European University Institute

EUI Working Papers

EXIT FROM A MONETARY UNION THROUGH EUROIZATION:
DISCIPLINE WITHOUT CHAOS

Russell Cooper

Exit from a Monetary Union through Euroization:
Discipline without Chaos

RUSSELL COOPER

Exit from a Monetary Union through Euroization: Discipline without Chaos [*]

Russell Cooper[†]

March 6, 2012

Abstract

This paper studies the role of exit from a monetary union during a debt crisis. A monetary union, such as the European Monetary Union, needs to establish a procedure for exit as a tool to cope with debt default. The paper studies various forms of exit and argues that "Euroization" is both a credible and effective means of punishment for countries in default.

1   Motivation

This paper confronts a fundamental problem of a monetary union: how to best arrange the orderly exit of a member country? The context, reflecting current debate, is one of debt distress and the potential for default. Dealing with countries in this situation within a union, such as the European Monetary Union, is important for two primary reasons.

First, exit must be a viable option for punishment of countries who default on their obligations. Any federation of sovereigns allows for some decentralized decision making. This is true for the two leading unions in the United States and in Europe. For these federations, it must be recognized that some member states (countries) might use their residual power to pursue their self interest to the detriment of the federation as a whole. This can include excessive expansionary fiscal policy, leading to debt default. In this case, a mechanism for exit is useful as a means of **discipline**.

Second, exit must be seen as a potential punishment as countries contemplate the future path of fiscal policy. That is, from the perspective of providing incentives for good behavior, a well-specified exit process is valuable. For example, a state (country) thinking of embarking on a fiscal program that might enhance the prospect of needing a bail-out will be influenced by the existence of a stark punishment through exit

[†]Department of Economics, European University Institute; Research Associate, NBER

from the federation. Even countries at the brink of default might be motivated to repay their debt if exit is a form of punishment. The mechanism for exit provides **incentives** to avoid default.

But not any mechanism will do. The mechanism put in place to facilitate exit must be **credible**. Recent history of institution building within the European Union is wrought with plans that appear to be effective but in fact are not credible. These plans do not solve any problems and only serve to heighten unrealistic expectations.

This paper studies a form of exit that draws upon the idea of "Dollarization" or "Euroization" in which one country unilaterally adopts the currency of another (or of a monetary union). It is argued that this is an effective way to use exit as a means of dealing with a debt crisis.

The mechanism does not entail complete exit from the monetary union and the creation (recreation) of a new currency for a couple of reasons. First, it is actually not possible to prevent one country from using the currency of another. That is, a proposal to force a country to withdraw from the Eurozone and create (or recreate) its own currency is not enforceable. Second, Euroization is more orderly than complete exit. Under a Euroization system, all of a country's preexisting contracts in euros would be enforced. There is no need for lengthy legal debate on enforcing a contract between individuals in two countries once a new currency is in place because the euro would continue to exist in both countries.[1]

Exit is studied in the context of a fiscal crisis, since this is the current situation in which this option is most likely to be exercised. Section 2 outlines a model of a monetary union in fiscal distress. The model provides the context for assessing the value of Euroization as a tool for fiscal discipline. Section 3 studies a debt crisis in this framework and provides conditions for a bailout. This lays the foundation for the consideration of Euroization and exit.

Section 4 argues that Euroization is both a credible and effective means of dealing with fiscal distress. It serves to both punish countries who pursue excessive fiscal expansions and provides incentives for others not to do so in the future.

2 A Monetary Union

We formalize these ideas using a model of monetary union taken from Cooper, Kempf, and Peled (2010). We use this structure to make precise the outcomes in the cases of a monetary union, Euroization and a multi-currency regime.

2.1 Environment

The economy is composed of three regions, indexed $i=1,2,3$. For simplicity, all regions are identical in terms of size, preferences and technology.

---

[1]See Scott (1998) for a discussion of some of the legal issues involved in a complete exit.

Here a region can be thought of as a state within a federation or as a country within a monetary union. The key point is the institutional structure of a central monetary authority and independent fiscal authorities at the regional level. Whether there is a central fiscal authority is not, for this discussion, crucial.

The model has overlapping generations. Agents live for two periods, consuming the single consumption good in each period. Agents have an lifetime utility given by $u(c^y) + v(c^o)$ where $u(\cdot)$ and $v(\cdot)$ are strictly increasing and strictly concave. All agents are endowed with ω^y units of the consumption good in youth and ω^o in old age. Agents have access to a storage technology that yields $x > 1$ units of the consumption good in period $t+1$ for each unit stored in period t. In addition, agents may save by holding debt issued by the region 1 government.

Finally, there is a legal restriction that requires money to be held in proportion to the level of real storage, as in Smith (1994). One interpretation is that access to the storage technology requires an intermediary which must hold money as a reserve requirement.

Ultimately the interest is in how two of the regions respond to fiscal problems in a third. For that reason we suppose that the only region issuing debt is region 1. A key issue will be how the union of the three countries deals with the repayment of region 1 debt.

There is also a central bank, CB, which can print money and make transfers to agents in the economy. This same power can be used to bailout the debt obligation of the region 1 government.

There is a key difference between the CB and the regional government: the objectives differ. It is natural to assume that the regional government acts to in the interest of regional 1 agents. Likewise, it is natural to assume that the CB acts in the interest of all agents in the federation. This reflects the presence of representatives of the regions on the governing board of the CB. As we shall see, this difference in objectives is important for understanding bailouts and for the Euroization scheme, which is the form of exit advocated in this essay.

2.2   Model of a Monetary Union

As a benchmark, we consider the steady state equilibrium of a monetary union. The representative region i young agent chooses how much to save and the structure of that portfolio.

In the portfolio of the agent, there are three elements: real storage with a fixed return x, bonds with an equilibrium real return of R and money with a return of $\tilde{\pi}$, the inverse of the gross inflation rate. There is a binding legal restriction, parameterized by a reserve requirement (λ), to generate a demand for money.[2] Working through the algebra, the return on storage is then $R \equiv \frac{x+\lambda\tilde{\pi}}{1+\lambda}$ per unit placed in storage. In equilibrium, the return on debt must equal the return on storage, R.

The representative agent living in region i solves

---

[2]If k units are in storage then money balances must satisfy: $m \geq \lambda k$. There is no reserve requirement for government debt. This structure builds upon Smith (1994).

$$max_s u(\omega^y + g^i - s^i) + v(\omega^o + s^i R - \tau^i) \tag{1}$$

where $s^i \equiv k^i(1 + \lambda) + b^i$ represents total saving. Here g^i is a transfer from the regional government and τ^i is a tax in old age levied by the regional government. As we shall see both fiscal policy, at the regional level, and monetary policy, through real transfers to the regional government, will be seen through the budget constraints of the household embedded in (1).

The optimal savings decision, which depends on R, is denoted by $s^{i*}(R, g^i, \tau^i)$, and satisfies

$$u'(\omega^y + g^i - s^{i*}) = Rv'(\omega^o + s^{i*}R - \tau^i) \tag{2}$$

for $i = 1, 2, 3$.

To focus on the fiscal policy of a single region, assume that region 1 is the only fiscally active region. For region 1, net government transfers in youth, g^1, along with lump sum taxation in old age, τ^1, can be non-zero. Accordingly, government transfers equal zero for the other regions: $g^i = 0$ for i=2,3.

The region 1 government makes transfers of g^1 to each young agent in that region. These transfers are financed by issuing debt. Let b^1 denote the level of debt per young agent in region 1. The debt is paid from tax revenues, τ^1, and transfers to region 1 by the CB, denoted T^1. The regional government budget constraint (written per region 1 agent) is given by:

$$g^1 = B^1; RB^1 = \tau^1 + T^1. \tag{3}$$

Here B^1 is the debt outstanding per region 1 agent. This is distinct from the demand for government debt of a region 1 agent, denoted b^1.

Agents in the other regions may receive transfers in old age if their regional government receives transfers from the CB. That is: $\tau^i = -T^i$ for $i = 2, 3$.

The actions of the CB are modeled, for simplicity, as direct transfers to the region 1 government. Cooper, Kempf, and Peled (July, 2009) looks at more general policies and considers transfers to all regions as well as open market operations. The point here is to study directly money financed bailouts.

Let M_t be the aggregate money supply in period t. Then the evolution of the real money supply is:

$$\frac{M_t - M_{t-1}}{p_t} = \sum_i N^i T^i \tag{4}$$

where N^i is the number of region i agents and p_t is the period t money price of goods.

2.3 The Repayment Game

To understand the factors that determine whether region 1 repays its debt, we study the outcome of the strategic interaction which occurs each period between the government of region 1 and the central authority. This sequence is modified below when exit and Euroization are introduced. The following events occur in

period $t + 1$ by the regional government representing region 1 agents born in period t. Importantly, the taxation decisions associated with generation t agents are made in period $t + 1$ after savings decisions have been made by that generation.

- The region 1 government either taxes the old to meet it debt obligation or not;

- If the region 1 government does not pay its debt obligation, the CB can pay the obligation by printing money and transferring it to the region 1 government ;

- If neither the region 1 government nor the CB repays the debt obligation, the region is in default and its citizens suffer a default cost of κ.

Here κ is not modeled explicitly. In the large literature on debt default, there are many models of this cost which include trade disruptions as well as exclusion from markets.[3] As we elaborate the exit options below, these can be viewed as ways of influencing the magnitude of the default cost and just of changing the incentives for repayment by region 1.

2.4 A Steady State with Ricardian Fiscal Policy

Following Cooper, Kempf, and Peled (2010) there exists a monetary steady state in which region 1 fiscal policy is irrelevant.[4] Hence we call this a Ricardian regime.

In this steady state, the rate of money growth is zero so that $T^i = 0$ for $i = 1, 2, 3$. The stock of money and prices are constant. If x, the rate of return on storage exceeds one, then the legal restriction on money holdings with bind.

Importantly, in this steady state, region 1 debt is held only by region 1 agents: $B^1 = b^1$. Since debt and storage have the same net return of R, this is really a restriction about how private agents break the indifference between holding bonds and storage. It is innocuous at the level of an agent. But, this is critical for this type of equilibrium to exist.

In the extensive form game outlined above, along the equilibrium path the regional government chooses to repay its debt. It makes this choice because it anticipates that there would be no bailout from the central government. As argued in Cooper, Kempf, and Peled (2010), the CB has no incentive to bailout since the consumption allocation across agents in the three regions is equal without a bailout. Thus there is no motivate to bailout as a means of smoothing consumption.

Note that at $\kappa = 0$ the regional government is actually indifferent between the repayment of debt or default. The consumption levels of all region 1 agents will be the same, regardless of the choice of the regional government. This is true because **all** region 1 debt is held by region 1 agents. The strict incentive for repayment comes from $\kappa > 0$.

---

[3]Eaton and Fernandez (1995) and Stähler (2011) survey these results, including recent quantitative evidence.
[4]That paper includes the details for characterizing the steady state.

With $T^1 = 0$, the region 1 government must repay its own debt, $\tau^1 = RB^1$. This future tax is, of course, anticipated by young region 1 agents. Since private and public consumption are perfect substitutes in preferences, young agents do not care about the composition of consumption. Taken together, this implies that a change in government transfers leads to an equal change in private savings and thus to bond holdings. The proceeds from the bond holdings are used to pay the tax in old age. Thus real consumption allocations are independent of g^1.

This Ricardian equilibrium will serve as a benchmark for the analysis that follows. Later when we turn to study the outcome of the interactions between regions, we will have to formalize the value of various outcomes and compared them to this benchmark.

Let the lifetime utility of a representative agent in one of the regions be given by $u(c^{y*}) + v(c^{o*})$ and let $V^* = [u(c^{y*}) + v(c^{o*})] \times \frac{1}{(1-\delta)}$ be the social discounted value of the regime, where δ serves as a discount factor.

Though not modeled here, there are many advantages of monetary union associated with ease of transactions, reductions of exchange rate uncertainty along with the delegation of monetary policy that provides economic gain to a properly run monetary union. Thus we will argue below that V^* is larger than the utility flows generated by in multi-currency world.

2.5 Default and Bailout

But this is not the only possible outcome. As argued in Cooper, Kempf, and Peled (2010) there may also be an equilibrium with the possibility of debt default.

This other equilibrium would not exist if the CB had the ability to commit not to bailout a regional government. In the absence of such commitment ability, which seems consistent with recent events in Europe, the incentives for bailout must be established, along with the incentives for exit.

To see how a bailout might arise, return to the extensive form game and suppose the government of region 1 announced it was not going to repay its outstanding debt. In the absence of commitment to repayment, this is conceivable. The question is whether the regional government has an incentive to default and what the response is to that prospect.

In the analysis of Cooper, Kempf, and Peled (2010), the CB would choose to undertake a monetary financed bailout of region 1 debt if that debt was largely held by agents in other regions. If the debt is sufficiently dispersed, the CB will choose to print money and transfer it to the region 1 government in order to avoid default.[5] This comes from an incentive of the CB to smooth consumption across the agents in the different regions: Cooper, Kempf, and Peled (2010) call this a *consumption smoothing* motive for bailout.
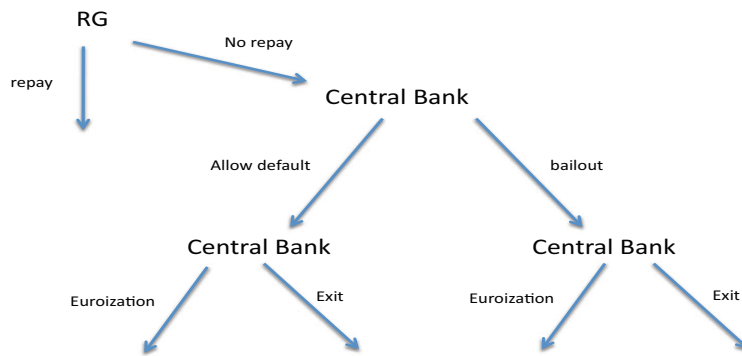
For what follows it is important to appreciate that there are two critical ingredients for this bailout. First, the CB must have the way to bailout the regional government. In the model, this comes from the

---

[5]One way to do so is to set $T^1 > 0$ and other transfers to zero. A bailout through more general money creation with transfers to other regions may also possible.

The Repayment Game

RG

No repay

repay

Central Bank

Allow default

bailout

Central Bank

Central Bank

Euroization

Exit

Euroization

Exit

assumption that it can directly transfer newly created money to the regional government. Second, the *CB* must have a desire to make these transfers. The desire itself comes from two sources: (i) the fact that the welfare of agents throughout the regions is included in the objective of the *CB* and (ii) the gains from consumption smoothing.

Anticipating a monetary bailout, the gain to default by the region 1 government is obvious: others get the benefit of repaying the debt when region 1 agents bear the cost. Further, since the debt is repaid, the default cost of κ is avoided. This is the traditional problem of strategic debt default.

3   Debt Crisis: Exit Options

We extend this analysis to include exit from a monetary union. For this discussion, exit can take two forms. The first is the continued use of the common currency of the union without the ability to influence monetary policy. This regime is Euroization. The second possible form of exit is to force a country to adopt and create its own currency. This multi-currency regime is studied as well.

Once these two options are delineated, we return to the key question of this essay: what is the role of exit in dealing with situations of debt distress? Using the extended model developed in this section, we are able to look at options beyond bailout, including some form of exit from the monetary union.

The extended game, as shown in Figure 1, involves the regional government (RG) and a central authority, labeled as a central bank.[6] This central authority includes the central bank as well as a representation of the countries in the federation. The game builds upon the one studied in Cooper, Kempf, and Peled (2010) to allow other options, including euroization and exit from a monetary union, which form the basis of this essay.

In this section, we use the model to explain the last choices of the CB in the game shown in Figure 1: Euroization and Exit. We then turn to the outcome of the expanded game in section 4.

3.1 Euroization

The regime termed "Euroization" occurs when region 1 is using the common currency of the monetary union but is not involved in policy determination. The regime is characterized by:

- a common currency used in all regions (countries);

- the transfer policy of the CB as determined by regions 2 and 3.

- region 1 has no influence on the conduct of monetary policy.

This is of course not just a abstract idea but one that has been used in a number of instances around the world.[7] The key to the Euroization regime is the continued use of the euro. In that case, there is no need for any restructuring of existing contracts. Moreover, there is a potential carrot (not modeled) involved: the easy return of the country to full representation in the conduct of monetary policy.

This regime is a special case of the model described in section 2.2. Euroization adds a restriction to participation in a monetary union. While the other regions are unable to prevent the use of the euro in region 1, they can deny that region representation in monetary policy decisions. Thus the objective function of the CB from the case of a monetary union is amended in the Euroization regime to exclude the welfare of region 1 agents.

Note that we need not assume $T^1 = 0$. It is still possible for the CB to make transfers to region 1. Yet in this model, that option is dominated. In particular, if the CB wishes to, for example, bailout agents in regions 2 and 3 it will do so directly with $T^i > 0$ for $i = 2, 3$.

This has a natural interpretation. If region 1 has debt outstanding in a Euroization regime, any bailout would be of the debt holders in the member countries, regions 2 and 3, rather than to the region issuing the debt. This is akin to bailing out the banks (and thus shareholders and depositors) who hold the debt rather than the country issuing the debt.

And, there is another important element. Though agents in regions 2 and 3 would receive the transfer, agents in region 1 holding euros, will pay their share of the inflation tax. Thus Euroization is a means of

---

[6]The decision on Euroization could be made by a different centralized entity. The results would be the same as long as the objective function, underlying the maximization of the joint welfare of member agents, was the same.

[7]Borensztein and Berg (2000) contains a lengthy presentation of a number of cases of dollarization.

taxing agents in region 1.

For this reason, the governments of region 2 and 3 might choose to create money and tax region 1 agents.[8] In this case, the welfare of these agents would exceed the benchmark of the Ricardian regime.

There is a benefit to Euroization for region 1. As argued in the Cooper and Kempf (2001) paper on dollarization, if region 1 wants the commitment power of a strong central bank, then it can have it through Euroization. This is in part a signal to deal directly with fiscal problems, rather than simply printing money using a newly created currency.

Earlier, we denoted by V^* the steady state value of utility for a representation agent in the Ricardian regime. To make comparisons with this benchmark, let V^E denote the value to a region 1 representative agent in the steady state of a Euroization regime. If the rate of money creation chosen by the CB is zero, then the welfare of region 1 is the same as in the Ricardian equilibrium: $V^* = V^E$. But if there is inflation and that tax is born by region 1 agents, Euroization is costly: $V^* > V^E$.

Let W^E be the welfare of agents in regions 2 and 3 in a Euroization regime. If the rate of inflation is zero, then Euroization is equivalent to the Ricardian steady state for agents in these regions: $W^E = V^*$. With positive inflation, the resulting redistribution implies $W^E > V^*$. Thus the regions have an incentive to inflate and tax the Euro holdings of region 1 households.

Of course, these are all steady state values. We take account of the transition from one regime to another below.

3.2   Exit from the Monetary Union

This section makes two points. First, it characterizes the outcome with multiple currencies. Second, it argues why exit may not be a credible option.

3.2.1   The Multi-currency Economy

Cooper and Kempf (2003) studies the motivation for the formation of a monetary union. The paper explains why there are gains to a monetary union and why those gains may be difficult to reap. Those arguments are relevant here insofar as exit from the monetary union is an alternative to Euroization.

The paper attempts to capture two features of a multi-currency world: trading costs and excessive inflation due to uncoordinated monetary policies. The model of Cooper and Kempf (2003) is a multi-country setting in which each country controls it money supply and trades with the other. Because of the trade, citizens of one country demand the currency of the other. This demand generates a source of revenue from seigniorage and the equilibrium entails positive inflation as each country follows a "beggar thy neighbor" policy.

---

[8]This follows from Proposition 4 in Cooper, Kempf, and Peled (2010) when the debt obligations of regions 2 and 3 would be monetized.

In addition, tastes over goods are uncertain. This leads to the misallocation of resources as household's sometimes do not have a portfolio of currencies to match their desired consumption.

The gains to monetary union come in two forms. First, the competitive monetary policies disappear. Second, with a common currency, there are no portfolio considerations and households are better able to respond to tastes variations in their consumption bundles.

It is certainly possible to add preference shocks and multiple goods to the present model to formalize the outcome with exit. In that case, we would have two countries inside a monetary union and a third with its own currency. That outcome would be qualitatively the same as the one for the two country case studied in Cooper and Kempf (2003).

It is constructive to compare this case with the Euroization outcome. The country excluded from the eurozone is not using the euro and thus it citizens face a currency portfolio choice problem. This exclusion means that transactions costs will be higher for the country outside the eurozone than under Euroization. The excluded country will demand some of the currency of the remaining union members and thus be subject to an inflation tax.

Assuming that exit is feasible, we let V^X be the welfare of a region 1 agent in the event of exit. Given the gains to monetary union in the Cooper and Kempf (2003) model, exit is worse for region 1 than Euroization: $V^X < V^E$.

Further let W^X be the welfare of region 2 and 3 households in a steady state with multiple currencies. From Cooper and Kempf (2003), we know that as long as inflation under Euroization is moderate, $W^X < W^E$ due to the transactions costs associated with multiple currencies that arise from the demand of region 2 and 3 agents for region 1 goods.

One of the significant issues with exit is whether it is actually feasible, as assumed. If one group of countries wants a third not to use its currency, how is that achieved? Countries who have dollarized can do so without the written consent of the US government. If that is the case, it is not clear that complete exit from the Eurozone is even possible.

3.2.2 Is Exit Credible?

As suggested by these inequalities, steady state welfare is higher for all regions under Euroization compared to exit. Thus, absent commitment, there are no incentives to force the exit of a country. Instead, the countries would renegotiate and opt for Euroization, at least in the context of a debt crisis and this particular model of the costs and benefits of monetary union.

Beyond this model, there are additional political and economic costs which reinforce these arguments. If exit entails the return to an original currency or the creation of a new one, there is the open question of how to deal with resolving claims over existing assets. Further, there is the added uncertainty over the value of the new currency, which could be detrimental to all countries involved. Finally there are the political cost of complete exit. Again, if there were political gains to union in the first place, they all countries share these

costs.

As indicated by these arguments, the costs of exit are borne by **all** parties. So, absent commitment to invoke this type of punishment, a threat of complete exit is not credible. That is why the Euroization option dominates: it is credible since the remaining countries have an incentive to enforce this punishment, $W^E > V^*$, and the defaulting country will go along with it rather than choosing to exit unilaterally, $V^E > V^X$.

4 Debt Crisis: What is the outcome?

The stage is set for an evaluation of Euroization. Using the options outlined above we study the outcome of the game given in Figure 1.

The Ricardian equilibrium outlined above still exists in this expanded game. If the region 1 debt is held entirely by region 1 agents, then the CB be unwilling to bailout this debt and the region 1 government will choose to repay it.

But, the focus of the essay is on the role of the exit option in a debt crisis. As before, there can be other equilibria in which repayment by region 1 does not occur. The (conjectured) equilibrium outcome is outlined in Figure 2. This outcome is first described and then the arguments are provided for why the actions assumed in the construction are incentive compatible.

There are two, distinct phases to the response of the remaining governments, regions 2 and 3, to the situation in region 1. Phase 1 is to determine an immediate response to the debt crisis: allow default or bailout. With fixed resources, this is a question about optimal redistribution.

Phase 2 is about subsequent punishment. That is, regardless of whether there is default or bailout, the remaining countries have to decide the nature of their ongoing relationship with region 1. The outcome of this phase must be consistent with the incentives of the parties.

4.1 The Equilibrium

In this conjectured equilibrium, after the regional government chooses not to levy taxes, the central authorities (labeled the Central Bank) choose: (i) to bailout the debt holders and (ii) to enforce Euroization. To be clear, as indicated in Figure 2, the bailout and Euroization decisions are separately made. It is possible for either a bailout or a default to be followed either by Euroization or complete exit.

For simplicity, the Euroization regime is viewed as permanent. One advantage of Euroization is that a country could more easily regain full status in the monetary union after adequate fiscal reform. This is made easier by the fact that the euro remains in use in region 1 during the Euroization period. The more difficult part is to credibly define "adequate fiscal reform". Having an option to return to full status in the monetary union which is easier under Euroization would further support the outcome shown in Figure 2.

The payoffs along the equilibrium path are then computed as the sum of the payoffs from phase 1 plus

those from phase 2. The argument that this is an equilibrium proceeds by showing the Euroization is an equilibrium in phase 2 and then, given this, using the arguments of consumption smoothing to determine whether a bailout or default occurs in phase 1.

Figure 2:

Equilibrium with Bailout and Euroization
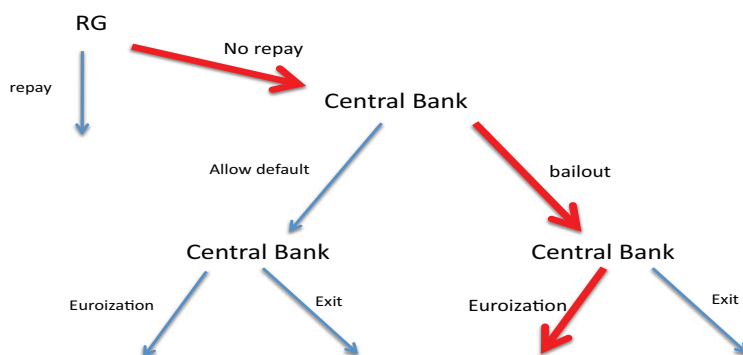
First focus on Phase 2 of this game. The novel feature of the conjectured equilibrium is the use of Euroization. This is better from the perspective of the governments of regions 2 and 3 remaining in the union than the other options of exit and continuation.

Previously we argued that from the perspective of the remaining members of the union Euroization was preferred to complete exit: $W^E > W^X$. This inequality reflected the gains from maintaing the common currency and thus continuing to trade with region 1 without transactions costs and without legal disputes. Further, since the union members can impose an inflation tax on region 1, the Euroization regime can be better for them than the Ricardian benchmark: $W^E > V^*$.

If region 1 was to refuse to levy taxes to repay it outstanding debt, the remaining governments of regions 2 and 3 would have an incentive for Euroization over the other options of continuation or exit. This supports the phase 2 outcome of the solution in Figure 2.

What about the conjectured outcome of bailout in phase 1? The arguments for bailout rather than default mimic those made earlier. If consumption smoothing motives are strong enough, then bailout is preferred to default.

Since both the Exit and Euroization options are available regardless of the choice of the CB to bailout or not, these can be taken as independent decisions. That is, the consumption smoothing argument, based on the dispersion of debt holdings, will guide the bailout decision. The choice in Phase 2 then follows.

In sum, looking at the incentives of the remaining governments, if region 1 chooses not to tax its agents, these governments and the CB will choose Euroization. As long as the consumption smoothing argument is operative, this will entail a monetized bailout as well. Here, as in Europe, the bailout is monetized in the absence of a central fiscal authority.

Looking further up the game tree in Figure 2 what will region 1 choose to do? That is, anticipating bailout and Euroization, what is the response of region 1?

If the cost of Euroization relative to the Ricardian steady state, $V^* - V^E$, is large enough, the region 1 will repay its debt even when some of it is held outside of the region. In effect, the imposition of Euroization with an inflation tax increases the incentives for repayment of region 1 debt.

It does so by creating a punishment from choosing not to repay it debt. From Figure 2, the default cost of κ is irrelevant to the repayment decision of the region 1 government since default does not occur in equilibrium. But the Euroization threat is credible and occurs in equilibrium. This has an incentive effect on the repayment decision of the region 1 government.

If region 1 will not levy a tax and defaults, the remaining governments will, as in Figure 2, bailout the debt of region 1 followed by Euroization. As noted in Cooper, Kempf, and Peled (2010), the region 1 agents will be holding more money in a bailout equilibrium and thus pay a greater share of the inflation tax used to fund the bailout.

In this case, the outcome will be the Euroization steady state outlined in section 3.1. This outcome benefits regions 2 and 3 to the extent they collect an inflation tax from region 1.

This discussion can be summarized by the following proposition:

Proposition 1 *If enough region 1 debt is held outside of the region, then there is an equilibrium in which the regional government does not repay its debt and the CB responds with a bailout and Euroization.*

Proof.   Cooper, Kempf, and Peled (2010) prove that if the cost of default, κ, and the share of region 1 debt held by region 1 agents are both small then the region 1 government chooses not to repay its debt and the CB will provide a monetary bailout. That proofs extends to this environment with three regions and arbitrary κ as long as enough debt is held outside region 1.

The fact that Euroization is preferred by the CB over exit comes from the arguments made above that $W^E > W^X$. ∎

It is important to make clear the role of Euroization for this result. The incentives for bailout come from consumption smoothing, independent of whether Euroization or Exit follow. The role of Euroization is from the incentive effects it creates on region 1. Since κ is not incurred in the bailout equilibrium, the region 1 government is not punished through this channel for choosing not to repay its debt. But under Euroization, since $V^* > V^E$, the region 1 government is penalized for choosing not to repay its debt. This punishment

13

influences how much debt must be held by other regions before the region 1 government has an incentive not to repay its debt. If the game was changed so that κ was incurred if the region 1 government chose not to repay, then Euroization would be an additional punishment.

4.2 Further Response of Region 1

The extensive form game assumes that once regions 2 and 3 decide on the punishment, it is followed by region 1. What would be the reaction of region 1 be? Though in the extensive form game of Figure 2, region 1 has no more options it is still useful to see the robustness of the equilibrium.

As a final stage of the game, suppose region 1 had a choice between exit and Euroization. We argued earlier that as long as the inflation tax imposed by regions 2 and 3 is not too severe, then Euroization will dominate exit: $V^E > V^X$. Thus faced with this choice, region 1 would go along with Euroization.

This case is further strengthened by noting the political costs of exit. As explained by Dor (2011), the only formal way to exit from the Eurozone is to exit from the EU. This is very costly to a government and thus further supports the outcome of Euroization over exit.

In the end, the actions prescribed in Figure 2 as the outcome of the game are consistent with the incentives of the parties involved. The possibility of bailout remains but it is combined with Euroization rather than banishment from the Eurozone.

5 Conclusion

In the absence of a device to commitment to its choices, the member countries of a monetary union need to establish guidelines for dealing with debt crises. The lack of a credible mechanism has been made clear by the ongoing dealings with Greece, Portugal, Ireland and Italy. The Eurozone nations are searching for a mechanism to deal with debt crises.

The solution studied in this paper combines two elements: bailout and Euroization. Absent commitment, member countries may ultimately be lead, following their joint interest, to bailout a member country. This argument, following Cooper, Kempf, and Peled (2010) reflects a desire to smooth consumption among union members.

This essay further argues that a form of exit from a monetary union can be an effective tool for dealing with a debt crisis. The exit device through Euroization is partial: the country which exits retains the use of the common currency but is eliminated from policy determination.

This approach has the virtue of avoiding lengthy and costly procedures to determine debt obligations in the face of a change in currencies. In Euroization, the unit of account need not change.

The punishment arises by exclusion from policy determination. A country cannot be prevented from using the Euro but is prevented from participating in monetary policy decisions. In the model studied here, this can lead to an inflation tax imposed on the excluded country. This is just a modeling device to capture

the various ways in which monetary policy can be conducted to the detriment of an outside country.

There are two effects of Euroization. First, a punishment for default of Euroization provides an incentive for a country to avoid default. The fact that Euroization is credible supports this incentive role. Second, in the Euroization equilibrium, the countries remaining in the union can benefit from imposing an inflation tax on the region which defaulted on its debt.

In the end, the outcome is both credible and effective. It recognizes that ultimately countries will act in their joint interest, threats and promises to the contrary notwithstanding. Hence it is recognized that bailouts cannot be prevented but can be followed by credible punishment through Euroization.

References

BORENSZTEIN, E., AND A. BERG (2000): "The Pros and Cons of full dollarization," *IMF Working Papers.*

COOPER, R., AND H. KEMPF (2001): "Dollarization and the Conquest of Hyperinflation in Divided Societies," *Federal Reserve Bank of Minneapolis Quarterly Review*, 25(3).

——— (2003): "Commitment and the Adoption of a Common Currency," *International Economic Review*, 44(1), 119–42.

COOPER, R., H. KEMPF, AND D. PELED (2010): "Regional debt in monetary unions: Is it inflationary?," *European Economic Review*, 54(3), 345–358.

——— (July, 2009): "Insulation Impossible: Fiscal Spillovers in a Monetary Union," NBER Working Paper #15176.

DOR, E. (2011): "Leaving the euro zone: a users guide," IESEG School of Management (Lille Catholic University, LEM-CNRS).

EATON, J., AND R. FERNANDEZ (1995): "Sovereign debt," *Handbook of international economics*, 3, 2031–2077.

SCOTT, H. (1998): "When the euro falls apart," *International finance*, 1(2), 207–228.

SMITH, B. (1994): "Efficiency and Determinacy of Equilibrium under Inflation Targeting," *Economic Theory*, 4(3), 327–44.

STÄHLER, N. (2011): "Recent developments in quantitative models of sovereign default," *Discussion Paper Series 1: Economic Studies.*

European University Institute

European University Press