Macro-Finance: Class 7

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Today's Outline

- Fiscal Debt Sustainability
- Monetary and Exchange Rate System

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Fiscal Policy

Borrower:

- ▶ Source of finance for government
- ▶ Denominated in the country's own currency

e.g. Federal government bonds in the United States include savings bonds, Treasury bonds and Treasury inflation-protected securities (TIPS), etc.

Lenders:

1. Domestic Investors (individual or institutional)
2. Foreign Investors (individual or institutional)
3. Central Bank (domestic) purchases a government security, such as a treasury bill, it increases the money supply, in effect creating money

Fiscal Policy

Debt Dynamics

- ▶ nominal interest rate i_{t+1}
- ▶ risk-free investment unless government defaults or inflation changes
- ▶ real growth g_{t+1}

$$D_{t+1} = \underbrace{(1 + i_{t+1})D_t}_{\text{Outstanding + Interest}} - \underbrace{(T_t - G_t)}_{\text{Primary Surplus}}$$

Arrange $Y_{t+1} = (1 + g_{t+1} + \pi_{t+1})Y_t$:

$$\frac{Y_{t+1}/P_{t+1}}{Y_t/P_t} = 1 + g_{t+1}$$

$$\underbrace{Y_{t+1}/Y_t}_{\text{nominal growth}} = (1 + g_{t+1}) \times (1 + \pi_{t+1}) \approx \underbrace{1 + g_{t+1} + \pi_{t+1}}_{\text{real + inflation rates}} + \underbrace{g_{t+1} \times \pi_{t+1}}_{\text{negligible}}$$

Debt-to-GDP ratio is:

$$d_{t+1} = \frac{1 + i_{t+1}}{1 + g_{t+1} + \pi_{t+1}}d_t - s_t \approx (1 + i_{t+1} - g_{t+1} - \pi_{t+1})d_t - s_t$$

Assume $s_{t+1} = 0$, then:

- unsustainable debt if $i_{t+1} > g_{t+1} + \pi_{t+1}$
- sustainable debt if $i_{t+1} \leq g_{t+1} + \pi_{t+1}$
- when $\pi_{t+1} = 0$, then $g_{t+1} \geq i_{t+1}$ ameliorate debt (conversely, exacerbates)
- when $g_{t+1} = 0$, then $\pi_{t+1} \geq i_{t+1}$ ameliorate debt (conversely, exacerbates)

At any point, $s_{t+1} \neq 0$ implies:

- higher tax rate, or lower spending, or both ($s_{t+1} > 0$)
- lower tax rate, or higher spending, or both ($s_{t+1} < 0$)

More interestingly, debt contracts incorporate future price changes because:

- when $\pi_{t+1} > 0$, then debt will partially be paid just due to rising prices
- when $\pi_{t+1} < 0$, then debt become more expensive (dissuades long-term borrowing)

Austerity $s_t > 0$

- ▶ Contractionary policy to reduce debt, particularly via primary surplus
- ▶ High cost of production (limits supply)
- ▶ Low government spending (limits demand)

$$\left(d_{t+1} \underset{2\,4}{\downarrow\uparrow}\right) = \frac{1 + \overline{i_{t+1}}}{1 + g_{t+1} \underset{3}{\downarrow} + \pi_{t+1}} d_t - \left(s_t \underset{1}{\uparrow}\right)$$

Trade-offs

- ▶ g may respond negatively but still growth slowdown can effectively lower debt
- ▶ g may respond positively if government turns surplus into real expansion

Monetary Implication

What are the drivers of inflation rate?

Fiscal Objectives: Achieve the following using d_t and s_t

1. low tax
2. low spending unless private sector is unable to fulfil
3. low debt
4. high growth
5. low but positive inflation

Scenario I: $s_t = 0$

- ▶ repay debt with new debt $(d_t \uparrow)$
- ▶ borrow from private sector
- ▶ g_{t+1} likely low
- ▶ π_{t+1} likely low
- ▶ $\overline{i_{t+1}}$ increases vs. $g_{t+1} + \pi_{t+1}$ low

Scenario II: $s_t = 0$

- ▶ repay debt with new debt $(d_t \uparrow)$
- ▶ borrow from central bank
- ▶ g_{t+1} likely low
- ▶ π_{t+1} high
- ▶ $\overline{i_{t+1}}$ increases vs. $g_{t+1} + \pi_{t+1}$ high

Scenario III: $s_t > 0$ (high d_t)

- ▶ high tax (low spending)
- ▶ surplus to repay debt ($d_t \downarrow$)
- ▶ limits private sector, limits demand
- ▶ g_{t+1} low or negative
- ▶ π_{t+1} likely to be very low
- ▶ $\overline{i_{t+1}}$ is low vs. $g_{t+1} + \pi_{t+1} \approx 0$
- ▶ can qualify for foreign aid

Scenario IV: $s_t < 0$ (low d_t)

- ▶ low tax (high spending)
- ▶ deficit accumulates debt (productive operations)
- ▶ stimulates private sector, stimulates demand
- ▶ g_{t+1} likely high
- ▶ π_{t+1} likely high
- ▶ $\overline{i_{t+1}}$ is high vs. $g_{t+1} + \pi_{t+1}$ high

Scenario V: $s_t < 0$

- ▶ low tax (high spending)
- ▶ deficit accumulates debt (finance productive, which could also be fulfilled by private sector)
- ▶ stimulates private sector, stimulates demand
- ▶ g_{t+1} likely high but *crowding out* effect
- ▶ π_{t+1} likely high
- ▶ $\overline{i_{t+1}}$ is high vs. $g_{t+1} + \pi_{t+1}$ high

Crowding Out

Trade-offs when the government borrows:

- ▶ government takes up investment project that private sector could be commissioned for.
- ▶ increased credit demand raises interest rate, more expensive private investment.

Fiscal Multiplier

Measures how much a change in government spending or tax policy increases or decreases an economy's gross domestic product. e.g. With a multiplier of two, GDP rises by $2 when the deficit increases by $1.

Controversial: *"When Barack Obama sought to boost America's ailing economy with a fiscal stimulus package worth more than $800 billion in the wake of the financial crisis of 2008, a fierce debate ensued. Some economists reckoned the spending would do little to help the economy. Others suggested it could add much more than $800 billion to GDP. These arguments centered on the value of the Keynesian multiplier, which determines by how much output changes in response to a change in government borrowing."*

Questions

How can a defaulting government repay debt?
In what situations a government cannot avoid bankruptcy?

Government Default

Failure or refusal of a government of a sovereign state to pay back its debt, liabilities, or to pay the interest on this debt at the maturity:

1. There have been many instances where a government has chosen to default on its domestic currency debt, such as Russia in 1998 (the "ruble crisis"). In June 2015 Greece defaulted on a $1.7 billion payment to the IMF.
2. May be widely excluded from further credit in future
3. Some of its overseas assets may be seized
4. What's the difference between bankruptcy and insolvency?

The IMF often lends for sovereign debt restructuring. To ensure that funds will be available to pay,

▶ conditional on acts such as reducing corruption, imposing austerity measures such as reducing non-profitable public sector services, raising the tax take (revenue), etc.

▶ A recent example is the Greek bailout agreement of May 2010.

Yield Curve

Describes short-term and long-term interest rates (and the spectrum within):

▶ Short-term: Conventional monetary policy (Fed Funds Rate, Interbank Operations)

▶ Long-term: Unconventional monetary policy (QE)
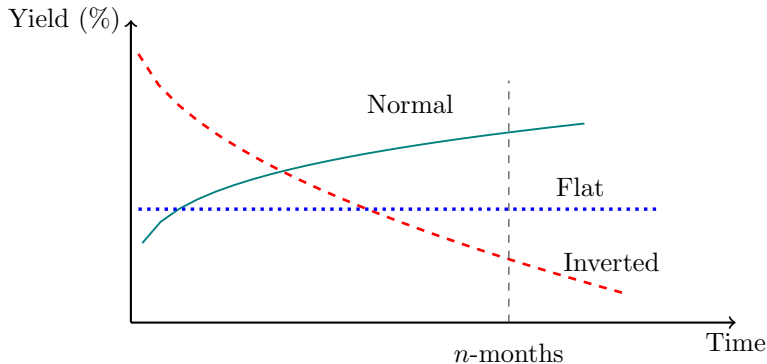
Debt Sustainability

What follows is very typical of what happens when a country turns to the IMF for help with its sovereign debt and therefore applies to any country facing these problems.

Before the Cyprus bail-in in March 2013, there was a substantial discussion about government debt sustainability ahead of the agreement with the Troika. Cyprus was excluded from borrowing in international capital markets since May 2011 when long term government interest rates went above 7%. At the time, the total deficit (as % of GDP) was around 6%, the primary deficit was around 3%, inflation was 2% and real GDP growth was around -1%. Public debt was approaching 88%.

1. Using these numbers, compute the projected next year end debt as a percent of GDP and decompose it to the three components: the real interest rate part, the part coming from growth and the primary deficit part. Why do you think Cyprus stopped borrowing internationally when interest rates moved above 7%?

2. When a country cannot borrow internationally but still needs to borrow to finance its operating needs, it usually enters into an agreement with the IMF. The IMF puts certain conditions on the country so that the debt can be repaid. This is known as IMF conditionality. The country gets the benefit of a lower interest rate loan from the IMF (relative to the interest rate capital markets would offer). The country pays the cost of some restructuring and austerity (growth falls to -3%) to be able to repay the loan. Assume in the Cyprus case the total deficit is reduced to 3% and the primary deficit to zero percent. In exchange the IMF/Troika gives a loan at 2.5%. Without changing any other numbers, re-compute the year end debt as a percent of GDP. Roll this forward one year to forecast next year's year end debt. What do you learn?

Description	Notation	Date-1	Date-2
Total deficit (% of GDP)		6.00	6.00
Primary deficit (% of GDP)	s_t	3.00	3.00
Interest rate (money market, %)	i_t	7.00	7.00
Inflation (%)	π_t	2.00	2.00
Real GDP growth (%)	g_t	−1.00	−1.00
Public debt (% of GDP)	d_{t-1}	88.00	96.28
Real interest rate (%)	$i_t - \pi_t$	5.00	5.00
— Real interest	$(i_t - \pi_t) \times d_{t-1}$	4.40	4.81
— Growth	$g_t \times d_{t-1}$	−0.88	−0.96
— Primary deficit	s_t	−3.00	−3.00
End of date-t Total Interest	$[(i_t - \pi_t) - g_t]d_{t-1} - s_t$	8.28	8.78
End of date-t Debt (% of GDP)	$[1 + (i_t - \pi_t) - g_t]d_{t-1} - s_t$	96.28	105.06

Conclusion: About 10% increase from date-1 to date-2.

Description	Notation	Date-1	Date-2
Total deficit (% of GDP)		3.00	3.00
Primary deficit (% of GDP)	s_t	0	0
Interest rate (money market, %)	i_t	2.50	2.50
Inflation (%)	π_t	2.00	2.00
Real GDP growth (%)	g_t	-3.00	-3.00
Public debt (% of GDP)	d_{t-1}	88.00	91.08
Real interest rate (%)	$i_t - \pi_t$	0.50	0.50
— Real interest	$(i_t - \pi_t) \times d_{t-1}$	0.44	0.46
— Growth	$g_t \times d_{t-1}$	-2.64	-2.73
— Primary deficit	s_t	0	0
End of date-t Total Interest	$[(i_t - \pi_t) - g_t]d_{t-1} - s_t$	3.08	3.19
End of date-t Debt (% of GDP)	$[1 + (i_t - \pi_t) - g_t]d_{t-1} - s_t$	91.08	94.27

Conclusion: About 3.2% increase from date-1 to date-2.

Trilemma: Impossible Trinity

Interrelated policies:

1. independent monetary policy
2. fixed foreign exchange rate
3. free capital mobility

Can only choose two:

▶ A stable exchange rate and free capital flows (but not an independent monetary policy because setting a domestic interest rate that is different from the world interest rate would undermine a stable exchange rate due to appreciation or depreciation pressure on the domestic currency).

▶ An independent monetary policy and free capital flows (but not a stable exchange rate).

▶ A stable exchange rate and independent monetary policy (but no free capital flows, which would require the use of capital controls).

Today focus on fiscal aspects and next week on exchange rates

Three Goals:
Autonomous monetary policy, free capital mobility, and exchange rate stability.
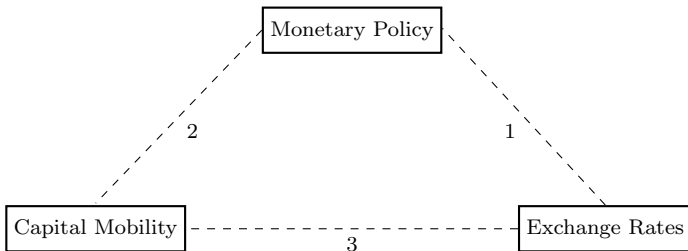
Control one side of the triangle:

1. Free capital inflow/outflow: Autonomous monetary policy (set interest rate and/or QE), *and* currency peg or managed-system (requiring reserves)

2. Floating exchange rates: Autonomous monetary policy, *and* free capital mobility

3. Non-independent monetary policy: Control inflows/outflows, *and* have stable exchange rates

Read the following article on the FT and answer the following questions:
Will the Riksbank do whatever it takes? (by Martin Sandbu on January 6, 2016)

1. What is causing the upward pressure on the Swedish krona?
2. Why is the upward pressure on the krona affecting the Riksbank's inflation targeting goal?
3. Why might ECB's QE be affecting the euro?
4. How was Switzerland defending the currency peg between the franc and the euro?
5. What are the costs of defending a peg which led Switzerland to abandon the explicit currency peg of the Swiss franc to the euro?

Appreciating Swedish Krona (1)

▶ Current (relative) economic growth (higher growth or lower uncertainty is equivalent to receiving higher interest on investment)

▶ Expectation of continued growth

▶ Capital inflows (kr/$ or kr/€ appreciates: pay more dollars for one krona)

Real Effects: Is appreciating exchange rates expansionary or contractionary (real economic output)? *Appreciation of exchange rates implies that products of domestic country become relatively more expensive for the rest of the world (and foreign products are cheaper in the domestic country), which as a side effect, could hurt domestic production sector.*

Inflation Target Goal (2): Either of the following,

- ▶ Capital flows in and *exchange rates appreciate* so that inflow slows down because of increases in exchange rates (appreciation may lead to lower home production, and lower inflation since imports are cheaper)
- ▶ Capital flows in and *peg exchange rates* (benefit from stable exchange rates) but since we have inflows, then need to buy FX to maintain the peg (This implies changes of central bank balance sheet and thus non-independent monetary policy)

Quantitative Easing and the Euro (3)

- ▶ Asset purchases increases money supply
- ▶ It also increases asset prices, lowering the yields (along the yield curve with most influence on longer maturities)
- ▶ Lower interest rates lead to capital outflows
- ▶ Lowering exchange rates

Currency Peg-to-Euro Advantages (4)

- ▶ Swiss National Bank (SNB) buys foreign currency (create more CHF to finance FX purchases)
- ▶ Lower import/export price volatility

Currency Peg-to-Euro Disadvantages (5)

- ▶ Increases SNB's balance sheet size (Franc vs. Euro)
- ▶ Unsustainable over long-term as balance sheet cannot grow forever (opposite would require large FX reserves which is also unsustainable over long-term)