

Lecture 2. Rethinking International Financial Architecture

1. Crisis prevention

- a. Analytical framework
- b. Overborrowing
- c. Liquidity problems
- d. Other issues

2. Crisis resolution

- a. Extending the analytical framework
- b. Creditor initiatives
- c. Debtor initiatives

1. Crisis Prevention

We model again the interaction between a small country and the international financial market. The country wants to borrow today, but it might be unwilling to pay debts tomorrow. Debt is non-contingent and the penalties the international financial market can impose in the event of default are uncertain.

Assumption 1. (Basic setup) The world lasts two periods, today and tomorrow, indexed by $t=0,1$. There is a single good that can be used for both consumption and investment.

Assumption 2. (The country) The country maximizes $W(L)$ which is increasing, twice-differentiable and concave.

Assumption 3. (International financial market) The international financial market extends loans to the country. This market is competitive, risk-neutral and discounts future payments with a *gross* interest rate r . If the country defaults, the financial market can impose an uncertain penalty equal to H , with distribution $F(H)$ and support $[\underline{H}, \bar{H}]$. This never occurs in equilibrium since crisis are efficiently resolved.

Benchmark I: Pretend first the country is unconstrained. Then, its maximization problem is:

$$\max W(L) - r \cdot L$$

The optimal amount of lending is L^* is implicitly given by $W'(L^*) = r$. This is an equilibrium if and only if

penalties are high enough, i.e. $L^* \leq \frac{\bar{H}}{r}$.

Benchmark II: If penalties are not that high, we must solve the following country maximization problem:

$$\max W(L) - R \cdot L \cdot [1 - F(R \cdot L)] - \int_{\underline{H}}^{R \cdot L} H \cdot dF(H) \quad \text{subject to} \quad r = R \cdot [1 - F(R \cdot L)] - \int_{\underline{H}}^{R \cdot L} \frac{H}{L} \cdot dF(H)$$

The optimal amount of lending is then $L = \begin{cases} L^* & \text{if } L^* \leq \frac{\tilde{H}}{r} \\ \frac{\tilde{H}}{r} & \text{if } L^* > \frac{\tilde{H}}{r} \end{cases}$, where $\tilde{H} = \int_{\underline{H}}^{\bar{H}} H \cdot dF(H)$.

Overborrowing

The solution above assumes that the country acts as a single individual that internalizes the effects of foreign borrowing on the interest rate it faces. This assumption fails if most of the borrowing is done by the private sector.

Each individual solves the problem: $\max W(L) - R \cdot L \cdot [1 - F(D)]$, where D is the debt of the country.

This yields the following loan demand: $L = \begin{cases} L^{**} & \text{if } L^{**} \leq \frac{\tilde{H}}{r} \\ \frac{\tilde{H}}{r} & \text{if } L^{**} > \frac{\tilde{H}}{r} \end{cases}$ where $W'(L^{**}) = R \cdot [1 - F(D)]$.

Since the loan supply is still $r = R \cdot [1 - F(D)] - \int_{\underline{H}}^D \frac{H}{L} \cdot dF(H)$ with $D=R \cdot L$, it follows that $L^{**} \geq L^*$

(overborrowing and too much default!).

How do we solve this overborrowing problem? How does the proposed solution work? How much information/resources are needed to implement it? Does this solution imply transfers?

1. Impose a *tax on foreign borrowing* equal to $r - R \cdot [1 - F(R \cdot L)] = \int_{\underline{H}}^{R \cdot L} \frac{H}{L} \cdot dF(H)$.

2. Create *rights to issue foreign debts* in the quantity $L^{**} - L^*$ to be sold in a competitive market.

3. Add *seniority clauses* in debt contracts. Let's order the loans according to seniority in $[0, L]$ and let $R(l)$ be the

contractual rate on loan $l \in [0, L]$. Then, debt payments until l are $\Gamma(l) = \int_0^l R(j) \cdot dj$. The supply of loans is

now $r = R(l) \cdot [1 - F(\Gamma(l))]$, which is exactly the cost perceived by the individual that takes on the l^{th} loan!

Liquidity problems

Assume next that the overborrowing problem has been solved and let's focus instead on the possibility of liquidity shortages. To do this, we need to introduce a new assumption:

Assumption 4. (Investment) If $L > L_0$ the country chooses to make an investment that raises not only welfare, but also penalties, i.e. $F(H,I)$ with $F_I < 0$. In particular, it raises average penalties from \tilde{H}_{BI} to \tilde{H}_{AI} , with $\tilde{H}_{AI} > \tilde{H}_{BI}$.

Under the following assumptions (which create strategic complementarities in lending):

1. $\tilde{H}_{BI} < r \cdot L^* < \tilde{H}_{BI} \Rightarrow$ without (with) investment, borrowing is (not) constrained.
2. $\frac{\tilde{H}_{BI}}{r} < L_0 < L^* \Rightarrow$ without (with) the borrowing constraint, there is (no) investment.

The country suffers a liquidity shortage if financial markets are pessimistic. If new lending is needed to pay old lending, the liquidity shortage is a full-fledged liquidity crisis.

How do we solve this liquidity problem? How does the proposed solution work? How much information/resources are needed to implement it? Does this solution imply transfers?

1. An international lender of last resort:

- When should a lender of last resort lend and at what rate?
- Is it necessary that the lender of last resort be able to create “money”?
- Can the IMF play this role?

2. Contingent lending contracts (Chamon)

- Intertemporal complications and the depth of markets
- Implementation issues

Other issues

There are other aspects of how country structure their debts that might affect the probability of default and the terms at which countries borrow: There is plenty of literature on:

1. Debt maturity
2. Currency denomination
3. Introducing various contingencies (inflation, GDP, commodity prices, ...)

2. Crisis Resolution

Default opens a period of debt renegotiation. Why are debt renegotiations messy in the real world? What can be done to make them efficient? When are debt renegotiations “efficient”?

1. “Ex-post” efficiency requires that debt renegotiations be speedy and that minimal resources be wasted on it.

The potential inefficiencies from this view point are:

- Costs of a war of attrition and other resource waste
- Costs of penalties being imposed

2. “Ex-ante” efficiency requires that debt renegotiations provide the correct incentives to the lender to pay.

The problems are:

- Giving power to debtors tightens the budget constraint but might have good risk sharing properties
- Applying penalties creates waste “ex-post” but might give good incentives “ex-ante”

Let's expand the framework and assume that the country arrives with debt D_0 and D_1 to be paid in period 0 and 1. However, the country is not willing to pay more than $H_0 < D_0$ in period 0. This starts a "debt crisis".

Should creditors forgive the debt or refinance it? An "ex-post" efficient debt renegotiation consists of deciding, without delay or penalty, four numbers N , R , F_0 and F_1 that determine the transfers the country makes:

$$T_0 = D_0 - N - F_0 \quad \text{and} \quad D = D_1 - F_1 + R \cdot N$$

$$\text{Country: } \max_I U^0(D_0 - T_0, I) + \beta \cdot \left\{ [1 - F(D, I)] \cdot U^1(D, I) + \int_0^D U^1(H, I) \cdot F_H(H, I) \cdot dH \right\}$$

$$\text{Creditors: } \max_{T_0, D} T_0 + \frac{1}{r} \cdot \left\{ [1 - F(D, I)] \cdot D + \int_0^D H \cdot F_H(H, I) \cdot dH \right\} \quad \text{s.t. } T_0 \leq H_0 \quad \text{and} \quad I = I^*(T_0, D)$$

To obtain the optimal debt renegotiation, we solve first the country's problem and then the creditors' problem.

Creditor initiatives

How does the optimal renegotiation package look like?

1. If investment does not depend on the transfers, then set $T_0=H_0$ (no debt relief today) and D as large as possible (keep option value).
2. But, in general, it is better to provide incentives to invest by setting $T_0 < H_0$ (debt relief) and limit D (forego some of the option value). Why? This provides incentives to the country to invest and increase total repayment.

This is how the optimal deal is calculated if:

- Creditors have all the bargaining power
- Creditors cannot make debt relief conditional on investment

A crisis resolution framework can increase (decrease) penalties and relax (tighten) “ex-ante” borrowing constraints by giving even more (less) power to creditors.

What can go wrong?

1. Creditor holdouts. Proposed solutions:

- A debt-restructuring mechanism? (“statutory” approach)
- Collective action clauses (“contractual” approach)

2. Heterogeneous creditors and endogenous penalties (Are there unintended effects of seniority and collective-action clauses?)

3. Asymmetric information and wars of attrition (between creditors and between creditors and the country).

Debtor Initiatives

When default is approaching (or has already arrived), it is often proposed that the country reduce its debt through an array of instruments: direct debt buybacks, debt-for-equity swaps, debt-for-nature swaps, and so on. Each of these instruments can be thought of as the sum of a pure buyback plus a subsidy for the corresponding purchase (equity or nature).

Are debt buybacks a good idea? It depends on:

1. Are there large enough inefficiencies in the debt renegotiation process than can be saved through buybacks?
2. How much do buybacks reduce future repayments?

Discussion

What international financial architecture does the world economy need? What are the key pieces? How should they be structured?

How does this problem fit in a broader framework for policy cooperation at the world level? What are the constraints in the short-run? What are the possibilities in the long-run?