to increase consumption. The agent also adjusts her subjective probability of no policy collapse. At the beginning of period one, she has a prior belief about the value of q_1. The agent observes the period one level of domestic credit and updates her belief based on (3.4), and in this case her posterior value of q_1 will be less than her prior. This calculation is then used to update her subjective probability of no policy collapse, which increases according to (3.5). The increase in p reinforces the effect due to overestimation and consumption tends to increase further. Nevertheless, there is still the conflicting force on consumption stemming from the actual change in the devaluation rate, which tends to lower consumption. Thus, the overall effect on consumption and the current account is still ambiguous during the transition to a lower devaluation rate.

Figure 5



In order to elucidate dynamics, I construct another simple numerical exercise (see Figure 5). This exercise assumes the same values for the devaluation rate and parameters as in the previous section's numerical exercise. The difference here is that I assume the agent learns over time that the domestic credit supply is consistent. This increases *p* and essentially, the agent becomes more optimistic that stabilization is permanent. The other difference is that I am using just the parameter value of $s = 5$ for the exercise. Figure 6 contains two sets of data. The solid lines pertain to the case of p=.2, which is used as a baseline. The dotted lines pertain to the situation where *p* starts out equal to .2 and increases by .2 every period until it reaches the value of one.

In comparing the two paths of consumption, it is shown that as p rises, the decrease in the growth rate of consumption is not as severe as when *p* is constant at the value of .2. The paths of the current account reveal that as p increases the current account deteriorates in comparison to its path that assumes an unchanging p. It is not until the fourth period that a rise in p translates into an absolute deterioration in the external balance. Therefore, this simple simulation suggests that the probability of no policy collapse is positively correlated to deteriorating current account balances.

4. Conclusions

This paper extends Obstfeld's (1985) analysis of stabilization policy by incorporating uncertain duration of policy. In contrast to previous studies, the model developed in this paper specifies how the public forms and updates their expectations concerning the collapse of stabilization. I show first that the presence of uncertain duration of policy functions like a precautionary saving motive. The uncertainty leads individuals to be more prudent about consumption choices. The impact on the current account occurs mainly in the initial period as more prudent behavior leads to a smaller deficit. The second result is that the probability of no policy collapse is positively correlated with deteriorating current account balances. A simple numerical exercise reveals that increases in the probability of no policy collapse cause the current account to deteriorate relative to what it would have been if probabilities remained constant.

These results suggest that changing expectations of duration of policy could help explain the stylized fact of persistent and increasing current account deficits during successful and failed stabilizations.

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