Debt and Default

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Outline

- Sovereign debt and default

- A brief history of default episodes

- A Simple Model of Default

- Managing Sovereign Debt

Sovereign Debt and Default

Sovereign Debt

- Not only investors but also governments can borrow or lend.
  - In fact, governments typically accumulate debt (called government or public debt).

- **Sovereign Debt:** Is a contigent claim on a nation's assets. Governments will repay depending on whether it is more beneficial to repay than to default

- **Sovereign Default:** Occurs when a sovereign government (i.e one that is autonomous or independent) fails to meet its legal obligations to payments on debt
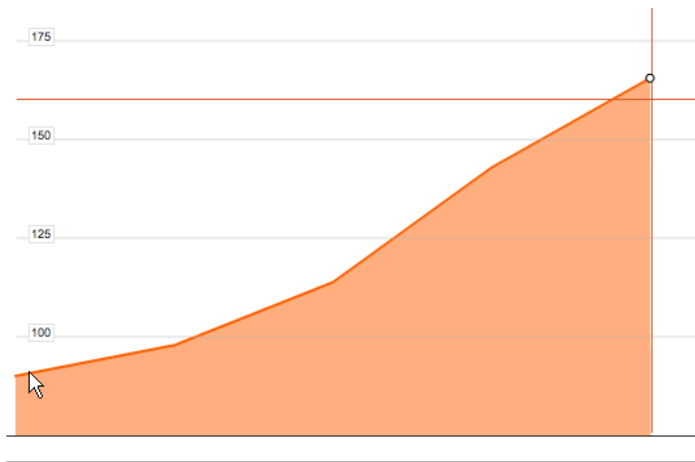
Sometimes the Debt Grows Large...

Figure: Greek Debt to GDP 2007-2011 Source: Bloomberg

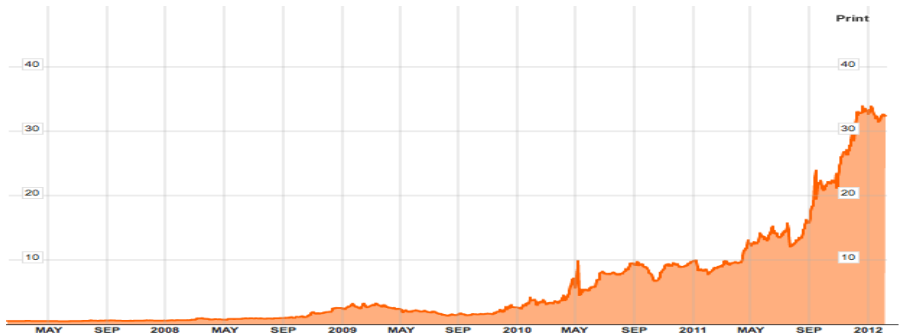# Typically Followed by the Interest Rate

...

Figure: Greek Spread over German Bonds, (10 Yr maturity bonds). Source: Bloomberg

A History of Default Episodes

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- Other episodes: 1343, Edward III of England, Spain 7 times in the 19th century
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  - US states defaulted in the 1800s

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  - US states defaulted in the 1800s
  - In modern times, Greece has defaulted five times - in 1826, 1843, 1860, 1893, and 1932
    - We are no match for the Spanish the last 300 years (but we are getting better at it!)

Default Episodes

- **In the past, defaults would sometime lead to conflicts**
    - Luckily, not in fashion any more

- Today no particular way to enforce repayment
    - But there are costs to defaulting
    - If there were not, none would lend in the first place!

- **Costs of Default**
    - Financial market penalties: markets will lend to you anymore. Lose consumption smoothing opportunities
    - Macroeconomic implications: disruption in financial markets may bring economic downturn, export/import declines etc

The Latin-American Debt crisis

- Evolution of Debt to GDP in some emerging economies

  Figure: The evolution of the debt/GNP ratio in selected countries

	$\frac{D}{GDP}$		
	1980	1982	1985
Argentina	.48	.84	.84
Brazil	.31	.36	.49
Mexico	.30	.53	.55

Source: Jeffrey D. Sachs and Felipe Larrain B., *Macroeconomics in the Global Economy*, Prentice Hall, Englewood Cliffs, New Jersey, 1993, Table 22-9.

Interest Payments in Latin American Countries

- Interest Payments in Latin America

Figure: Interest payments in selected Latin American countries. Average 1980-81.

Country	Percent of Debt at floating rate	Interest Payment to Exports ratio (%)
Argentina	58	15
Brazil	64	28
Colombia	39	16
Chile	58	28
Mexico	73	19
All Latin America	65	28

Source: Andres Bianchi et al., "Adjustment in Latin America, 1981-86," in V. Corbo, M. Goldstein, and M. Khan, ed., *Growth Oriented Adjustment Programs,* Washington, D.C.: International Monetary Fund and The World Bank, 1987.

Trade Balance in Latin America

- To repay debts requires running trade surpluses
  - Also implement austerity measures (lower wages, decrease fiscal deficit)

Figure: Trade Balance in the Latin America
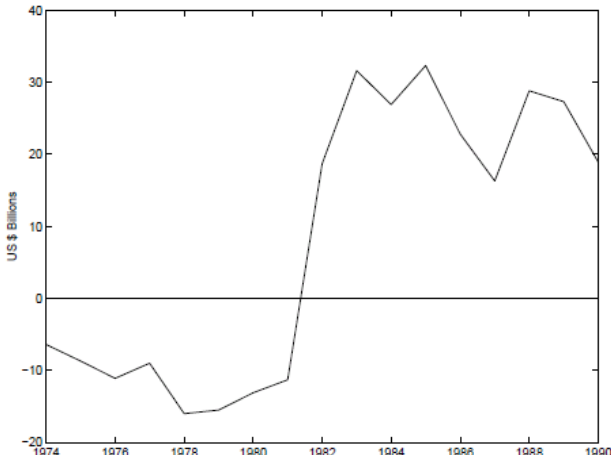
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  - 1. High debt arises due to adverse shocks
  - 2. High debt leads to higher interest rates
  - 3. Combination leads some times to default

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- **Two periods: 1st period country gets a loan, 2nd period decides whether to repay the loan or not**
    - Given decisions for 1st period, only action in the 2nd one

- **Country sells bonds** d' in a price $q = 1/(1+r)$ to receive $d = qd'$ in the 1st period. World interest rate prevails $r = r^*$. **If the country defaults, it loses fraction** c of its output

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  - **Ouput,** $y'(s)$, is stochastic for different states of the world s
  - If the country decides to repay next period $y'(s) - d'$ but if the country defaults it gets $y'(s)(1 - c)$, $c \in (0, 1)$

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- Limitation of the model: This model **ingores completely lenders
  expectations**. In reality, $r \neq r^*$ and in fact $r = r(d')$

The Eaton-Gersovitz Model of Default

- **Now we will make the simple model a tad more exciting. Accomodate possibility that bonds prices depend on the expectation that the country defaults on its debt**
  - Essentially study the model of Eaton-Gersovitz, 1981, Review of Economic Studies
  - **Two periods: 1st period country gets a loan, 2nd period decides whether to repay the loan or not**
  - Output stochastic in period 2, $y'(s)$
  - No consumption in the first period, but some debt, d, that needs to be rolled-over using new debt, d'
  - In the second period the government has to decide whether to repay the debt d' so that she consumes $y'(s) - b'$ or to default in which case she will consume $y'(s)(1-c)$ where c is the fraction of output reduction caused as the result of the default (e.g. due to political unrest etc)

Government problem

- Government picks debt for next period

$$\max_{d'} E\left\{ u\left(y' - d'\right), u\left(y'\left(1 - c\right)\right) \right\} \quad \text{s.t. } d = q\left(d'\right) d'$$

where $q\left(d'\right)$ is determined in equilibrium by

$$q\left(d'\right) = \frac{\Pr\left\{u\left(y' - d'\right) \geq u\left(y'\left(1 - c\right)\right)\right\}}{1 + r^*} = \frac{\Pr\left\{y' - d' \geq y'\left(1 - c\right)\right\}}{1 + r^*}$$

Notice that we can directly substitute out $d' = d / q\left(d'\right)$.

- For example if there are 3 states with equal probabilities and country defaults only in the worst state:

$$q\left(d'\right) = \frac{2}{3}\frac{1}{1 + r^*}$$

- Effective interest rate

$$\left(1 + r^*\right) * 1.5 > 1 + r^*$$

  - Probability of default affects the interest rate!

Default Probabilities Increase in Initial Debt

- Government picks debt for next period

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- But if Initial debt, d, is high, default may happen in $2/3$ states.

$$q\left(d'\right) = \frac{1}{3} \frac{1}{1 + r^*}$$

- Effective interest rate (spread) is higher

Managing Sovereign Debt

Debt Reduction Schemes

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  5. ...(Partial) Unilateral Default! (the so-called nuclear option)

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- **February 2014:** Greek debt/GDP>170%. Clearly unsustainable... Greece hopes for partial *Debt Forgiveness* from Troika

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    - There is a free rider problem: how can you ensure that all the lenders reduce the debt at the same time?
    - From an individual lender's point of view, it might be better if he does not forgive

Debt Reduction Schemes

- **If probability of repayment is low, it could be realistic for lenders to adjust the value of the debt**
  - Debt Overhang.
    - Let the debt be D. Consider the possibility that part of the debt is forgiven to allow for the possibility that the country recovers
    - Let π the probability that the good state occurs, where this probability is a function of the state, $\pi = \pi(D)$, and $\frac{d\pi(D)}{dD} < 0$. Total expected revenues of the lender are

      $$\pi(D) D + (1 - \pi(D)) aD$$

      where $a < 1$ is the fraction of the money that the country will get if there is a default. There might be an optimal $a < 1$ (Given that π is a function of D)