Issues in International Finance

The long run budget constraint

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Roadmap

- Where we have been
  1. Measuring external transactions
  2. Unbalanced trade means borrowing or lending with ROW
  3. Measuring external wealth
- Today
  1. Derive the long run budget constraint
  2. Determines how much borrowing and lending is possible
- Next up
  1. The gains from international borrowing and lending
  2. Consumption smoothing, efficient investment, risk diversification

External wealth: recap

- A country's external wealth is

$$W = A - L$$

- Earn interest on A and pay interest on L
- If $W > 0$ net creditor (lender) to ROW
- If $W < 0$ net debtor (borrower) to ROW
- Changes in external wealth

$$W_t - W_{t-1} = CA_t + KA_t + \textit{valuation effects}_t$$

- Wealth is a stock variable. We measure it at the end of the period.

A simple long run budget constraint

- Some assumptions
  1. Small open economy: actions in the country cannot affect prices of imports and exports
  2. Constant interest rate: country earns r^* on its assets and pays r^* on its liabilities. r^* is constant.
  3. No unilateral transfers, no capital transfers, and not valuation effects
  4. No expatriate workers: only *NFIA* is interest payments and receipts

Assumption #3

- No unilateral transfers, no capital transfers, and not valuation effects

$$W_t - W_{t-1} = CA_t + KA_t + \textit{valuation effects}_t$$

$$W_t - W_{t-1} = CA_t$$

$$W_t - W_{t-1} = TB_t + NFIA_t$$

Assumption #2 and #4

- Constant interest rate: country earns r^* on its assets and pays r^* on its liabilities. r^* is constant.
- No expatriate workers: only *NFIA* is interest payments and receipts

$$W_t - W_{t-1} = TB_t + NFIA_t$$

$$W_t - W_{t-1} = TB_t + \underbrace{r^*A - r^*L}_{r^*W_{t-1}}$$

$$W_t = TB_t + (1 + r^*)W_{t-1}$$

- Wealth at the end of time t = wealth at end $t-1$ + trade balance at t + interest payments/receipts

Example: Two period world

- Start in year 0, finish at the end of year 1
- Wealth at end of year 1 must be zero

$$W_0 = TB_0 + (1 + r^*)W_{-1}$$

$$W_1 = TB_1 + (1 + r^*)W_0$$

- Since $W_1 = 0$

$$-\frac{TB_1}{1 + r^*} = W_0$$

- Substitute into period zero wealth equation

$$-\frac{TB_1}{1 + r^*} = TB_0 + (1 + r^*)W_{-1}$$

$$TB_0 + \frac{TB_1}{1 + r^*} = -(1 + r^*)W_{-1}$$

Example: Two period world

- Two-period budget constraint

$$TB_0 + \frac{TB_1}{1 + r^*} = -(1 + r^*)W_{-1}$$

- If $W_{-1} < 0$, then "average" trade balance must be positive
- If $W_{-1} > 0$, then "average" trade balance must be negative
- The budget constraint is in present-value form
  - $(1 + r^*)W_{-1}$ is the value of your debt at the end of period zero
  - TB_0 is the trade balance in period zero
  - $\frac{TB_1}{1+r^*}$ is the period-1 trade balance in period-0 value

Example: Two period world

- Two-period budget constraint

$$TB_0 + \frac{TB_1}{1 + r^*} = -(1 + r^*)W_{-1}$$

- $W_{-1} = -\$100$
- If $r^* = 0.10$, what trade balances are feasible?
  - $TB_0 = \$110$ and $TB_1 = 0$
  - $TB_0 = 0$ and $TB_1 = \$121$
  - $TB_0 = -\$5$ and $TB_1 = \$126.5$
  - ...
- If GDP is constant, what is happening to expenditure?

$$GNE + TB = GDP$$

The long run budget constraint

- Time goes on forever

$$-(1+r^*)W_{-1} = TB_0 + \frac{TB_1}{(1+r^*)} + \frac{TB_2}{(1+r^*)^2} + \frac{TB_3}{(1+r^*)^3} + \cdots$$

- Related: U.S. Social Security

LRBC, GDP, and GNE

- $GDP = GNE + TB$

$$-(1+r^*)W_{-1} = TB_0 + \frac{TB_1}{(1+r^*)} + \frac{TB_2}{(1+r^*)^2} + \frac{TB_3}{(1+r^*)^3} + \cdots$$

$$-(1+r^*)W_{-1} = (GDP_0 - GNE_0) + \frac{GDP_1 - GNE_1}{(1+r^*)} + \frac{GDP_2 - GNE_2}{(1+r^*)^2} + \cdots$$

- Rearrange terms

$$GNE_0 + \frac{GNE_1}{(1+r^*)} + \cdots = (1+r^*)W_{-1} + GDP_0 + \frac{GDP_1}{(1+r^*)} + \cdots$$

- LHS = present value of spending
- RHS = present value of resources

Open economy vs. closed economy

- In a closed economy, $TB = 0$. **Budget must balance every period.**

$$GNE = GDP$$

- In a closed economy $TB \neq 0$. **Budget must balance in the long run.**

$$GNE_0 + \frac{GNE_1}{(1+r^*)} + \cdots = (1+r^*)W_{-1} + GDP_0 + \frac{GDP_1}{(1+r^*)} + \cdots$$

The U.S. LRBC and rates of return

- Assumption #2 was that $r_A = r_L$
- This is not true for the United States $r_A > r_L$: The US borrows cheaply and earns lends at higher rates ($r_A - r_L \approx 0.015$)
- We can see this in the data: $W < 0$, but $r_A A - r_L L > 0$
  - A net debtor, but earns positive interest income
  - Largely due to low return on foreign direct investment in US

The U.S. LRBC and valuation effects

- Assumption #3 was no valuation effects
- This is not true for the United States: prices of U.S. external assets increasing faster than prices of U.S. external liabilities ($\approx$ 2% per year)
- Not obvious why this is the case
  - Is the U.S. better at picking investments?
  - Is it statistical error?

The U.S. LRBC

- Interest rate differentials and valuation effects mean that the effect of trade deficits on external wealth are partially offset

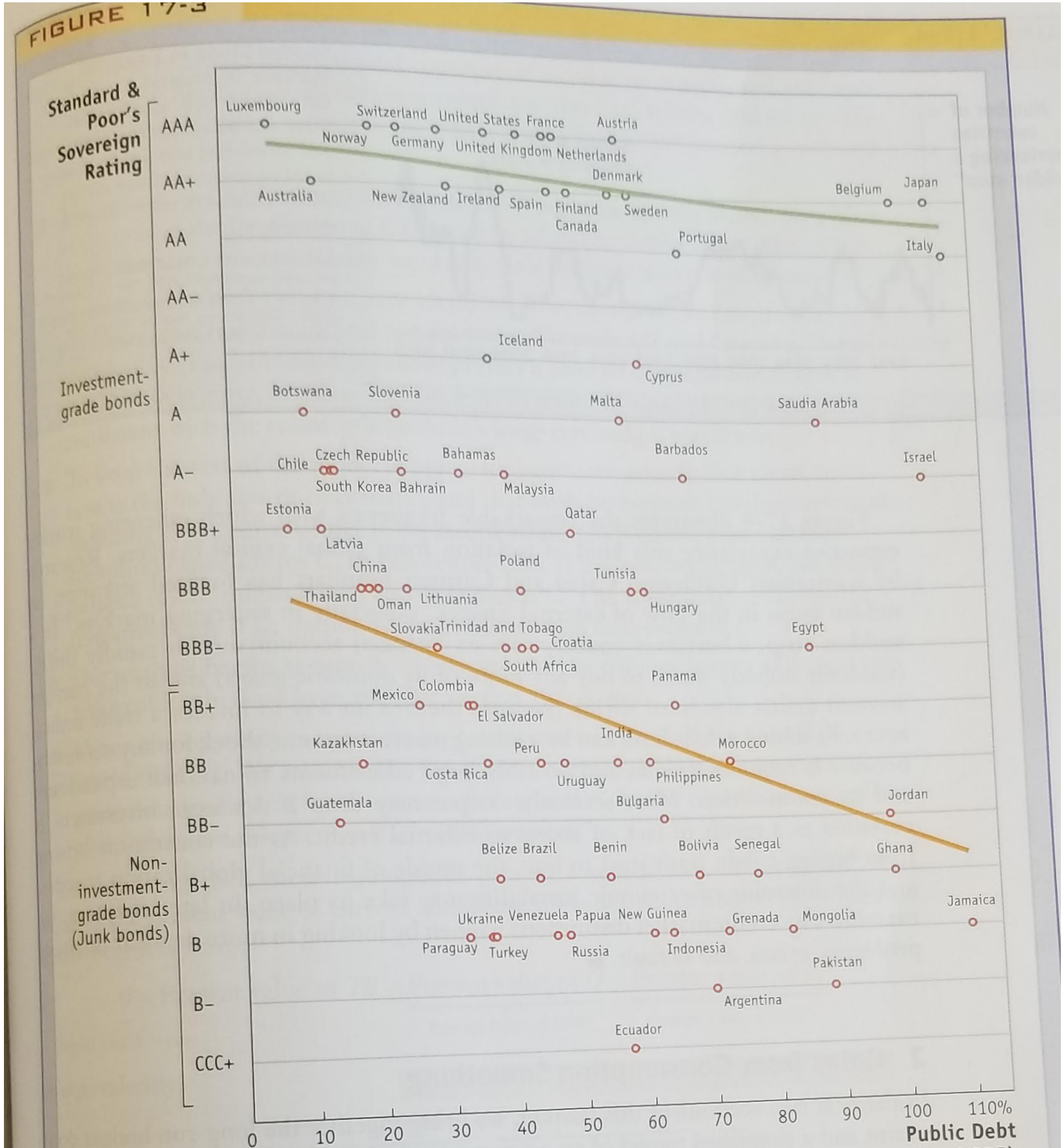
$$W_t - W_{t-1} = TB_t + (r_A A - r_L L) + \text{valuation effect}$$

What if the LRBC doesn't hold?

- The LRBC says that today's debt stock must be balanced by future trade surpluses (payments to the rest of the world)
- The larger is the debt, the larger are the future surpluses (and lower GNE)
- Agents in the country could declare bankruptcy and not make payments
- This risk is obvious in government debt ratings
  - In general, larger debt level require larger interest rates
  - More so for countries with worse reputations

- In our model, we assume that r^* is constant across countries...

FIGURE 17-3


Standard & Poor's Sovereign Rating
AAA
AA+
AA
AA–
A+
A
A–
BBB+
BBB
BBB–
BB+
BB
BB–
B+
B
B–
CCC+
Investment-grade bonds
Non-investment-grade bonds (Junk bonds)
Luxembourg
Switzerland
United States
France
Austria
Norway
Germany
United Kingdom
Netherlands
Denmark
Australia
New Zealand
Ireland
Spain
Finland
Canada
Sweden
Belgium
Japan
Portugal
Italy
Iceland
Cyprus
Botswana
Slovenia
Malta
Saudia Arabia
Chile
Czech Republic
Bahamas
Barbados
Israel
South Korea
Bahrain
Malaysia
Estonia
Qatar
Latvia
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Trinidad and Tobago
Egypt
Croatia
South Africa
Panama
Mexico
Colombia
El Salvador
India
Kazakhstan
Peru
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Costa Rica
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Jordan
Guatemala
Bulgaria
Belize
Brazil
Benin
Bolivia
Senegal
Ghana
Jamaica
Ukraine
Venezuela
Papua New Guinea
Grenada
Mongolia
Paraguay
Turkey
Russia
Indonesia
Pakistan
Argentina
Ecuador
0
10
20
30
40
50
60
70
80
90
100
110%
Public Debt