Sovereign Default

Econ 690

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Default

"Default" is when the borrower does not pay back everything he or she has agreed to pay. If someone borrows $1000 and promises to pay back $1100 (that is, pay back the loan with 10% interest), the borrower defaults if she pays back anything less than $1100. Default does not necessarily mean that the borrower pays back nothing. It only means the borrower pays back less than promised.

In this section, we will examine the economics of default on international loans. Specifically, we want to understand under what conditions a borrower will default or not.

The question that may occur to you is, "Why do borrowers default?" A good starting point is to pose the question, "Why do borrowers ever pay back what they promise?" If the bank lends you $10,000, why do you pay the bank back?

Commitment

Legal institutions within the country will force you to pay back what you can afford to pay back.

A legal system that forces you to repay is in your interest. If there were no punishment that the lender could impose on the borrower in the event of default, then the lender would recognize that the borrower would never want to pay back. In that case, no loan would be given in the first place.

The borrower's problem is that he cannot *commit* to repayment.

Consider the situation of the guy who would like a loan today (say because he has a large medical expense.) What would happen if there were no way for the borrower to enforce repayment? When the loan repayment is due in the future, it will be in the borrower's interest to default. That is why the lender won't make the loan.

Punishment

The lender also benefits from the loan actually being made, as long as there is no default. The lender would also like to find a way for the borrower to commit to repayment, because then the loan will be made and the lender will earn the interest from the loan. The lender likes having a court system that will enforce repayment.

Now, it may turn out that the borrower actually is not able to repay and must default because he does not have the assets to make the promised payment. This could be entirely unplanned – just the result of bad luck.

Then, unfortunately, there will be punishment because that is part of the initial bargain that allowed the loan to be made in the first place. If the threat of punishment for non-repayment was not credible, then it won’t be possible for the lender to make profitable loans in the future.

Default may be a Choice

It might also be the case that the borrower decides not to pay back even though he can. Suppose courts could not enforce repayment. If his debt is large enough, he might choose not to repay because the pain of repaying the loan might be greater than the pain of the punishment.

This is an important point that will carry over to the analysis of international loans – default might occur by choice when the cost of repayment is greater than the penalty.

A little thought is required here: if the lender realizes that the borrower's debt will be so large that he won't repay the loan even if he is punished if he defaults, then the lender won't make the loan in the first place. This situation will arise – the situation in which the borrower chooses to default, even though he can afford repayment – only when the lender cannot be fully certain that this situation will arise. We will shortly see an analogy to this case when considering international loans.

Sovereign Debtors

The biggest enforcement problems come when the loan is to a sovereign debtor. If the borrower is the government of a country, then the lender will expect to have little or no luck in having his claims enforced in the courts of that country in the event of sovereign default.

The lender can take his case to a U.S. court (we're assuming here that the lender is American), or to an international court, but these courts can only impose a limited punishment. They might allow the borrower to seize assets of the sovereign borrower that are held outside the borrower's borders.

Another thing that is different about a sovereign borrower's case is that it can always in practice, in a literal sense, afford to repay. The sovereign can raise taxes on its citizens to repay the loan.For a sovereign, default is always made by choice. It defaults when the costs of defaulting are less than the costs of paying back the loan.

Sovereign Loans are not Collateralized

Finally, an important point to make is that often loans that a household or business receives are *secured* or *collateralized*. There is no collateral offered by the sovereign borrower that can be seized by the lender in the event of non-repayment.

In the following analysis, we will assume that the lender can impose some sort of punishment on the borrower if he does not repay. That may come in many different forms in real life. Borrowers may exclude the sovereign lenders from credit markets for an extended period of time. They may be able to seize some assets the sovereign holds outside the country. The lenders might withhold trade credit – the short-term loans that are necessary for international markets in goods and services to function properly.

Default Punishment is a Deadweight Loss

These punishments, in practice, work to reduce output in countries that have defaulted. That is how our simple model will work – in the event of default, the sovereign loses some output.

But, importantly, that loss is a deadweight loss. By that, we mean that the borrower's loss is not a gain for the lender. The lender does not receive the lost output (so the output is not collateral.) But we will see that just the threat of lost output will be helpful in supporting international markets in borrowing and lending.

An Economic Model of Sovereign Default

A simple model to illustrate incentives to default.

Two periods – periods 1 and 2.

Sovereign is acting benevolently on behalf of its country's citizens to maximize their utility.

The model has some *special features*. We make these assumptions to avoid difficult complications.

Assume that the ***lender*** cares only about his expected return. That is, the lender does not care about risk, and will make a loan as long as the expected return is positive (or greater than the expected return on alternative, safe, investments.)

No uncertainty about time period 1. Decisions are made in period 1, and everyone knows the state of the economy in period 1.

But there is uncertainty about period 2. The uncertainty arises because nobody – neither the borrower nor the lender – knows what the level of output will be in the second period.

Output

We assume that first period output is zero! Output in period *i* is denoted Q_i, so this assumption means $Q_1 = 0$.

We want a simple set-up where we know we are talking about a sovereign borrower, not a saver, so we assume that in the first period the sovereign's households get no income, and must borrow to consume.

In the second period, they receive an "endowment" of output.

Output is a random variable in period 2

Two possible outcomes for their endowment in period 2: low (L) or high (H).

$Q_2 = L$ or $Q_2 = H$. Low output is lower than high output: $L < H$. We will assume the endowment in both state is greater than one: $1 < L < H$.

The outcome is random. Let p be the probability that $Q_2 = L$. That is, $\text{Prob}\left(Q_2 = L\right) = p$, and therefore, $\text{Prob}\left(Q_2 = H\right) = 1 - p$.

We will assume $L < \left(1 - p\right)H$.

Household Preferences

We assume that households in the sovereign's country have a utility function at time 1 given by:

$$(1) \quad U = \ln\left(C_1\right) + \left(1 - p\right)C_{2H} + pC_{2L}$$

The household gets utility from consumption in both periods.

In the first period, utility is a log function of consumption. This functional form is assumed because it will make the problem simple. It does capture one important feature. The marginal utility of consumption in the first period is $\frac{1}{C_1}$. As C_1 gets close to zero, the marginal utility is getting very large. This tells us that the household will always want to consume at least a little bit in the first period. Because we assumed that the country gets no income in the first period, the sovereign will have to borrow in the first period.

From the perspective of period 1, the level of consumption in period 2 is a random variable depending on the income level in period 2.

C_{2H} is consumption when $Q_2 = H$ and C_{2L} is consumption when $Q_2 = L$.

Our assumption is that utility is linear in second-period consumption. is a special assumption we make that helps to simplify the problem. For example, we could have assumed that utility was also logarithmic in period 2 just as it is in period 1, and then the utility function would be written as:

$$U = \ln(C_1) + (1-p)\ln(C_{2H}) + p\ln(C_{2L}).$$

Also, usually economic models assume that people put less weight on utility from consumption in the future than they put on utility of consumption today, because they are impatient. They prefer consumption today to consumption tomorrow. A conventional way to represent utility might be more like:

$$U = \ln(C_1) + \beta\left[(1-p)\ln(C_{2H}) + p\ln(C_{2L})\right], \text{ with } 0 < \beta < 1.$$

But we use the utility function above because it simplifies the analysis!

Lenders

We assume that the risk neutral lenders charge a gross interest rate of 1. These are zero (net) interest rate loans. We state this as $R^* = 1$, where R^* is the real interest rate the lender would like to receive. Again, this is a simplifying assumption

When the lender makes a loan to the sovereign, the actual gross rate of return is given by R. The actual return to the lender is uncertain, because in our model, the sovereign might not repay all of what he borrows. The sovereign might default, in which case, we will assume that he repays zero.

Let R^p denote the return when the sovereign does repay. There are two possible values for R: it can be zero, or it can be R^p.

The lender wants to receive an expected return of $R^* = 1$, so we say $E(R) = R^* = 1$.

Commitment

We first will solve the model when the borrower can commit to repay. This is what we have assumed in all previous chapters, because we have not allowed for the possibility of default.

Budget constraint for the sovereign:

Let D be the amount of borrowing, or debt, acquired in the first period. The first period budget constraint is quite simple:

$$C_1 = D.$$

Because the country gets no endowment in the first period, it can only consume what it is able to borrow on international markets.

There are two budget constraints for the second period, depending on whether $Q_2 = L$ or $Q_2 = H$. The country must repay its debt in period 2, but the interest rate is zero (the gross interest rate is 1). Consumption will be whatever is left of the endowment after the debt is repaid:

$$C_{2L} = L - D$$
$$C_{2H} = H - D.$$

When we substitute these three budget constraints back into the utility function (7), we get:

$$U = \ln(D) + (1-p)(H-D) + p(L-D).$$

There is only one thing to choose – borrowing in the first period, *D*.

The first-order condition for choosing D to maximize utility is:

$$\frac{1}{D}-(1-p)-p=0,$$

which gives $D=1$ as the solution. It follows from the budget constraints that $C_1=1$, $C_{2H}=H-1$ and $C_{2L}=L-1$.

(If we were more rigorous, we would impose the constraints that consumption could not be negative: $C_1\geq 0$, $C_{2L}\geq 0$, and $C_{2H}\geq 0$. But even without explicitly imposing those constraints, we find that they are satisfied in this problem because of our assumption that $1<L<H$.)

At the optimum levels of consumption, we find utility is given by:

$$U=\ln(1)+(1-p)(H-1)+p(L-1)=(1-p)(H-1)+p(L-1)=(1-p)H+pL-1$$

.

No Commitment

Suppose the borrower cannot commit to repay the loan.

Without any further features in the model, the borrower has no incentive to repay in period 2 rolls around. In period 2, whether income is high or low, the borrower simply would not repay.

Why would it? Period 2 is the last period of life. The borrower's utility is clearly higher if it does not repay its debt than if it did repay. If it repays, its consumption in each state is lower by the amount *D*.

Time consistency

Notice how the borrower's decision-making is different when it cannot commit to repay the loan. When the borrower can commit, it finds it optimal to borrow the amount $D = 1$ in period 1; and, when period 2 comes around, to repay the loan whether $Q_2 = L$ or $Q_2 = H$.

But when the borrower cannot commit to repay, then when period 2 comes, it finds it optimal not to repay, whether $Q_2 = L$ or $Q_2 = H$.

We say that the borrower's plans under commitment are not *time consistent*. That means that if the borrower could change the plan he committed to, he would do so at time 2. There is an inconsistency between what he plans (in period 1) for period 2, and what he would like to do when period 2 arrives.

If the borrower could not commit to repay, how much could he borrow in period 1? Clearly the answer to that is zero!

Cost of Default

Assume that, in the event that the sovereign defaults, the country loses a fraction k of its output. There is only a fraction $1-k$ left over.

Consider each state of the world. If the country pays back its loan when $Q_2 = L$, then it loses no output, and $C_{2L} = L - R^p D$ as above. But if it defaults, it does not pay back any of its loan. However, it loses a fraction of its output, so $C_{2L} = (1-k)L$.

Similarly, in the state in which the endowment is high, if there is no default, $C_{2H} = H - R^p D$, and if there is default, $C_2 = (1-k)H$.

The Interest Rate Schedule

Next, we want to figure out what interest rate the lender charges. The interest rate that the lender charges will be a function of the amount of debt taken out by the sovereign: $R^p(D)$. Our objective is to characterize this function – what interest rate is charged for what levels of debt?

Let π be the probability of default, given the information in period 1. Again, the probability of default will depend on how much debt the sovereign takes out in period 1, so we can write that function as $\pi(D)$.

We must have $(1-\pi(D))R^p(D)=1$, because the lender wants to earn an expected interest rate equal to what it could get on alternative loans within its own country, R^*, which equals one. This means $E(R(D))=1$.

The interest rate schedule, $R^p(D)$

Case A.

Suppose that $D < kL$. Here we conjecture that $R^p = 1$. We will verify that this conjecture is correct.

If $D < kL$, then it is better for the borrower to repay the debt when $Q_2 = L$ then to default. If he repays, he loses $R^P D = D$, and if he defaults, he loses kL. The loss from default is greater than the "loss" from repayment when $D < kL$, so he repays.

Of course, if he repays when $Q_2 = L$, he will also repay when $Q_2 = H$, because $L < H$.

If the borrower does not default when $D < kL$, then the probability of default, $\pi(D)$ is zero for all levels of debt less than kL. Because $(1-\pi(D))R^p(D)=1$, it follows that $R^p(D)=1$ for all levels of D such that $D < kL$. This verifies the conjecture that $R^p=1$ when $D < kL$.

(In the case where we have exactly $D = kL$, so the borrower is indifferent between defaulting and paying back, we will assume he pays back. In that case, we have $R^p(kL)=1$.)

Case B

That part was simple! Now we need to characterize $R(D)$ for $D > kL$.

Suppose $kL < D \leq (1-p)kH$.

(Here, we are using our assumption that $L < (1-p)H$, so that it is possible that $kL < D \leq (1-p)kH$.)

We claim for levels of debt in this range that $R^p = \frac{1}{1-p}$. Let's verify this claim!

What happens if the borrower has taken an amount of debt in this range, and it turns out that $Q_2 = H$? In that case, the repayment that is owed is $R^p D$, which here is $\frac{1}{1-p}D$. His consumption if he repays is $H - \frac{1}{1-p}D$. If he defaults, he does not pay back the debt, but he is penalized some output. His consumption is $(1-k)H$.

He will not default if his consumption under repayment is greater than its consumption under default: $H - \frac{1}{1-p}D > (1-k)H$. This inequality can be expressed as $kH > \frac{1}{1-p}D$, or $D < (1-p)kH$. (In the case in which we have exactly $D = (1-p)kH$, so he is indifferent between paying back or defaulting, assume he pays back.)

We can conclude that if $Q_2 = H$, he will pay back the loan when the interest rate is $R^p = \frac{1}{1-p}$ if $D \leq (1-p)kH$.

But, continuing with the claim that the interest rate will be $R^p = \frac{1}{1-p}$ if the debt is in the range $kL < D \leq (1-p)kH$, what happens when $Q_2 = L$? Then the cost of defaulting is kL and the repayment is $\frac{1}{1-p}D$, so clearly he is better off defaulting since we are looking at the range of debt where $kL < D$ and $D < \frac{1}{1-p}D$.

Therefore, if $kL < D \leq (1-p)kH$, then if the lender charges $R^p = \frac{1}{1-p}$, we can conclude the borrower will pay back when $Q_2 = H$ and default when $Q_2 = L$. So for D in this range, we have that the probability of default is given by $\pi(D) = p$.

Now let's verify that this interest rate satisfies the lender's desire to get $E(R(D)) = 1$, which means $(1-\pi(D))R^p(D) = 1$. If we substitute into this expression that $\pi(D) = p$ and $R^p(D) = \frac{1}{1-p}$, we find it is satisfied.

We now have characterized the function $R^p(D)$ for all values of $D \leq (1-p)kH$. For $D \leq kL$, we found $R^p(D) = 1$, and for $kL < D \leq (1-p)kH$ we have just found $R^p(D) = \frac{1}{1-p}$.

We are not done yet, but we are getting close!

Case C.

What does $R^p(D)$ look like for $D > (1-p)kH$? In that case, if $Q_2 = H$, the borrower can consume $(1-k)H$ if he defaults, and will consume $H - R^p D$ if he pays back. In order to have the incentive to pay back, it must be that his consumption under repayment is greater than his consumption under default: $H - R^p D > (1-k)H$. This can be rewritten as $kH > R^p D$, or $R^p < \dfrac{kH}{D}$.

Since when $D > (1-p)kH$ then it must be the case that $D > kL$ (because we assumed $L < (1-p)H$), we know the borrower will default if $Q_2 = L$. So, there is at best a probability of $1-p$ he will repay when $D > (1-p)kH$, because if he repays, it will only be when $Q_2 = H$.

The lender must be able to satisfy $E\left(R\left(D\right)\right)=1$, which means $\left(1-\pi\left(D\right)\right)R^{p}\left(D\right)=1$, which means $\left(1-p\right)R^{p}\left(D\right)=1$. This would mean $R^{p}\left(D\right)=\dfrac{1}{1-p}$ if $D>\left(1-p\right)kH$. But this contradicts the conclusion above that when $D>\left(1-p\right)kH$, we must have $R^{p}<\dfrac{kH}{D}$. That is, $\dfrac{1}{1-p}>\dfrac{kH}{D}$ when $D>\left(1-p\right)kH$.

We then must conclude that when $D>\left(1-p\right)kH$, there is no interest rate that the lender can set that will allow it to receive an expected interest rate that satisfies $E\left(R\left(D\right)\right)=1$. Therefore, the lenders are not willing to lend any amount of debt greater than $D>\left(1-p\right)kH$.

Credit Rationing

In this case there is a *credit limit* for borrowers. They can never borrow more than $D > (1-p)kH$. Lenders are not willing to lend more than that because they cannot charge a high enough interest rate to insure that they receive $E\big(R(D)\big)=1$.

If they charge $R^p \le \dfrac{1}{1-p}$, the borrower will not default when $Q_2 = H$ and will default when $Q_2 = L$, and the lender's expected return is $(1-p)R^p < 1$.

If the lender charges $R^p > \dfrac{1}{1-p}$, then the borrower will default no matter whether $Q_2 = H$ or $Q_2 = L$, so the lender's expected return is zero.

The household's choice of debt with no commitment

We have found that lenders offer borrowers a schedule of interest rates. If $D \leq kL$, they may borrow at a rate of $R^p = 1$. We also know that in this case, the borrower will not default. If $kL < D \leq (1-p)kH$, they may borrow at a rate of $R^p = \frac{1}{1-p}$. We know in this case, the borrower will default if $Q_2 = L$ and will repay if $Q_2 = H$. And they may not borrow $D > (1-p)kH$.

So how much do they borrow?

The answer will depend on how severe is the punishment for default, given by *k.*

Case 1

Let's look at the household's problem under different possibilities. Suppose k is large enough that $kL > 1$. We now claim that in this case, the lender will charge $R^p = 1$, and the household will not default.

We saw that when the borrower could commit to repay, he would choose $D = 1$. Since he could commit to repayment, then it must be optimal to borrow $D = 1$ at rate $R^p = 1$ if it is possible to do so even when he cannot commit. Being unable to commit limits the borrower's choices, but if he can still reach the optimum he reached under commitment, he would certainly opt for that.

When $kL > 1$, if he chose a debt of $D = 1$ when $R^p = 1$, then he would satisfy $D \leq kL$. As we have seen, if $D \leq kL$, the lenders are willing to offer $R^p = 1$. We then have an equilibrium. Borrowers prefer to borrow $D = 1$ at an interest rate of $R^p = 1$ and lenders are willing to lend that much at that interest rate.

Case 2

Now suppose that the penalty k is such that $kL<1<(1-p)kH$. That means the punishment for default is weaker than in Case 1, in which $kL>1$.

In the no default case in which the lender charges $R^p=1$, the borrower could not choose $D=1$ at a rate $R^p=1$ as in Case 1. If he chose $D=1$ that would give him $D>kL$. The interest rate of $R^p=1$ is only offered for $D\le kL$. The most debt he could acquire and still borrow at rate $R^p=1$ is $D=kL$. If he chose to borrow at a rate of $R^p=1$, he would borrow as much as he could, which is $D=kL$. He would then repay with certainty, and his utility would be

$$U=\ln(kL)+(1-p)(H-kL)+p(L-kL)=\ln(kL)+(1-p)H+pL-kL$$

As we noted above, if the borrower were charged $R^p = \frac{1}{1-p}$, we know he will default and consume $(1-k)L$ if $Q_2 = L$ and repay and consume $H - \frac{1}{1-p}D$ if $Q_2 = H$. He chooses D to maximize:

$$U = \ln(D) + (1-p)\left(H - \frac{1}{1-p}D\right) + p(1-k)L \ .$$

The first-order condition is $\frac{1}{D} - 1 = 0$. He would choose $D = 1$ if he could. That amount is debt is feasible in this case because $1 < (1-p)kH$ and so it satisfies the condition that $D \leq (1-p)kH$ in order to be offered a rate of $R^p = \frac{1}{1-p}$.

The borrower's utility would be given by:

$$U = \ln(1) + (1-p)\left(H - \frac{1}{1-p}\right) + p(1-k)L = (1-p)H + pL - 1 - pkL$$

The borrower could either borrow $D = kL$ at a rate $R^p = 1$ or borrow $D = 1$ at a rate of $R^p = \dfrac{1}{1-p}$. He would choose the latter if his utility were higher in that case, which means:

$$(1-p)H + pL - 1 - pkL > \ln(kL) + (1-p)H + pL - kL,$$

which simplifies to:

$$(1-p)kL > 1 + \ln(kL).$$

This condition is satisfied for small values of k, because $\ln(kL)$ becomes a very negative number as $k \to 0$ (a negative number that is large in absolute value.)

So for small k, the borrower accepts an interest rate of $R^p = \dfrac{1}{1-p}$ and borrows $D = 1$. He would then repay in period 2 if $Q_2 = H$ and default if $Q_2 = L$.

When k is larger, the borrower might prefer to borrow $D = kL$ at a rate $R^p = 1$. Then he would repay his debt in period 2.

Case 3

Next, suppose k is so low that $kL<(1-p)kH<1$. What debt level would the borrower choose?

The interest rate of $R^p=1$ is only offered for $D\leq kL$. The most debt he could acquire and still borrow at rate $R^p=1$ is $D=kL$. If he chose to borrow at a rate of $R^p=1$, he would borrow as much as he could, which is $D=kL$. His utility would be given as in the equation above:

$$U=\ln(kL)+(1-p)(H-kL)+p(L-kL)=\ln(kL)+(1-p)H+pL-kL$$

He might be offered a rate of $R^p = \dfrac{1}{1-p}$, but only if $kL < D \le (1-p)kH$. Since we are looking at the case of $(1-p)kH < 1$, then he must choose a debt of $D < 1$ in order to satisfy the constraint that $D \le (1-p)kH$. We saw in Case 2 that he would choose $D = 1$ if he could.

However, $D = 1$ would violate the constraint $D \le (1-p)kH$ because we are looking at the case of $(1-p)kH < 1$. He could at most borrow $(1-p)kH$, his debt limit, at this interest rate. If he borrowed that much, his utility would be given by:

$$U = \ln\big((1-p)kH\big) + (1-p)\left(H - \frac{1}{1-p}(1-p)kH\right) + p(1-k)L$$
$$= \ln\big((1-p)kH\big) + (1-p)H + pL - (1-p)kH - pkL$$

Would his utility be higher if he borrowed $D = kL$ at an interest rate of $R^p = 1$, or if he borrowed $(1-p)kH$ at an interest rate of $R^p = \dfrac{1}{1-p}$?

The latter would be better if

$$\ln\left((1-p)kH\right) + (1-p)H + pL - (1-p)kH - pkL > \ln(kL) + (1-p)H + pL - kL.$$

This condition is satisfied if

$$\ln\left((1-p)kH\right) - \ln(kL) > (1-p)k(H-L),$$

or $\ln\left(\dfrac{(1-p)H}{L}\right) > (1-p)k(H-L).$

When k is close to zero, the condition is satisfied, and the borrower will choose to borrow his credit limit of $(1-p)kH$. He would then default in period 2 if $Q_2 = L$ and repay if $Q_2 = H$.

If k is larger, then the inequality might not be satisfied, and then the borrower would choose to borrow kL. He would then repay in either state in period 2.

Conclusions about punishment and welfare

What can we conclude from this analysis? The best case scenario when there is lack of commitment is a very strict punishment, such that $kL > 1$ so that we are in Case 1. In that case, the punishment threat is so large that the debtor would never want to default. As a result, it is as if the debtor could commit to repay! He is able to borrow at an interest rate of $R^p = 1$, he borrows a debt of $D = 1$ and his expected utility is the same as under commitment:

$$U = \ln(1) + (1-p)(H-1) + p(L-1) = (1-p)(H-1) + p(L-1) = (1-p)H + pL - 1$$

If the level of punishment is intermediate, so that $kL < 1 < (1-p)kH$ and we are in Case 2. There were two possibilities then, depending on k.

He might end up with utility of $\ln(kL) + (1-p)H + pL - kL$ if he borrowed $D = kL$ at a rate $R^p = 1$ or he might end up with utility of $(1-p)H + pL - 1 - pkL$, if he borrowed $D = 1$ at a rate $R^p = \dfrac{1}{1-p}$.

We can see that utility is lower under either choice than it is in Case 1 when $kL > 1$.

Case 3 is the worst. That is the case in which $(1-p)kH<1$. He might end up with utility of $\ln(kL)+(1-p)H+pL-kL$ if he borrowed $D=kL$ at a rate $R^p=1$. This is worse than Case 2 when the borrower chooses to borrow $D=kL$ at a rate $R^p=1$ because k is lower in this case.

We saw in Case 3, he might also end up with utility of $\ln((1-p)kH)+(1-p)H+pL-(1-p)kH-pkL$, if he borrowed $D=(1-p)kH$ at a rate $R^p=\frac{1}{1-p}$. That is also worse than Case 2.

Remember, this is a very special example. Let's not conclude that it is always better to put on a higher punishment. Indeed, look at what happens in Case 2. Suppose the borrower has chosen to borrow $D=1$ at a rate $R^p = \frac{1}{1-p}$. When period 2 comes around, the country is definitely worse off for having a harsh punishment if it turns out that $Q_2 = L$. He will default in this case, and his consumption is only $(1-k)L$. That consumption level is lower the harsher the punishment (the higher is *k*.)

The overall lesson we have learned about sovereign debt is, first, that it is indeed possible to sustain international borrowing even if there is no collateral, and even if there are no courts to enforce repayment.

Second, default is a choice. It is not forced upon the sovereign. In our model, when default does occur, the sovereign could “afford” to repay, but it chooses not to because the punishment from repayment is not as bad as the cost of repaying the debt.

A third lesson is that stronger punishments effectively act like a device to give the borrower the ability to commit to repayment.

One final note. In our model, default in Case 2 occurs when output is low but not when output is high because the cost of default is lower when output is low then when it is high ($kL < kH$) but the cost of repayment is the same. That is, the required repayment is $R^p D$, and we have assumed that utility is linear in consumption in period 2.

Instead, we could have assumed that utility is concave in consumption (such as with the log function) so there is decreasing marginal utility of consumption. This would give us another reason why it is more tempting to default when output is low then when output is high.