Back to Sovereign Debt

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Much work in the last decade, starting with Arellano (2008) and Aguiar and Gopinath (2006) have instead focused on the ability of sovereign debt models to rationalize stylized business cycle facts.
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Small country has output

\[ Y_t = \bar{Y} + \varepsilon_t \]

where \( \varepsilon_t \) is i.i.d. with \( E(\varepsilon) = 0 \)
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The representative agent has preferences

\[ E \sum_{t=0}^{\infty} \beta^t u(C_t) \]
Feasible Allocations

- Right before each period $t$, and as long as the country is in good standing, it can purchase insurance contracts to pay $P_t(\varepsilon)$ if $\varepsilon_t = \varepsilon$ (or, if negative, to receive $-P_t(\varepsilon)$)

$$E_t = 0$$

The country's budget constraint is

$$B_{t+1} + Y_t C_t P_t(\varepsilon_t)$$

where $\beta(1+r) = 1$

If the country reneges on its debt, it is permanently excluded from the world market.
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Zero profit:

$$E_{t-1} P_t(\varepsilon) = 0$$
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- Zero profit:
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- The country’s budget constraint is
  \[ B_{t+1} = (1 + r)B_t + Y_t - C_t - P_t(\varepsilon_t) \]
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Intuitively, the best that the country can do is to consume its mean endowment every period:

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The question: is this self enforcing?
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Incentive Constraints (the one shot no deviation principle)

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- If the country defaults,
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  u(Y_t) + E \sum_{s=t+1}^{\infty} \beta^{s-t} u(Y_s) = u(Y_t) + \frac{\beta}{1 - \beta} Eu(\bar{Y} + \varepsilon_s)
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The country will never default if the former is always greater than the latter
So the critical condition is

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This says that the short run gain from default must be more than compensated with the long run gain from consumption smoothing.
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1
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3. The gains from consumption smoothing are bound to be small
4. Default is never observed
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"Proof": suppose $\varepsilon_t = \bar{\varepsilon}$. Then the country can default, deposit $P_t(\bar{\varepsilon})$ abroad, and initiate a series of fully collateralized contracts that replicate the reputational contract.
Is Reputation Really Enough?

- Bulow-Rogoff: The reputation argument is based on strong implicit assumptions about creditor rights and incentives.
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- "Proof": suppose $\varepsilon_t = \bar{\varepsilon}$. Then the country can default, deposit $P_t(\bar{\varepsilon})$ abroad, and initiate a series of fully collateralized contracts that replicate the reputational contract.
- The country then gets to realize at least the reputational outcome plus $r$ times $P_t(\bar{\varepsilon})$. 

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Sovereign Debt II  
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Stylized facts to explain quantitatively:

1. Frequency of default (about 3 every 100 years)
Recent lit: Eaton-Gersovitz and Cycles in Emerging Economies

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2. Size of debt (70 percent)
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1. Frequency of default (about 3 every 100 years)
2. Size of debt (70 percent)
3. Business cycle facts, especially the positive relation between the interest rate (inclusive of spread) and the trade balance
\( t = 0, 1, 2, \ldots \)
\begin{itemize}
  \item $t = 0, 1, 2, \ldots$
  \item One nonstorable good
\end{itemize}
- $t = 0, 1, 2, ...$
- One nonstorable good
- Small country with a representative agent with preferences

$$\mathbb{E} \sum_{t=0}^{\infty} \beta^t u(c_t)$$
One nonstorable good

Small country with a representative agent with preferences

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Agent receives a stochastic, nonstorable endowment $y_t, t = 0, 1, 2, \ldots$
AG, Arellano

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\]

- Agent receives a stochastic, nonstorable endowment \( y_t, t = 0, 1, 2, \ldots \)
- Endowment follows

\[
y_t = Ae^{zt} \Gamma_t
\]

where \( z_t \) is a transitory process and \( \log \Gamma_t \) is \( I(1) \).
Recursive Formulation of Country’s Problem

Let \( d_t \) = debt at the beginning of period \( t \).
The state at \( t \) is given by \((y_t, d_t)\). The value function is denoted by \( V(y_t, d_t) \).
Let \( V^B(y_t) \) be the value of ending the period in default. Then it must be that:

\[
V^B(y_t) = u((1 - \delta)y_t) + \beta E_t \left\{ \lambda V(y_{t+1}, 0) + (1 - \lambda) V^B(y_{t+1}) \right\}
\]

Let \( V^G(y_t, d_t) \) be the value of ending the period in good standing, so:

\[
V(y_t, d_t) = \text{Max}\{V^G(y_t, d_t), V^B(y_t)\}
\]

and

\[
V^G(y_t, d_t) = \text{Max} \ u(c_t) + \beta E_t V(y_{t+1}, d_{t+1})
\]

s.t. \( c_t = y_t + q_t d_{t+1} - d_t \)

where \( q_t \) is the price at which the country can sell debt in period \( t \).
Let $\chi(y_t, d_t) = 1$ if the country defaults in period $t$ (this is part of the policy function)
The Price of the Debt

- Let $\chi(y_t, d_t) = 1$ if the country defaults in period $t$ (this is part of the policy function).
- Risk neutrality then implies:

$$q_t = \frac{1}{1 + r^*} E_t [1 - \chi(y_{t+1}, d_{t+1})]$$
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$$q_t = \frac{1}{1 + r^*} E_t [1 - \chi(y_{t+1}, d_{t+1})]$$

Hence $q_t = q(y_t, d_{t+1})$