Government Debt

- We will examine the effect of monetary policy on government debt, which in turn influences savings and investment.

- Governments frequently finance current deficits by borrowing.

- Governments issue two forms of debt: money and government bonds.

- The rate of return on government bonds clearly dominates that of currency. Yet, people hold both. Why?
  1. Because of the different denominations in which they are offered (debt has high denominations);
  2. Because of legal restrictions on intermediaries.
A model of separated asset markets

- We will build a model where the government may wish to issue high-denomination bonds to finance debt in addition to money, and people have an incentive to hold both assets.

- Two populations growing at rate $n$:
  1. rich (endowed with $Y$ when young) and;
  2. poor (endowed with $y < Y$ when young).

- Initially there are only two assets available:
  1. fiat money and;
  2. capital.
A model of separated asset markets

- The one period rate of return on capital is $x$.

- There is a minimum requirement for capital investment.

- One must invest more than $k^*$, where $Y > k^* > y$.

- Individual investment is not observed by the government.

- The supply of fiat money grows at rate $z > 1$. 
A model of separated asset markets

- Suppose an intermediation industry is allowed.

- Then the poor can pool resources and everybody gets a rate of return of \( x \).

- A monetary equilibrium requires \( \frac{n}{z} \geq x \).

- This places an upper bound on the rate of money creation (\( z \leq \frac{n}{x} \)) in the absence of legal restrictions on intermediation.
A model of separated asset markets

- Consider the imposition of a law banning intermediation that pools resources.

- The poor will have only one asset available – fiat money.

- There is no upper bound on the rate of fiat money creation.

- If \( z > \frac{n}{\chi} \), the rich will invest only in capital.

- The government collects seignorage revenue from the poor, but not from the rich.
Government Bonds

- By increasing $z$, the government can take more seigniorage revenues from the poor, but not from the rich.

- Is there a way to take revenue from both?

- Suppose the government issues bonds that pay a one period rate of at least $x$, then:
  - the rich will want to hold them, but so will the poor.

- A government that wants to keep extracting seigniorage from the poor can issue bonds that cost a minimum of $k^*$, while banning intermediation.

- The government reduces the liquidity of debt because bonds are intended to be a substitute for capital, not for fiat money.
Continual debt issue

- Debt issuance defers the need to raise revenue.

- Can the government defer debt’s payment forever?

- Suppose there are 10 rich young people and the government issues 100 goods per young rich person.

- Suppose $x = 0.9$ and $n = 1$.

- The government can sustain this level of debt issue forever and obtain 100 units of revenue per period.
Continual debt issue

- The minimum denomination of $k^*$ allows government to generate revenue from bond issuance and money creation.

- The above example relied on the low rate of return on capital.

- Can the government still obtain revenue permanently with $x > 1$?

- Yes, but only if population grows at a high enough rate.
Rolling over the debt

- In the preceding examples we assumed $x < n$.

- If $x > n$, the government cannot permanently obtain revenue from bond issuance.

- Suppose the government only issues enough to make repayments.

- This is known as rolling over the debt.

- The total amount of bonds issued grows at rate $x$. 
Rolling over the debt

- Compare this path of debt to the government’s ability to borrow.

- The most it can borrow is the total endowment of rich.

- After some time $T$, the total amount of bond issuance exceeds endowment of young rich.

- This is not feasible.
Rolling over the debt

- If the real interest rate on government bonds exceeds the growth rate of the economy, perpetual debt financing becomes impossible, otherwise it is possible.

- There are two important facts conditioning the feasibility of rolling over the government’s debt:

  1. The ability of a government to place its debt depends on the economy’s ability to absorb it.
     - The debt-to-GNP ratio is a good indicator of how large a burden the debt is for the economy.

  2. The relative magnitudes of the economy’s real interest rate and growth rate.
The government’s budget constraint

- The government’s budget constraint states that a government cannot use up more goods than it acquires.

- Bonds represent a source of revenue when issued, and an expenditure when repayed:

\[ N_t g + r N_{t-1} b_{t-1} = N_t \tau_t + v_t [M_t - M_{t-1}] + N_t b_t \]

\[ g + r \left( \frac{N_{t-1}}{N_t} \right) b_{t-1} = \tau_t + \frac{v_t [M_t - M_{t-1}]}{N_t} + b_t \]

\[ g + \left( \frac{r}{n} \right) b_{t-1} = \tau_t + \left( \frac{v_t M_t}{N_t} \right) \left( 1 - \frac{1}{z_t} \right) + b_t \]

\[ g + \left( \frac{r}{n} \right) b_{t-1} = \tau_t + q_t \left( 1 - \frac{1}{z_t} \right) + b_t \]
The government’s intertemporal choice

- In period 1 the government’s BC is:

\[ g + \left( \frac{r}{n} \right) b_0 = \tau_1 + q_1 \left( 1 - \frac{1}{z_1} \right) + b_1. \]

- Suppose that for \( t > 1 \), \( b_t = b_1 = b \), \( \tau_t = \tau \), \( q_t = q \), and \( z_t = z \).

- Then the BC for \( t > 1 \) is:

\[ g = \tau + q \left( 1 - \frac{1}{z} \right) + b \left( 1 - \frac{r}{n} \right) \]

- Increasing spending in period 1 without increasing taxes or money creation in period 1 means that bond issuance in period 1 has to increase.

- If \( r > n \) this implies that either future taxes or future money creation must increase.
The government’s intertemporal choice

- During the 1980s, the US experienced large budget deficits financed by debt issues.

- This lead to an increase in interest payments.
  - By the early 1990s they were 14% of total govt. expenditures.

- Government decisions made today affect the options available for the government in the future.
The government’s intertemporal choice

- If the government increases spending today, it cannot expect to lower both taxes and inflation in the future if \( r > n \).

- There are strong links between monetary and fiscal policy.

- The government may have reasons to run a deficit today, like
  1. financing durable investments;
  2. financing wars.

- Both, could be argued, should be financed by the current as well as future generations.

- Nonetheless, the government cannot ignore the above constraints.
Open market operations

- The central bank is only allowed to issue money for **open market purchases** of government debt.

- When the central bank prints money to buy up government bonds, it **monetizes** the debt, reducing its burden.

- An increase in money stock remains a tax on money holders, so wealth is transferred from these to the government.
Open market operations

- Seignorage from open market operations provides revenue in the future instead of the present.

- If a government can count on the central bank to monetize its debt, it can use debt to increase expenditures or reduce taxes.

- The net effect is the same as that of printing money to buy goods.
Example

Suppose \( r > n \), and use the government's budget constraints to answer the following questions:

a. Every year the government runs the same deficit, \( g - \tau \). If the central bank reduces inflation today, what must happen to inflation in the future?

b. Suppose the central bank will never increase the rate of money expansion. If the government reduces taxes today, what must happen to taxes in the future?

c. Can the central bank vow to reduce money expansion forever and the government vow to reduce taxes forever at the same time?
Example: Political strategy and national debt

Can a current government use the budget to condition the options of future governments?

- Suppose taxes and seignorage cannot exceed 1,000,000.
- Suppose real debt cannot exceed 950,000.
- Government pays 1.2 rate of return on debt.
- Today’s government expenditures are 900,000.

How can current government make sure future government spends as little as possible?