Comment on Cooley and Quadrini, 'The Costs of Losing Monetary Independence: The Case of Mexico', by Stefania Albanesi and Lawrence J. Christiano, Northwestern University.

1. Introduction

The dollarization debate focuses on several benefits and costs. The essence of the case for dollarization is that it solves various problems that can occur when there is lack of commitment in monetary policy. Proponents argue that in the absence of commitment, two types of bad equilibria can occur. First, there can be an inflation bias along the lines of Kydland-Prescott and Barro-Gordon. Second, it is possible for self-fulfilling expectations about monetary policy to produce costly volatility in real allocations, such as output and employment. Both these possibilities can occur in environments in which agents' expectations of high inflation lead them to take actions which make it optimal for the monetary authority to validate those expectations. Some have argued that the dramatic fall in output in Mexico in 1995 and the loss of output in several Asian countries in 1998 are examples of the type of volatile equilibria that can occur when there is a lack of commitment in monetary policy. Proponents of dollarization argue that any policy that prevented just one episode like these is worth a great deal.[1]

But, there are opponents to dollarization too. They tend to take the position that the financial instability observed in several countries reflect other problems, and not a lack of commitment in monetary policy. They focus on the fact that the loss of control over monetary policy under dollarization means that the central bank loses the power to insulate the real economy and the fiscal system from shocks (see, e.g., Sims (1999).)

The Cooley-Quadrini paper is potentially very appealing because it purports to construct a single environment that incorporates the benefits and costs of dollarization just emphasized. Cooley and Quadrini construct a two-country model, in which one country is calibrated to Mexico and the other to the US. They take US monetary policy as given and they model the Mexican central bank as an optimizing authority. They assume that the Mexican central bank has no ability to commit to its future policies. So, in principle at least, this sort of environment should be able to capture the costs associated with lack of commitment. They also include some of potential stabilization advantages attributed to monetary policy by including shocks to technology in Mexico and the US. They compare welfare in the equilibrium of this model with welfare under an alternative dollarization scenario in which Mexico simply adopts the US monetary policy.

They reach a potentially very important conclusion. By assuming that the central bank

[1]See, for example Francois Velde and Marcello Veracierto (1999).

has no ability to commit, they seem to be making the best possible case *for* dollarization. Yet, they conclude that dollarization is a *bad* thing.[2]

Moreover, the reason for the finding that dollarization is bad is as surprising as the finding itself. The problem with dollarization, in their environment, is not the loss of the ability to stabilize the economy. Instead, dollarization is a bad thing because it is desirable for Mexican inflation to be higher than US inflation.

We are unconvinced by the conclusion for two reasons. First, the model does not include any of the costs normally associated with the inability to commit. In particular, there is no time consistency problem and the policymaker in the model implements the ex ante optimal policy. At first, this came as a surprise to us because the model has several of the basic ingredients for a time consistency problem to emerge. In particular, at the beginning of each period, private agents make a decision based on an expectation about what the monetary authority will do. The monetary authority takes this decision as given in determining the action that it actually takes. This is the basic setup of the Kydland-Prescott and Barro-Gordon environment, which gives rise to an inflation bias. It is also the setup in more recent models which emphasize the possibility that private expectations can be a source of instability.[3] The environment in this paper differs from the one in these other papers in a crucial way. As we show below, the decision taken by private agents (a portfolio decision) does not constrain in any way the equilibrium allocations that the monetary authority can or wants to achieve by choice of its policy. In this sense, the decision taken by private agents before the monetary authority makes its decision is economically irrelevant. This is why there is no time consistency problem in the Cooley-Quadrini model. Since there is no problem for dollarization to solve, it is not surprising that dollarization fails to raise welfare.

Second, we are not convinced that high inflation is a good policy for Mexico. As we explain below, this conclusion is based on the assumption that Mexico can control its terms of trade. No defense of this assumption is presented and we are skeptical that it represents a good approximation for Mexico. Still, this aspect of the paper points to a novel channel for the effects of monetary policy, one that operates through the terms of trade. The channel may be of interest in the analysis of monetary policy in larger countries.[4]

In what follows, we substantiate the claims above. To clarify the workings of the model, we first describe a barter economy whose allocations coincide with the allocations in the

[2]This is conclusion featured in the paper. The authors do present examples in which the policymaker is exogenously constrained to implement a very bad monetary policy. Relative to this, they show that dollarization might be a good thing.

[3]See, for example, Chari, Christiano and Eichenbaum (1998) and Albanesi, Chari and Christiano (2000).

[4]The strategic issues discussed at the end of the paper might potentially be of substantial interest in such a context.

monetary economy studied in the paper. This device, standard in the analysis of monetary models, is useful because it allows us to highlight the main forces operating in this economy. A final section presents concluding remarks.

2. A Barter Economy

Here, we describe a barter economy that is equivalent, in a sense made precise below, to the monetary economy studied by Cooley and Quadrini. The barter economy is composed of domestic and foreign households denoted $i = 1, 2$, respectively. In addition, each country has a single representative firm, also indexed by $i = 1, 2$. Since the two countries are identical except for size, it is enough to describe economy 1.

Households solve the following problem:

$$\max \sum_{t=0}^{\infty} \beta^t u(c_t^1),$$

subject to

$$c_t^1 \leq \tau_t^1 + w_t^1, \ t \geq 0,$$

where w_t^1 denotes the wage rate and the household is assumed to offer its entire labor endowment of 1 inelastically. Also, τ_t^1 is a lump sum tax, received from the government.

Firms solve:

$$\max_{x_{11}, x_{12}, l^1} \ (1 - \theta^1) y_1 - (x_{11} + \bar{e} x_{12}) - w^1 l^1, \ 0 < \nu < 1,$$

where A_1 is a constant, $\bar{e}$ is the terms of trade and l^1 is the amount of labor hired. To conserve on notation, we do not use time subscripts in cases where omitting them leads to no confusion. The technology is:

$$y_1 = A_1 \left(l^1\right)^{1-\nu} x_1^{\nu}, \ x_1 = (x_{11}^{\epsilon} + \phi x_{12}^{\epsilon})^{\frac{1}{\epsilon}}, \ \epsilon < \nu.$$

Here, x_{ij} is the quantity of country j's output used by a firm in country i for use as an intermediate input in production.

The resource constraint is:

$$Y_1 = C_1 + X_{11} + X_{21} \mu,$$

where uppercase letters denote economy-wide averages. Also, μ is the size of country 2 relative to country 1. Clearing in the labor market requires $l^1 = 1$.

The government budget constraint is:

$$\tau^1 = \theta^1 Y_1.$$

Government policy is a sequence of tax rates, one for each date.

With the obvious adjustments with respect to μ, the above equations hold for country $i = 2$ as well. An implication of our assumption that households cannot borrow or lend is that trade must be balanced:

$$X_{21}\mu = \bar{e}X_{12}.$$

The results reported by Cooley and Quadrini impose this restriction too.

Under the restriction, $0 \leq \theta^i < 1$, $i = 1, 2$, this economy is equivalent to the Cooley-Quadrini economy.[5] To see this, one needs only to note that the equations characterizing the equilibrium allocations in the two economies coincide, as long as the policies in the two economies satisfy the following relationship: $1 + R_i = 1/(1 - \theta^i)$. (See Cooley and Quadrini's equations (36)-(42), plus the trade balance.) Here, we use the Cooley-Quadrini result that policy in the monetary economy can be characterized in terms of the interest rate.

3. Results

This section uses the barter economy interpretation of the Cooley-Quadrini model to make two points. First, we establish that the optimal policy with commitment for country 1, taking the policy of country 2 as given is time consistent. Second, we use the barter economy to gain intuition into the nature of the optimal policy.

3.1. Time Consistency in the Barter Economy

To determine the equilibrium associated with a given tax policy in the barter economy, simply solve the equations characterizing the equilibrium for each date. These equations define a mapping from θ_t^1 to consumption, $C_{1,t}(\theta_t^1)$. Now consider the date 0 optimization problem of the country 1 government which can commit to its future policies. Its problem, the Ramsey problem, is:

$$\max_{\left\{0 \leq \theta_t^1 < 1\right\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \beta^t u\left[C_{1,t}(\theta_t^1)\right].$$

[5] The restriction, $0 < \theta^i < 1$, is required for the equivalence result. Although $\theta^i < 0$ is admissible in a barter economy, the associated equilibrium allocations have no analog in the monetary economy due to the constraint in that economy that the equilibrium nominal rate of interest must be non-negative.

Notice that, because of time separability, this problem is equivalent to the following sequence of problems:

$$\max_{0\leq\theta_t^1<1} u\left[C_{1,t}(\theta_t^1)\right].$$

Now consider the problem of a government that cannot commit to its future policies. Suppose that at some time $t>0$, the government reassesses its decisions about θ_{t+j}^1, $j\geq 0$. To define this new problem, we need to specify when during period t, θ_t^1 is selected. Here, we follow Cooley and Quadrini. In their model the analog of θ_t^1, namely $R_{1,t}$, is determined before the date t x_{ij}'s and c_i's are selected.[6] Following their lead, we assume that θ_t^1 is selected before the firms and the households make their time t decisions. As a result, the period t mapping from θ_t^1 to period t consumption is still given by $C_{1,t}(\theta_t^1)$. Since this policy maker solves the same problem solved in period 0, there is no reason for the outcome to differ from the Ramsey outcome. This establishes time consistency of the Ramsey outcome.

One way to understand why there is no time consistency problem is to note that this economy excludes a key feature of the Kydland-Prescott or Barro-Gordon environment. In particular, private agents' expectations about θ_t^1 do not have an impact on the mapping from the policy variable to private sector allocations, $C_{1,t}(\theta_t^1)$. In the monetary version of the Cooley-Quadrini model it may appear that private expectations do impact on this mapping. This is because agents make a portfolio decision based on expectations before the monetary authority makes its decision. However, the fact that that portfolio decision does not show up in the barter representation of the monetary economy establishes that it is economically irrelevant. This is why only θ_t^1 - and not additional variables dependent upon expectations of θ_t^1 - is sufficient to determine $C_{1,t}$.

3.2. Optimal Policy

In the barter economy, the tax rate, θ^1 has two effects on output and consumption. The first holds the terms of trade, $\bar{e}$, constant. This direct channel works to reduce output and consumption, hence, utility. This is simply because now it is more expensive to produce

[6] In the Cooley-Quadrini model, the household makes a portfolio decision, $\bar{d}_1 = D_1/M_1$, say, before the monetary authority selects the period t rate of interest. However, this decision by the household does not restrict the monetary authority's choice of R_1. This is the essence of Cooley and Quadrini's claim that monetary policy in their economy can be characterized in terms of R_1. To see how this argument works, one verifies that for any $R_1\geq 0$ and any $0\leq\bar{d}_1<1$, an admissible g_1 (i.e., $g_1\geq -1$) can be found that supports the given R_1. This is verified by noting that a $g_1\geq -1$ can always be found that solves (34) given any $R_1\geq 0$ and any $0\leq\bar{d}_1<1$. If $\bar{d}_1=1$, then our argument breaks down. However, an optimizing household would never choose $\bar{d}_1=1$ since this implies zero consumption in period t.

output. The second effect operates indirectly, via the effect of θ^1 on the terms of trade. With the output of the domestic economy more expensive, the real exchange rate appreciates.[7] The foreign country responds by absorbing less of the output of country 1 (i.e., x_{21} falls) in exchange for more of their output (i.e., x_{12} goes up). This makes it possible for country 1 to actually expand production and consumption. The presence of both these effects guarantees an interior solution for θ^1.

4. Conclusion

In conclusion, the argument against dollarization made in this paper is unconvincing, for two reasons. First, by adopting an environment that excludes commitment problems, Cooley and Quadrini have assumed away the problem dollarization is supposed to solve. Second, their case against dollarization is based on the notion that high inflation in Mexico is desirable. The high inflation in their model implements a price support program for Mexican goods. We doubt that high inflation is an efficient way to implement such a policy, in part because we think there are costs of inflation that are not captured in their model. In any case, we doubt that such a program would be effective because we suspect that the elasticity of demand for Mexican exports is high. We conjecture that, by limiting the analysis to two countries, the framework adopted by Cooley and Quadrini understates the elasticity of demand for Mexican exports.

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[7] This is easy to see when there is no substitutability in inputs, i.e., when $\varepsilon = -\infty$. Substituting from (39)-(42) in the Cooley-Quadrini appendix into the trade balance formula, one obtains:

$$\bar{e} = \left(\frac{A_1}{A_2} \frac{1-\theta^1}{1-\theta^2} \right)^{\frac{1}{\nu}}.$$

From this it is clear that a rise in θ^1 drives $\bar{e}$ down.

Without the restriction on ε, one obtains, again by substituting into the trade balance formula (after some rearranging):

$$\bar{e}^{-\frac{1+\varepsilon}{1-\varepsilon}} = \left(\frac{\phi_2}{\phi_1} \right)^{\frac{1}{1-\varepsilon}} \left(\frac{\left(1-\theta^2\right) A_2}{\left(1-\theta^1\right) A_1} \right)^{\frac{1}{1-\nu}} \left[\frac{1+\phi_2 \left(\phi_2 \bar{e}\right)^{\frac{\varepsilon}{1-\varepsilon}}}{1+\phi_1 \left(\frac{\phi_1}{\bar{e}} \right)^{\frac{\varepsilon}{1-\varepsilon}}} \right]^{\frac{\nu-\varepsilon}{\varepsilon(1-\nu)}},$$

or, $g(\bar{e}) = f(\bar{e}; \theta^1)$. where g is the function on the left of the equality and f is the function on the right. Now consider $-1 < \varepsilon < 1$ (the numerical analysis in the paper is restricted to this range of values for ε). It is easy to verify the following: (i) g is strictly decreasing in $\bar{e}$; (ii) f is increasing in θ^1 and $\bar{e}$. From this it follows that when θ^1 increases, $\bar{e}$ falls.

References

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