Problem Set 6

- Chapter 19, exercises 1 and 4, pp. 537-538
- Chapter 20, exercise 4, p. 573
- Practice Exams 3A and 3B are now available
- Some of the answers to the above will be reviewed in discussion sections Monday, March 13

Outline of Chapter 18 lectures

18.1. Fiscal policy and monetary policy
18.2. Spending and deficits
18.3. The three categories of government spending
18.4. Fiscal challenges of the 21st century
18.5. The government’s long-term budget constraint
18.6. Sovereign debt crises

18.5. The government’s long-term budget constraint

\[ b_{t+1} = \left(\frac{1+i_t}{1+g^n_t}\right) b_t - s_t \]

- \( b_t \) = debt-to-GDP ratio at start of year \( t \)
- \( i_t \) = average nominal interest rate on govt debt
- \( g^n_t \) = growth rate of nominal GDP
- \( s_t \) = primary surplus as a fraction of GDP

\[ s_t = \frac{T^n - G^n - TR^n}{Y^n} \]

Historically for the U.S., \( i_t \) is often close to \( g^n_t \), meaning \( b_{t+1} = b_t - s_t \).

Debt-to-GDP (\( b_t \)) is steady if have primary balance (\( s_t = 0 \)).

Debt-to-GDP rises (\( b_t \uparrow \)) if have primary deficit (\( s_t < 0 \)) that is, if taxes are not enough to cover noninterest expenses.

But in many countries and many time periods, \( i_t > g^n_t \)
When this happens, need primary surplus just to hold debt-to-GDP steady.
\[ b_{t+1} = \frac{(1+i_t)}{(1+g_t^m)} b_t - s_t \]

**Example:** \( i_t = 4\% \quad g_t^m = 3\% \)

\[ (1+i_t)/(1+g_t^m) \approx 1.01 \]

\[ b_{t+1} = 1.01b_t - s_t \]

Then even if \( s_t = 0 \), \( b_{t+1} \) is 1% bigger than \( b_t \).

If \( i_t > g_t^m \), then debt would grow to infinite multiple of GDP even with primary budget always in balance.

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If \( i_t > g_t^m \), then debt would grow to infinite multiple of GDP even with primary budget always in balance.

If \( i_t > g_t^m \), need primary surplus to keep debt from growing relative to GDP.

**Example:**

If \( i_t = 4\% \) and \( g_t^m = 3\% \), then:

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1.8.6. **Sovereign debt crises**

- Taxpayers are asked to give up 2% of income each year just to keep debt from exploding.
- This gets harder to do the higher the ratio of debt to GDP.
- If lenders to government start to worry about this, they will ask for even higher interest rate on government debt and problem becomes worse.
- Result can be a sovereign debt crisis.

11. **Reinhart and Rogoff (“This Time Is Different”) document 250 separate instances of default on government debt (failure to make promised payments on time) since 1800.**
Case study: Greece looked sustainable in 2008

2008: debt/GDP = 100%, i = 5%, g = 6.6%

Recession pushed Greece to tipping point

Recession and data revisions pushed Greece past tipping point

Interest rate reached 39% before March 2012 default

Case study: Ireland
Nationalizing banking losses pushed Ireland into tipping point

General government budget balance

General government debt

Sovereign debt crisis brought Europe to recession even as U.S. was back to growth

Real GDP

Interest rate spiked but confidence restored by external assistance

Greece’s economic downturn in 2007-2014 was as bad as U.S. Great Depression in 1929-1933

Depressions in Greece and the United States

Outline of Chapter 19 lectures

19.1. Some basic facts about trade
19.2. Trade arising from differences in endowments
19.3. Trade arising from differences in the timing of production
19.4. Trade arising from comparative advantage in production
19.5. Migration
19.6. Trade deficit and foreign debt

Chapter 19:
International Trade
19.1. Some basic facts about international trade

Observation 1: both imports and exports have risen as a percent of GDP
- Reasons:
  (a) Transportation and communication costs have fallen
  Ship ton of freight cost $95 (in 1990 dollars) in 1920, $29 in 1990
  3-minute phone call from New York to London cost $250 (in 1990 dollars) in 1930, today practically free

Observation 1: both imports and exports have risen as a percent of GDP
- Reasons:
  (b) Governments around the world have reduced tariffs and restrictions on trade
  Average worldwide tariff on manufactured goods was 14% in 1960s, 4% in 2000

Observation 2: imports have risen faster than exports
- Trade balance (also called net exports) is the value of all exports of goods and services minus the value of all imports of goods and services.
- Trade balance was mildly positive in the 1950s and 1960s and big negative value since 1980.
Observation 3: Both imports and exports fell in nominal terms in 2015 and 2016

- Weak economy outside U.S. and strong value of dollar discouraged U.S. exports.
- Falling nominal oil prices brought down dollar value of U.S. imports.

If the U.S. is importing more goods than we’re exporting, some other country must be exporting more goods than they’re importing.

2013 Trade balances

- U.S. trade balance with world: -$508 B or -3.0% of U.S. GDP
- World trade balance with US: +$508 B
- China trade balance with US: +$318 B
- China trade balance with world: +2.6% of China GDP
- Euro area trade balance with US: +$125 B
- Euro area trade balance with world: +2.2% of Euro area GDP

19.2. Trade arising from differences in endowments

- Island 1 has 750 fish and 250 bananas per year
- Island 2 has 250 fish and 750 bananas per year
- People prefer (and good nutrition requires) eating same number of fish and bananas

Definition: a country that has no trade whatever is said to be in autarky

- If these islands are in autarky
  - Island 1 gets 750 fish, 250 bananas
  - Nobody is healthy or happy
- If island 1 trades 250 fish for 250 bananas from island 2
  - Each island gets 500 fish, 500 bananas
  - Everybody is healthy and happy
Examples:
• Japan has essentially no crude oil
• U.S. has essentially no bauxite (used to make aluminum)

19.3. Trade arising from differences in the timing of production
• Oddtopia: produces abundant wheat crop in odd-numbered years, produces nothing in even-numbered years
• Eventopia: produces abundant wheat crop in even-numbered years, produces nothing in odd-numbered years
• Autarky: everybody in Oddtopia and Eventopia starves

• Better solution: Oddtopia imports wheat in even-numbered years, exports wheat in odd-numbered years

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• What is Oddtopia trading to Eventopia in even-numbered years in exchange for the wheat they import?
• Answer: Oddtopia is giving Eventopia debt (an I.O.U. in even-numbered years)

• Trade over time:
  – Country runs a trade deficit, paid for by running up debt
  – Promises to pay back later with a trade surplus
How does U.S. pay for goods when it imports more than it exports?
• Answer: by borrowing from foreigners or selling U.S. assets
• The foreign seller accepted as payment a financial instrument rather than a good or service
• When we pay back the borrowed funds, we will need to run a trade surplus (send them more goods than they send us)

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<th>Year</th>
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Recall that
\[ Y = C + I + G + EX - IM \]
\[ EX - IM = Y - C - I - G \]
If \( Y < C + I + G \) (country produces less than it consumes), then \( EX < IM \) (country imports more than it exports)

Country can use a trade deficit (\( EX < IM \)) if conditions make it want to consume more than it produces this year
• For example, Eventopia wants to consume more than it produces in odd-numbered years and so runs a trade deficit in odd-numbered years
• In so doing it accumulated a debt to Oddtopia that it paid back in even-numbered years