International Debt with Default
A simplified version

Outline

- The empirical evidence
- Theory of default: Why / when
- Case studies

International borrowing when allowing for default

- In note 2 we discussed international borrowing when debt is perfectly free from default risk (borrowers always repay fully their foreign creditors)
- In the real world, borrowers do not always honor their international debt obligations (they default).
- As a matter of fact, historically, default has been a recurrent phenomenon
- Many defaults, variable default rate (haircut)
- Examples: 1930s (many LDCs defaulted; two thirds of all foreign dollar bonds lapsed into default), 1980s (Latin America), 1990s (S. Asia, Russia), 2010s (Greece)

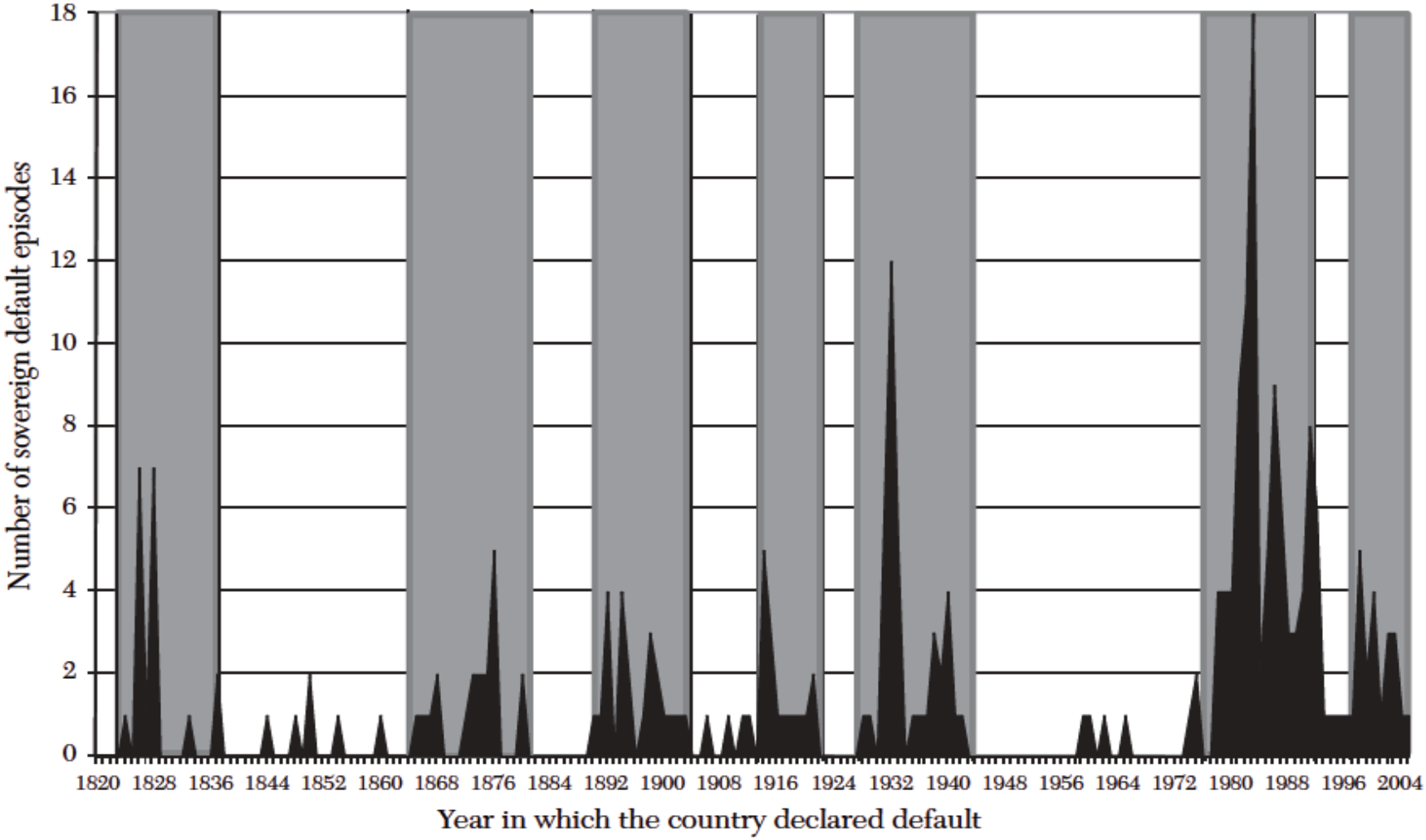


Figure 1. Default Clusters, 1820–2005

Source: Sturzenegger and Zettelmeyer (2007) and Borensztein and Panizza (2008).

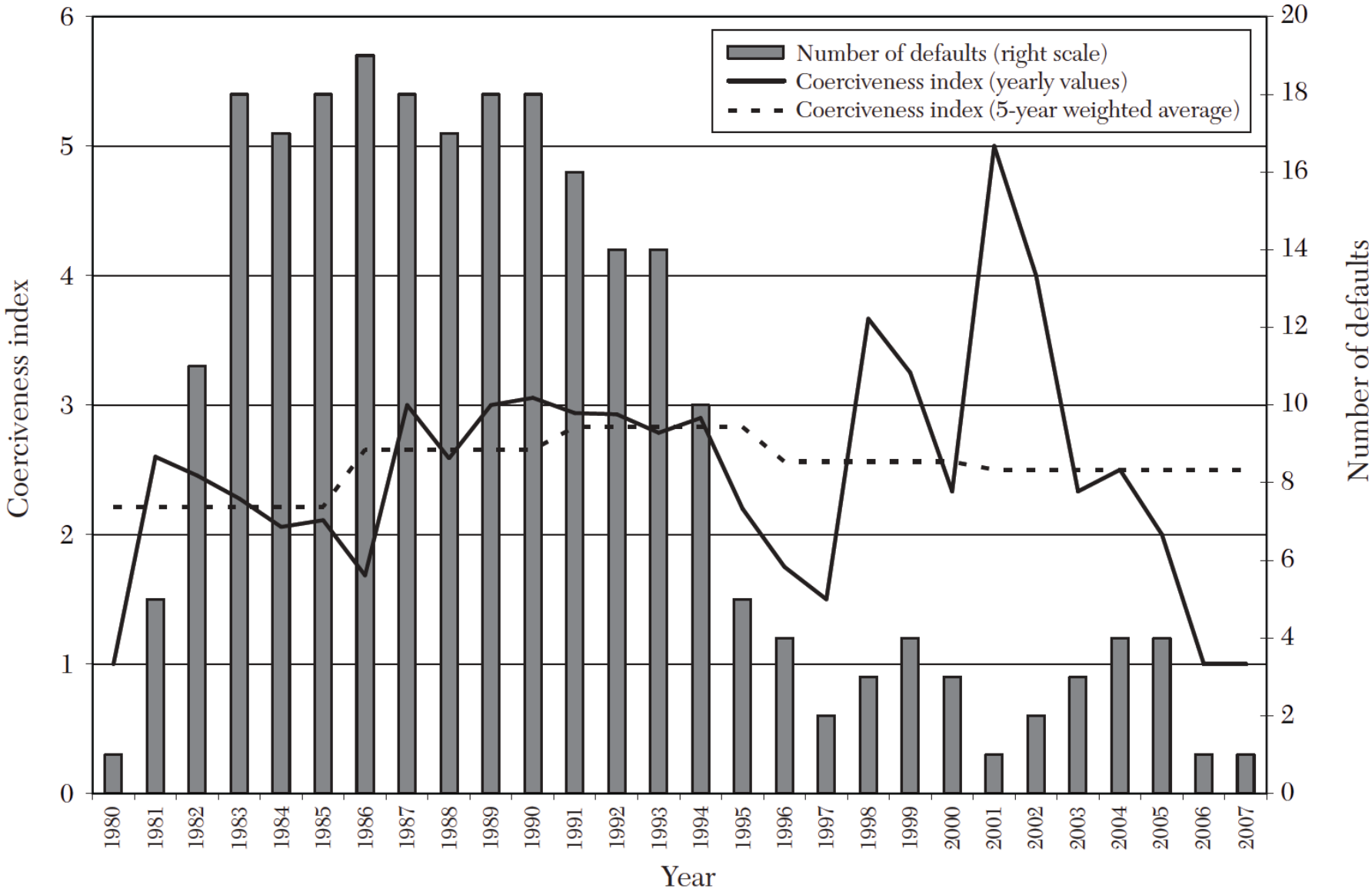


Figure 2. The Index of Coerciveness

TABLE 4
CHARACTERISTICS OF RECENT DEBT RESTRUCTURINGS

Country	Year	Total amount restructured[1] (bill US$)	Haircut (%)	Type of restructuring
Russia	1998–2000	38.7	52.6	Postdefault
Ukraine	1998–2000	7.8	28.9	Predefault
Pakistan	1999	0.61	31	Predefault
Ecuador	1999–2000	6.5	28.6	Postdefault
Argentina	2001–2005	145	75	Pre- and postdefault
Uruguay	2003	5.4	13.3	Predefault
Moldova	2002	0.08	37	Pre- and postdefault
Dominican Republic	2005	1.5	2	Predefault

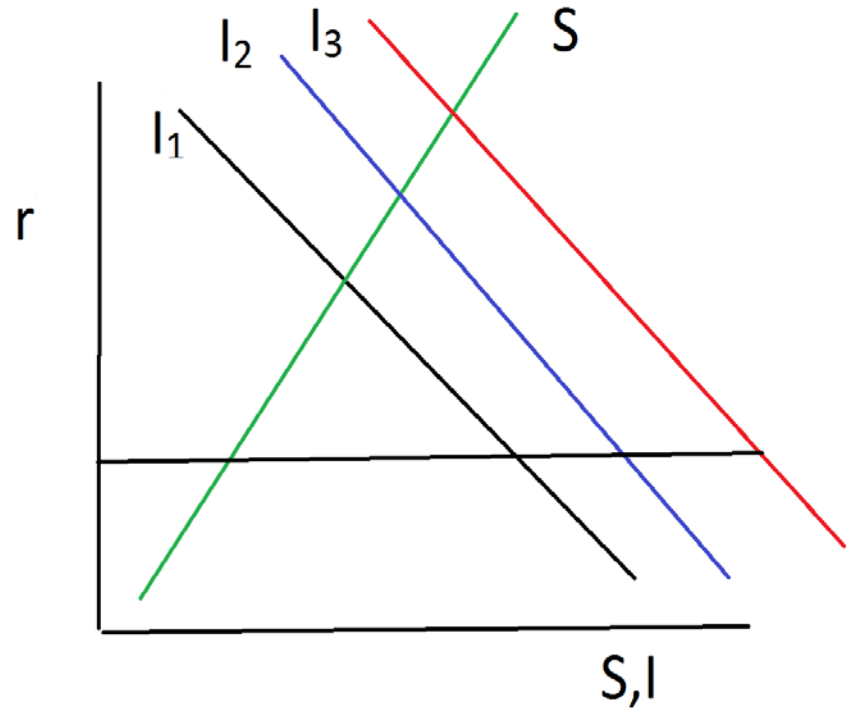
[1] Domestic and external debt with private creditors.

Source: Sturzenegger and Zettelmeyer (2007, 2008).

Empirical findings

- Sovereign defaults occur all the time
- They are partial (some of the debt is paid back)

- Can the model of note 2 be adapted to accommodate default?
- What are the implications of the *possibility of future default* for current funding, consumption (austerity), investment, growth, welfare?
- Fewer/more expensive funding, lower consumption, investment and growth
- What are the implications of *actual* default for concurrent consumption, investment, growth, welfare?
- Lower consumption, investment, growth
- How are defaults resolved? Do defaulters get punished? How?
- Typically through negotiations with creditors (has become harder) that lead to debt restructuring. Penalties vary but not too severe (but cost may nonetheless be high), countries return to intl capital markets soon



Graph 1

Graph 1 is a multi country extension (1,2,3) of the small open economy.

It has two key properties: A borrowing country

a) can borrow as much as she desires (the distance between I_i and S) AND
b) It pays a fixed rate that is independent of the size of the gap (that is, of the amount of money borrowed)

In the real world, sovereigns pay different rates

An important distinction: The rates can be different across countries because they involve different currencies. Expected exchange rate movements play a role in such differences

But they can be different even when the countries issue debt in the *same* currency. In this case, the differences are mostly due to differences in default risk

Mar 3rd 2012

Trade, exchange rates, budget balances and interest rates

	Trade balance* latest 12 months, $bn	Current-account balance latest 12 months, $bn	Current-account balance % of GDP 2011†	Currency units, per $ Feb 29th	Currency units, per $ year ago	Budget balance % of GDP 2011†	Interest rates, % 3-month latest	Interest rates, % 10-year gov't bonds, latest
United States	-737.1 Dec	-466.8 Q3	-3.1	—	—	-8.7	0.12	1.94
China	+178.7 Jan	+201.1 Q4‡	+3.1	6.29	6.57	-1.6	5.28	3.64
Japan	-20.5 Dec	+120.3 Dec	+2.2	80.9	81.7	-8.6	0.15	0.96
Britain	-159.2 Dec	-70.6 Q3	-1.9	0.63	0.61	-8.4	1.10	2.14
Canada	+1.2 Dec	-49.7 Q3	-2.9	0.98	0.97	-4.1	0.94	2.08
Euro area	-11.2 Dec	-44.9 Dec	-0.5	0.75	0.72	-4.3	0.98	1.81
Austria	-11.6 Nov	+10.5 Q3	+2.5	0.75	0.72	-2.6	0.98	2.93
Belgium	+14.4 Dec	+0.3 Sep	+1.1	0.75	0.72	-4.3	0.98	3.56
France	-97.3 Dec	-65.2 Dec	-2.5	0.75	0.72	-5.4	0.98	2.88
Germany	+192.5 Dec	+188.1 Dec	+5.2	0.75	0.72	-1.0	0.98	1.81
Greece	-37.9 Dec	-29.2 Dec	-8.6	0.75	0.72	-10.0	0.98	38.8
Italy	-33.9 Dec	-70.9 Dec	-3.6	0.75	0.72	-3.9	0.98	5.18
Netherlands	+56.8 Dec	+66.6 Q3	+7.0	0.75	0.72	-4.8	0.98	2.14
Spain	-60.7 Dec	-53.6 Nov	-3.7	0.75	0.72	-8.2	0.98	4.95
Czech Republic	+10.8 Dec	-5.6 Q3	-3.2	18.6	17.5	-3.8	1.22	3.33
Denmark	+15.0 Dec	+22.2 Dec	+6.0	5.56	5.37	-3.7	1.00	1.79
Hungary	+9.7 Dec	+1.8 Q3	+1.5	215	195	+1.2	7.33	8.83

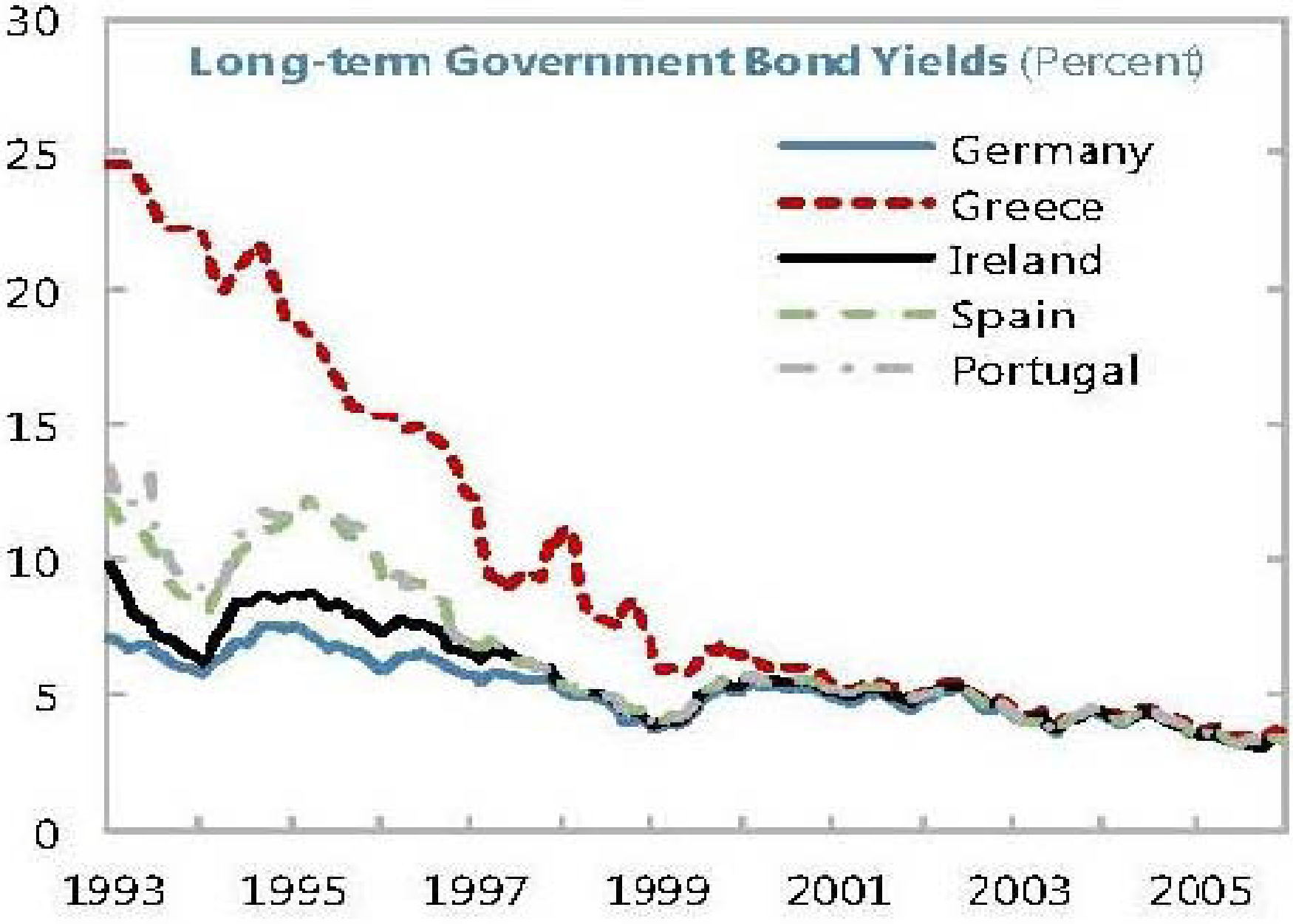
Feb 2016

Trade, exchange rates, budget balances and interest rates

	Trade balance	Current-account balance		Currency units, per $		Budget balance	Interest rates	
	latest 12 months, $bn	latest 12 months, $bn	% of GDP 2015†	Jan 20th	year ago	% of GDP 2015†	3-month latest	10-year gov't bonds, latest
United States	-760.9 Nov	-456.6 Q3	-2.5	-	-	-2.6	0.62	2.04
China	+601.9 Dec	+275.9 Q3	+3.0	6.58	6.21	-2.7	2.99	2.68§§
Japan	-9.9 Nov	+131.5 Nov	+3.3	116	118	-6.8	0.08	0.22
Britain	-195.4 Nov	-134.2 Q3	-4.4	0.70	0.66	-4.4	0.57	1.80
Canada	-18.8 Nov	-54.1 Q3	-3.3	1.46	1.21	-1.8	0.80	1.16
Euro area	+278.6 Nov	+346.9 Nov	+3.0	0.92	0.86	-2.1	-0.14	0.49
Austria	-1.1 Oct	+10.7 Q3	+2.0	0.92	0.86	-2.1	-0.14	0.79
Belgium	+21.3 Nov	+1.1 Sep	+0.4	0.92	0.86	-2.6	-0.14	0.92
France	-50.5 Nov‡	+3.5 Nov‡	-0.3	0.92	0.86	-4.1	-0.14	0.87
Germany	+277.1 Nov	+279.0 Nov	+8.1	0.92	0.86	+0.7	-0.14	0.49
Greece	-18.8 Nov	-1.1 Nov	+2.5	0.92	0.86	-4.1	-0.14	10.2
Italy	+50.3 Nov	+39.3 Nov	+1.9	0.92	0.86	-2.9	-0.14	1.65
Netherlands	+55.3 Nov	+74.8 Q3	+10.6	0.92	0.86	-1.8	-0.14	0.67
Spain	-27.2 Oct	+19.7 Oct	+1.0	0.92	0.86	-4.4	-0.14	1.80
Czech Republic	+18.1 Nov	+2.0 Q3	-0.1	24.8	24.2	-1.8	0.29	0.68
Denmark	+9.5 Nov	+21.3 Nov	+7.1	6.85	6.42	-2.9	-0.06	0.77
Hungary	+8.6 Nov	+5.1 Q3	+4.6	290	274	-2.6	1.35	3.30

Russia	+149.2 Nov	+65.8 Q4	+5.2	81.8	65.5	-2.8	12.5	10.8
Sweden	+1.7 Nov	+31.8 Q3	+6.3	8.60	8.18	-1.2	-0.29	0.80
Switzerland	+37.1 Nov	+84.1 Q3	+8.6	1.00	0.88	+0.2	-0.75	-0.23
Turkey	-63.1 Dec	-34.7 Nov	-4.9	3.06	2.36	-1.6	12.0	11.2
Australia	-9.1 Nov	-49.5 Q3	-4.3	1.46	1.22	-2.4	2.34	2.66
Hong Kong	-58.8 Nov	+9.3 Q3	+2.8	7.83	7.75	nil	0.63	1.74
India	-124.4 Dec	-22.7 Q3	-1.1	68.0	61.7	-3.8	7.26	7.76
Indonesia	+7.5 Dec	-18.4 Q3	-2.0	13,960	12,584	-2.0	8.49	8.59
Malaysia	+24.6 Nov	+7.8 Q3	+2.5	4.40	3.61	-4.0	3.83	4.05
Pakistan	-22.1 Dec	-1.4 Q4	-0.7	105	101	-5.1	6.36	9.56†††
Singapore	+49.9 Dec	+68.6 Q3	+21.2	1.44	1.34	-0.7	na	2.38
South Korea	+90.4 Dec	+104.9 Nov	+8.0	1,214	1,088	+0.3	1.60	2.01
Taiwan	+16.4 Dec	+77.2 Q3	+12.8	33.7	31.6	-1.0	0.80	0.96
Thailand	+11.8 Nov	+32.1 Q3	+2.4	36.3	32.7	-2.0	1.46	2.32
Argentina	+2.4 Oct	-8.3 Q2	-1.8	13.4	8.61	-3.6	26.7	na
Brazil	+19.7 Dec	-68.0 Nov	-3.7	4.11	2.63	-6.0	14.7	16.6
Chile	+4.1 Dec	-2.7 Q3	-1.2	731	630	-2.2	0.46	4.55
Colombia	-18.6 Nov	-20.8 Q3	-6.7	3,374	2,379	-2.1	5.32	8.74
Mexico	-13.3 Nov	-29.9 Q3	-2.6	18.6	14.6	-3.4	3.55	6.26
Venezuela	-36.2 Oct~	-17.8 Q3~	-1.8	6.31	6.29	-16.5	14.9	11.0

Exchange rate risk



Outright default vs default through inflation

1. We will abstract from situations where a country repays its debt simply by printing more money (effectively inflating away the value of debt) and focus only on non-inflation related **default risk**

The latter is more general as the countries that might be tempted to use the former (mostly LDCs) typically have to borrow in a foreign currency, which precludes them from altering their real liabilities by manipulating their inflation rate (exchange rate)

2. The distinction between **ability** and **willingness** to repay debt is important. It is clear in models but less so in the real world

The economics literature has focused on the latter as this seems to be the more empirically relevant and theoretically interesting case (it involves strategic considerations)

A simple model to help fix ideas

A small open economy that lasts for two periods; all borrowing is done by the government in the 1st period. The debt is to be repaid in the 2nd period. There is no investment.
y1=the country's income in the 1st period, y2 in the 2nd period, r is the interest rate.
y2 is assumed to be known in period 1.

Case 1: Full commitment to repay debt

Can borrow any amount b^c up to b^{max} where $(1+r)* b^{max} <= y2$.
r is a constant rate *independent* of the amount borrowed.
y2 defines the ability to repay

The actual amount borrowed, b^c, depends on desired consumption smoothing and can be represented by a variant of Graph 1(without the investment schedule)

- Case 2: The borrowers cannot commit to always repaying loans (lack of commitment)

- If the foreign creditors cannot force the borrower to repay (due to national sovereignty) and a defaulting country does not suffer any cost (punishment) then there will be zero borrowing!

  $b^n=0$ (why?)

- An important observation: Borrowing can occur only when the borrower suffers some cost when defaulting

- Types of default costs

- **Collateral** seized and/or

- **Sanctions** (trade-investment embargo, travel restrictions), exclusion from int'l financial markets, evaporation of trade credit,..

The disruption of trade and investment leads to output losses (see Iran) in the defaulting country

- Do sanctions matter for borrowing?
- **Empirical evidence**: More open economies can borrow more

Determination of loan size

Cost of default, s, depends on output, say, s=k*y2

What is the maximum amount of debt that can be issued?
= maximum repayable amount

Default criterion: Default if the cost of repaying is greater than the cost of defaulting

Default if $b*(1+r) > s = k*y2$

Repay if $b*(1+r) <= s = k*y2$

The maximum obtainable loan is $b^{n,max}=k*y2/(1+r)$

If k<1, then the maximum loan falls short of the repayment capacity (ability) of the borrower (=y2)

- Typically $b^{n,max} < b^{c}$ → the loan that can be obtained falls short of the country's desired level

- Consequently, consumption in the 1st period is too low relative to its desired level

- The borrower suffers as a result of

1. his inability to commit to repayment and
2. the fact that he cannot be made to suffer enough in the case of default!

A borrowing country is better off (gets larger loan, has more current consumption, better consumption smoothing) when s=k*y2 is large

When is k large?

- If the country has lots of collateral (such as the gold reserves or others assets of the country stored abroad, other assets,..)
- When the country is very open to the rest of the world (trade, finance,..)
- When the country will need future access to credit markets to finance domestic investment
- When doing business with creditors who possess superior enforcement power (Mafia?)

Dellas-Niepelt (JIE 2016) suggest that the switch of the source of Greek funding from private markets to official creditors (Germany) was done for precisely this reason. Germany has a lot of leverage over Greece (it can inflict large damages on Greece if Greece defaults on German loans) due to their membership in the same club (EU)

Investment, reforms and borrowing ability

- How to make y2 larger?

- By investing more or by undertaking growth enhancing economic reforms

Think of $y2=f(L, K, A)$ where A captures the efficiency of production in the borrowing country. Investment increases K and reforms tend to increase A

Consequently, a country that commits to use more of the money borrowed for investment purposes (or, to undertake costly reforms) will be able to get a larger loan and enjoy higher current consumption together with higher growth and future consumption.

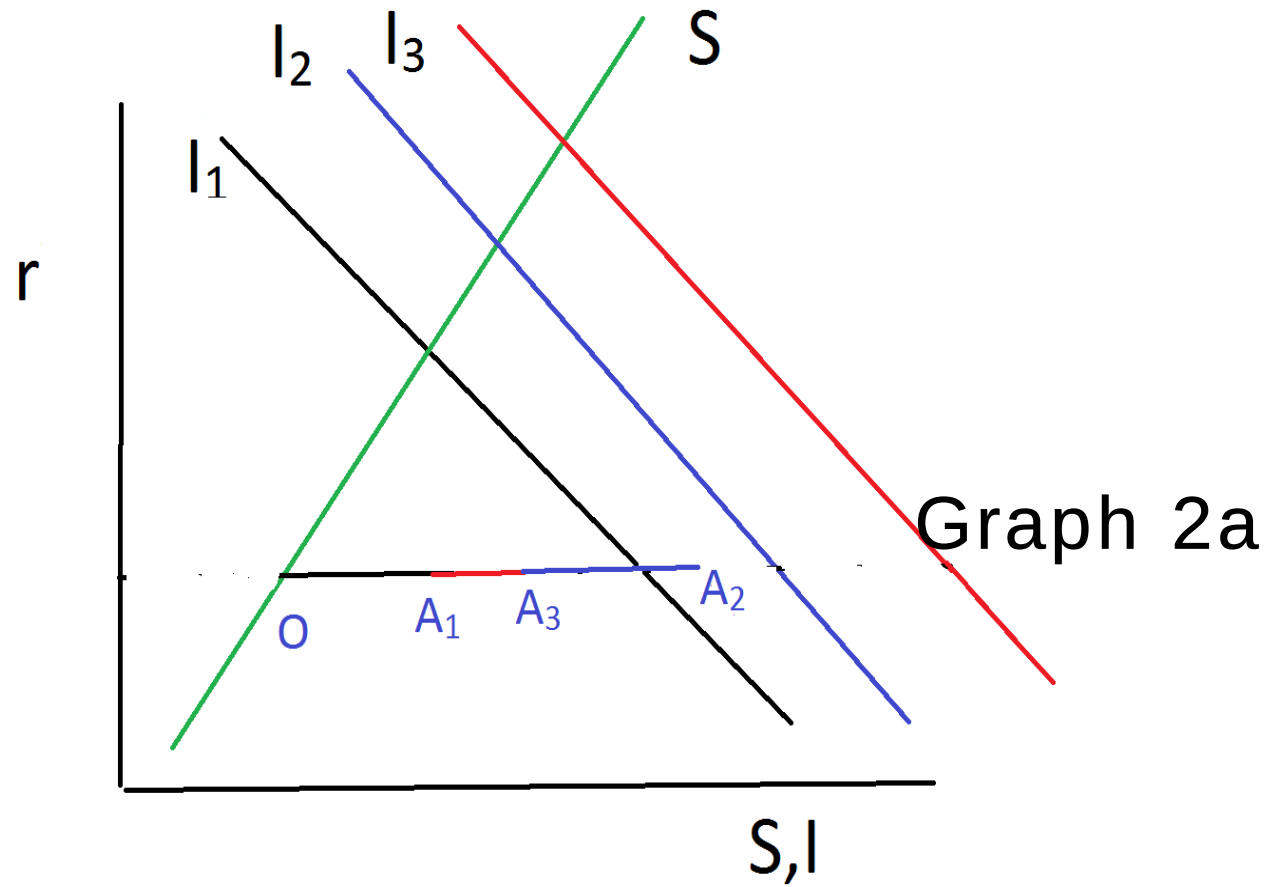
Limitations of the simple model

Our simple model is illustrative but has an important weakness: Due to the assumption that future output/cost of default are perfectly known when the loan is taken, the lenders know that if they lent more than k*y2/(1+r) then the borrower would default

Consequently, they will limit loans to amounts less than k*y2/(1+r). Default will never take place, different countries i will be able to borrow up to their k_i*$y2_i$ /(1+r) and will all pay the same interest rate (the default risk free rate) independent of the size of their borrowing, see Graph 2a

This implication is at variance with real world experience

Fortunately, a simple modification to our simple model can improve our understanding of international debt



Country 1 borrows 0A1 , country 2, 0A2 and country 3, 0A3. They all borrow less than what they desire, 3 being the most constrained (min b/(I-S)

A more general model where default can actually occur

- Let the level of future output, y2, be unknown in period 1

(can instead assume that k is unknown or that both k and y2 are random)

- How does this affect the analysis, namely, the occurrence of default, the size of the debt, the price of (interest rate on) debt, the wisdom of choosing to borrow from strong enforcers (Mafia) and so on.
- For simplicity, let y2 take two possible values: $y2=ya$ with probability ½ and $y2=yb$ with probability ½, with $ya<yb$
- Let the default risk free rate on the world credit markets be r^f

There are two possibilities regarding desired debt, b:

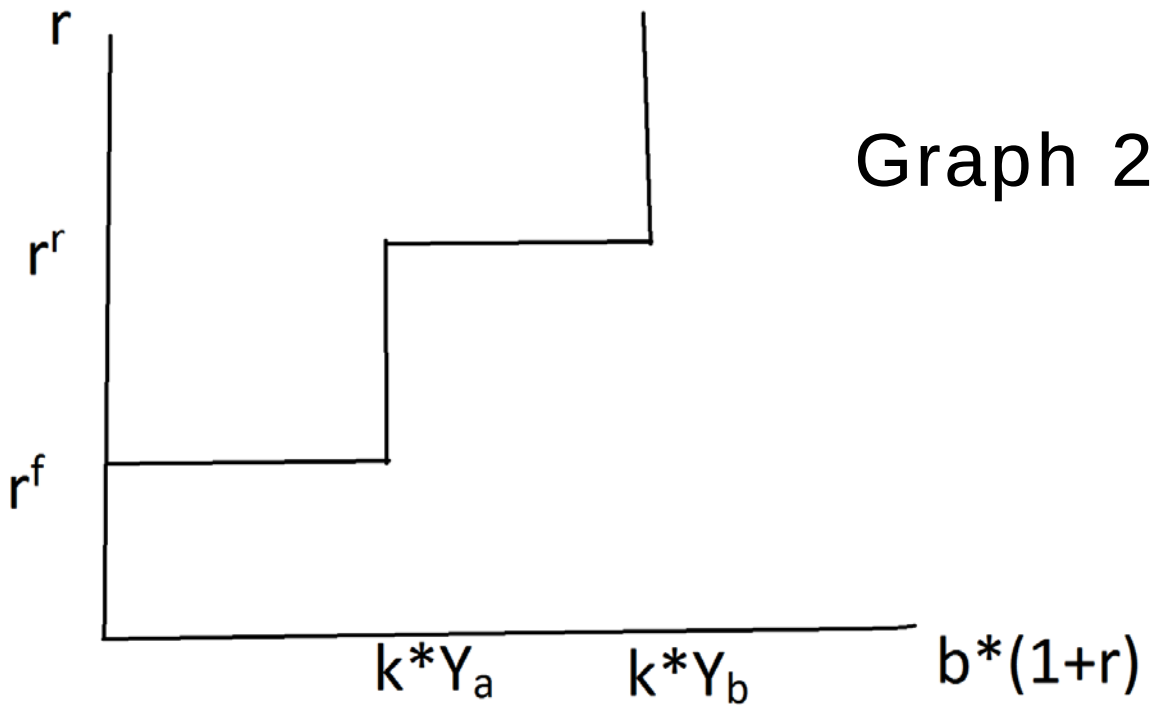
- If b: $b*(1+r^f) < k*ya$ then debt is default free, the country borrows at r^f and there is no default whether the high or low level of y2 materializes (check the default criterion)

- If b: $k*yb > b*(1+r^f) > k*ya$, the borrower defaults if there is a recession (y2=ya) in the second period, and pays back if there is a boom, (y2=yb) (Again, check the default criterion)

In the later case, creditors require compensation for the risk of default so they charge a r^r that exceeds r^f. Under risk neutrality, r^r, is such that (prob of default)X $r^r = r^f \rightarrow ½ * r^r = r^f \rightarrow$ **$r^r = 2*r^f$**

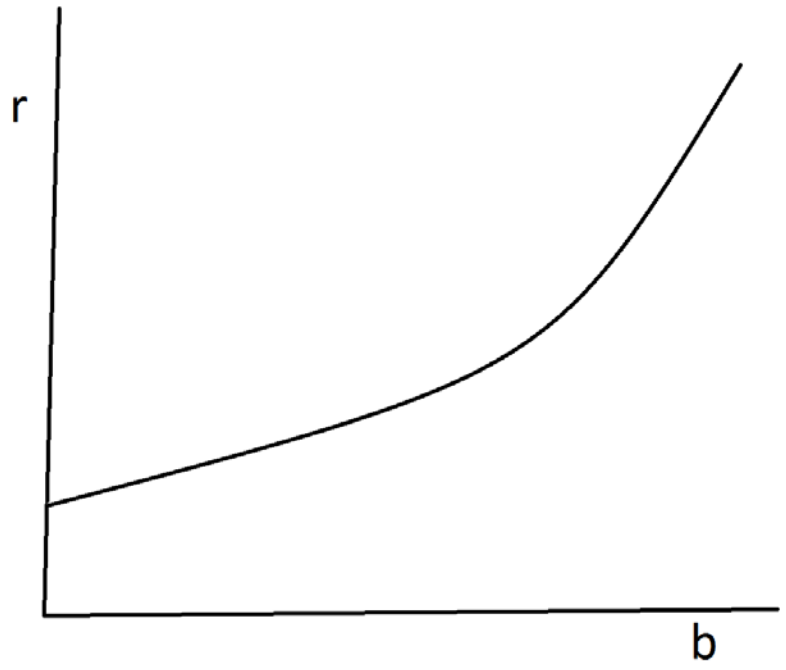
(is there a 3rd case with b: $b*(1+r^f) > k*yb$? If not, why?)

Interest rate schedule as a function of the amount of the loan



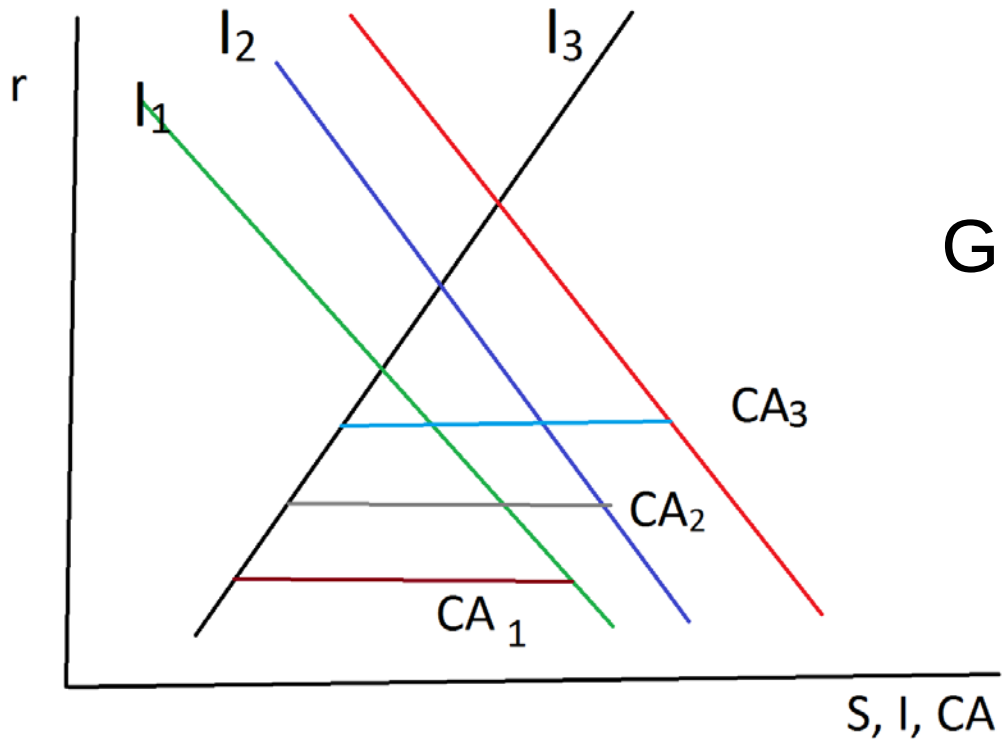
Graph 2

If we allowed y2 to take many more random values, then the interest rate as a function of the level of debt would look like that in Graph 3



Graph 3

Graph 4 is the analogue to Graph 2 (p. 8) with countries borrowing different amounts and being charged different rates



Graph 4

Prob(default)=prob(k_i*$y2_i$ <b*(1+r_i))=prob($y2_i$ <b*(1+r_i)/k_i). Note that this prob. *decreases* with k; for any given b, the prob is lower when k is higher

Country 3 has greater borrowing needs than 2 (greater I-S) Could $CA_3 < CA_2$ ($b_3 < b_2$)? The **debt Laffer** curve

Why some countries go to the IMF for loans?

If a country faces very high rates on the international credit markets (Greece faced an interest rate of 38% during the crisis as opposed to 3% before the debt crisis) would it make sense to seek a loan from a better enforcer (Mafia)? For instance, get a loan from the IMF or some other group of governments?

Think of a better enforcement as making it harder –more costly, i.e. k goes up- for the borrower to default and thus reducing the probability of default, default risk and the interest rate on loans. Greece borrowed at rates of 2% from its EMU partners while it would have to pay 40% if it tried to borrow from private creditors

Why some countries try to steer away from the IMF?

A fundamental trade off between receiving a better deal in the present (low rate) but limiting default options in the future (the Mafia example):

- Borrow from the private (p) credit markets: Pay high interest rate; have the option to default in the future at a cost of a sanction, s^p.
- Borrow from official (o) creditors (Germany, IMF): Pay low interest rate; have the option to default in the future at a higher sanction cost, s^o ($> s^p$).

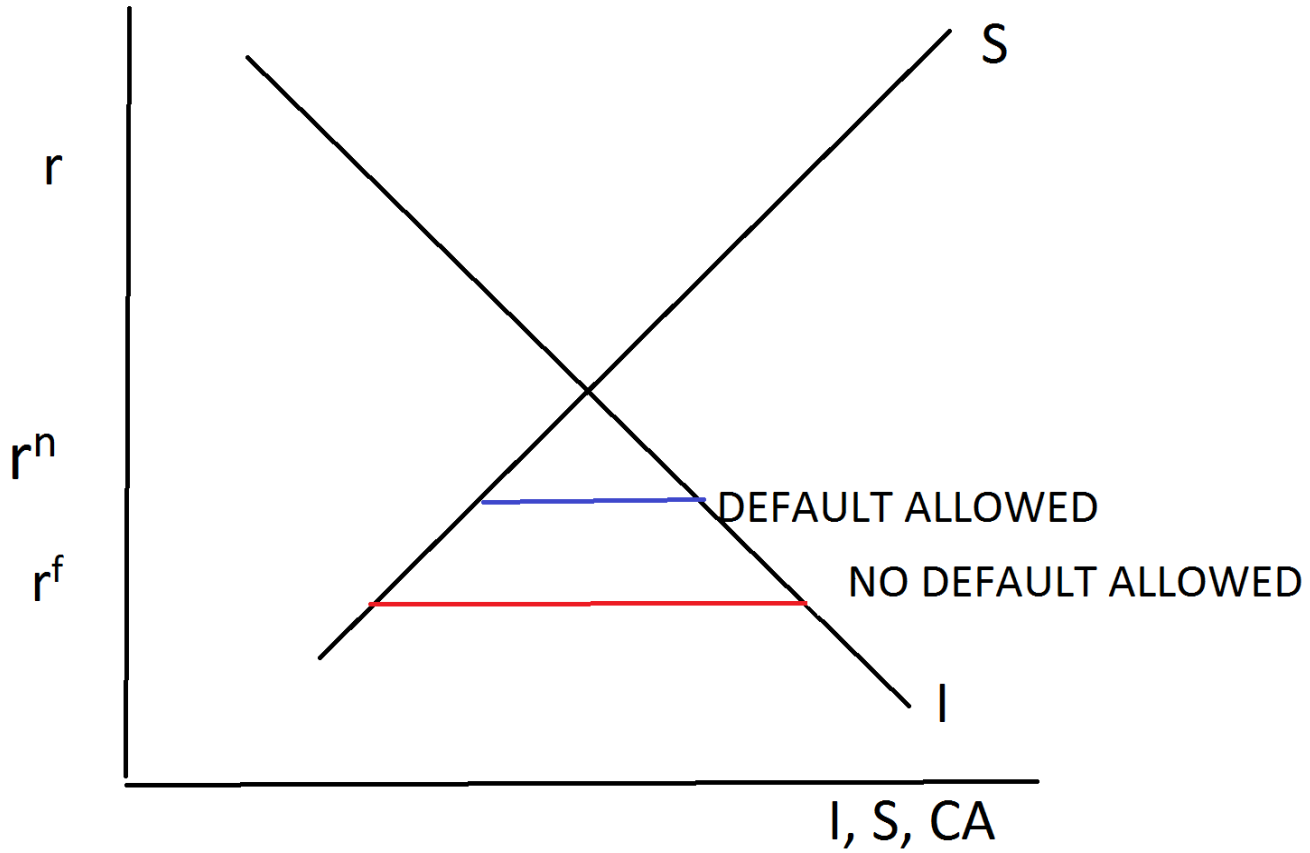
If you value future flexibility (due to uncertain economic conditions, re-election concerns, ..) then you may want to avoid going to official creditors. This is what Italy did in 2012, when it chose to borrow at 5% from private creditors (see Table on p.12) than at 2-3% from the IMF and Germany.

Implications of default risk

For given k, countries that have large debt to GDP ratios are more at risk of default → (b>k*y → b/y > k)

They pay higher interest rates when they borrow

This implies smaller new loans, and lower consumption, investment and growth relative to when there is no default risk



Debt Overhang

Debt overhang (debt issued in the past and due today or in the future): It discourages current borrowing/makes it more expensive, leading to lower consumption, investment and growth.

How? Our simple two period model with debt overhang: In addition to debt, b, issued newly in period 1 at r to be repaid in period 2, there is also some –long term- debt issued in the past, b2, at rate r_2, also due in period 2. The criterion for default in period 2 is

Default if $k*y2 < b*(1+r)+b2*(1+r2)$ so the probability of default is

$prob(y2<(b*(1+r)+b2*(1+r2))/k)$

The RHS increases with debt overhang, b_2 . New debt is thus more risky and carries a higher rate when there is debt overhang, which discourages borrowing and reduces current consumption, investment and growth

Debt crises resolution process

Renegotiation between the borrower and its creditors. The *free rider* problem

The problem has become worse. In the 1970s and 1980s, the creditors --of default prone, emerging market sovereigns-- tended to be banks.

They formed Bank Advisory Committees to negotiate with the borrower

In contrast, after the mid-1990s, creditors were mainly bondholders, from pension funds to individual “retail holders”

Recent examples: Argentina and Greece. Holdovers

- What happens when a country is not willing to pay back?
-
- Default, typically partial
- Bail outs
- Renegotiation

- 1. Unilateral (partial) forgiveness
- It may increase debt repayments (debt Laffer curve).
- A simple example: Suppose an amount z is forgiven so that debt due after the forgiveness is b-z. It is then conceivable that $b*(1+r) > k*y2$ but $(b-z)*(1+r) < k*y2$ (recall the criterion for default)
- The Free Rider Problem In Debt Forgiveness: Let the other creditors forgive!

- 2. Debt buyback
- Own
- Third-party debt buy-backs
- Criticism

- 3. Other
- Equity-debt swaps
- **A Swap**—involves an exchange of a developing country's debt for an ownership or equity position in a business in the debtor country

Causes of default: Fundamentals vs self-fulfilling debt runs

Fundamentals

In the case of L. America in the 80s there were three main external and one internal factor that contributed to the debt crises –by raising the b/y ratio- and triggered default

External factors:

Trade related

a. A severe US recession in the US (1981) that reduced the US demand for imports from the L. American countries. The US was the major trading partner of the heavily indebted L. American countries.

b. A significant reduction in the world prices of commodities exported by the L. American countries.

Both of these factors reduced export ($) earnings and the ability to pay debt due

Financed related

c. The increase in interest rates in the US that made it very expensive for borrowers to roll over existing debt obligations

Internal factors

Much of the borrowed funds were not invested productively (corruption, white elephants etc.). As a result, they did not generate income for debt repayment

For instance, per capita consumption in Greece during the 2000s reached that of Germany, in spite of the big differences in productivity per worker. Furthermore, productivity growth in Greece remained low.

A debt crisis and default could arise from a liquidity –rather than a solvency – problem. That is, the country may not have the means to pay right now but would if the repayment date was postponed (without changing the value of the debt, that is, keeping the PDV the same)

A debt crisis could also be fueled by self-fulfilling beliefs about a crisis and default.

Suppose a country is trying to roll over a large amount of debt due now. If creditors believe that other creditors are doubtful that about the country's ability to roll over they may refuse to extend credit. If enough creditors refuse then the country cannot roll over debt and will default.

Otherwise stated, if the credit markets start thinking that a country is likely to default on its debt then they will require large interest rates when lending as compensation for default risk. But large interest rates increase the burden of debt and encourage default (recall, the default criterion, $(1+r)*b>k*y2$). Even the most creditworthy may go down.

Composition of Greek government debt in terms of residence of debt holders

		2001	2002	2003	2004	2005	2006	2007	2008	2009
Govt debt	(%GDP)	103.7	101.7	97.4	98.9	110	107.7	107.5	113	129.3
Debt	b. EUR	151.9	159.2	168	183.2	212.4	224.9	239.5	263.3	299.7
change	in	10.9	7.3	8.8	15.2	29.2	12.5	14.6	23.8	36.4
Debt share	dom res	56.6	54.1	46.3	40	32.1	30.2	24.2	21.6	21.3
Domestic	Banks	26.9	25.1	21.6	18.3	18.5	19.2	17.1	15.2	15.5
Share held	non-res	43.4	45.9	53.7	60	67.9	69.8	75.8	78.4	78.7

The case of Greece

- Greece's participation in the EMU has an arduous history
- Entry: Optimum Currency Area (OCA) Criteria

- Labour mobility
- Similarity in production structure
- The degree of commodity diversification
- The openness and size of an economy
- Fiscal integration

Greece

- **Greece did not satisfy the criteria**
- Greece is a closed economy
- It also has a low share of intra vs extra EU-27 trade
- No fiscal integration
- Limited labor mobility

Greece

- **Implications of not satisfying the criteria**
- Giving up the exchange rate instrument was costly
- But Greece also suffered from policy credibility problems. Inflation was too high
- Pre-EMU inflation differences vs Germany
- With such a large inflation bias it made sense for Greece to delegate monetary policy to the Bundesbank

Greece

- Greece defaulted in 2012
- Questions:
- How could Greece borrow so much?
- Moral hazard: Investors expecting Germany to take care
- Either by applying the Stability and Growth Pact (3% deficit, 60% Debt/GDP ratio; sanctions)
- Or, by bailing Greece out

Greece

- Reasons for Greece's default
- 1. Lack of international competitiveness: Need to generate trade surpluses to pay external debt (most of Greece's public debt was held externally)
- Greece entered with an overvalued parity
- Low productivity
- 2. The borrowed funds were wasted (public sector expansion, higher wages)
- 3. Greek statistics (under-reporting debt-deficits)

Greece

Table 5: GDP per Hour, in 1990 USD

	2000	2006	2012
Greece	14.17	16.80	15.83
Germany	27.16	30.12	30.97
Italy	25.43	25.80	25.80
Spain	22.50	23.22	25.70
Portugal	14.53	15.38	16.25

Greece

- Why did the Eurozone countries bail Greece out?
- Much of Greek debt was held by French and German banks
- Fear of contagion to the European banking system
- What was the problem with the other countries (Spain, Ireland, Portugal)?
- Troubled banking sector (Spain, Ireland) that caused the fiscal crisis (the govt had to borrow to bail out the banks) . Unlike Greece where the debt crisis led to a banking crisis.