
2014/2015, week 5

Debt policies and monetary policies

Mankiw, Chapter 19, except for 19.2

Romer, Chapter 11.7, 11.8

Structure lecture

- ❑ Public debt
 - ❑ Facts and figures about (statutory) public debt
 - ❑ Idem about the implicit debt due to population ageing
 - ❑ (Un-)stable and (un-)sustainable public debt
 - ❑ Economic effects of public deficits

Structure lecture

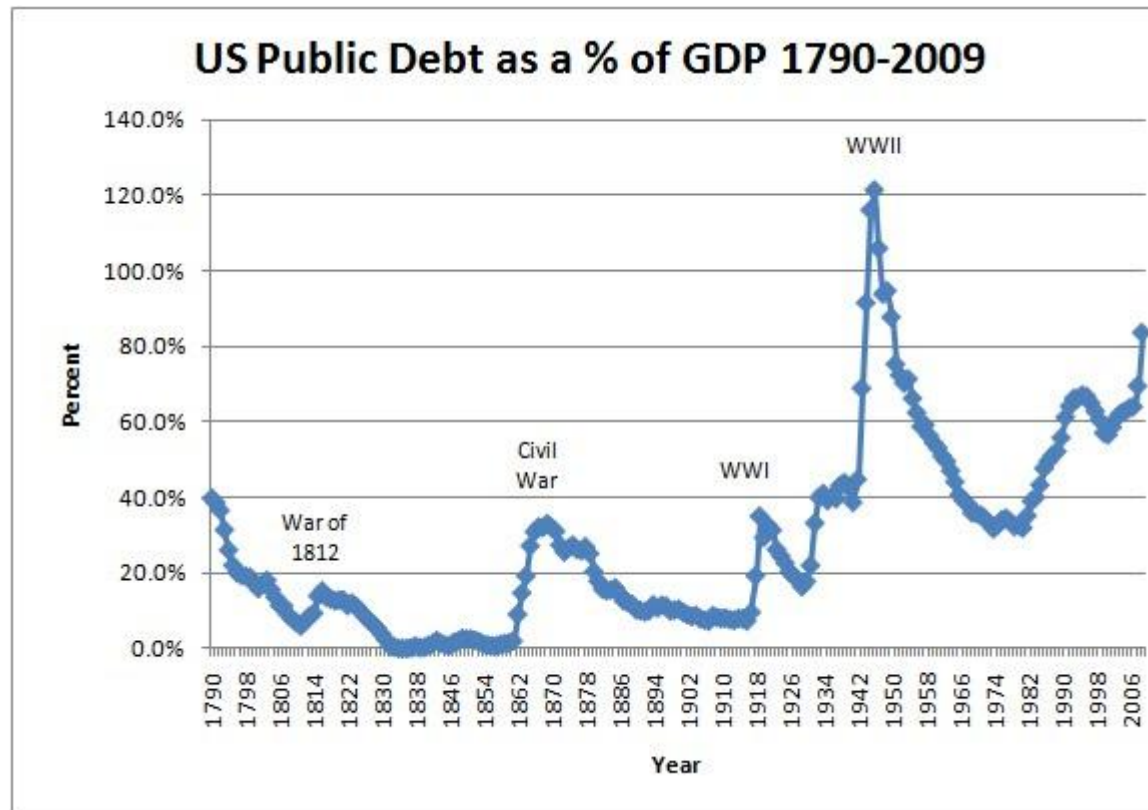
□ Inflation

- Facts and figures about inflation and hyperinflation
- The theory of time-inconsistent monetary policies
- Empirical evidence on the theory

The public debt

Introduction

- History of public debt: US case



Introduction

- Public debt across countries (M, p. 543, 2011)

Public Debt of Countries Exceeding 0.5% of World,
2012 estimate (CIA World Factbook 2013)

Country	Public Debt % of GDP
United States	73.60%
Japan	214.30%
China	31.70%
Germany	81.70%
Italy	114.60%
France	89.90%
United Kingdom	88.70%
Brazil	54.90%
Spain	85.30%
Canada	84.10%

Introduction

Country	Public Debt % of GDP
India	51.90%
Mexico	35.40%
South Korea	33.70%
Turkey	40.40%
Netherlands	68.70%
Egypt	85.00%
Greece	161.30%
Belgium	99.60%
Singapore	111.40%
Taiwan	36.00%
Argentina	41.60%
Indonesia	24.80%
Portugal	119.70%

Downgrade of US government debt: facts

- Standard & Poor's downgraded US government debt in 2011
 - From AAA (highest category) to AA+
- The Netherlands: AA+ (AAA)

Downgrade of US government debt: consequences

- How to interpret this result?
 - AAA: An obligor has EXTREMELY STRONG capacity to meet its financial commitments
 - AA+: An obligor has VERY STRONG capacity to meet its financial commitments. It differs from the highest rated obligors only in small degree

Population ageing

- ❑ Driving factors demographic and economic
- ❑ Demographic factors
 - ❑ Decrease in mortality rates (increasing life expectancy)
 - ❑ Decrease in fertility rates
- ❑ Economic factor
 - ❑ Share of health care spending in GDP increases over time (health care is a luxury good)

Hidden public debt

- ❑ For both reasons:
 - ❑ Primary public expenditure will increase more than revenues from taxes and social security contributions
 - ❑ Primary public deficits will increase
 - ❑ This implies a further increase of public debt
 - debt service, deficit, debt, debt service, and so on

Important definitions

- Change in public debt equals sum of primary deficit and debt service
 - $\Delta D = G - T + iD_{-1}$
 - Primary deficit: $G - T$
 - (Primary balance/surplus: $T - G$)
 - Debt service: iD_{-1}
 - Total deficit: $G - T + iD_{-1}$

Important definitions

- Assume Y (GDP), G and T grow at rate g
- Change in public debt ratio equals sum of primary deficit ratio and growth-corrected debt service ratio

- $$\Delta\left(\frac{D}{Y}\right) \sim \left(\frac{G-T}{Y}\right) + (i - g) \left(\frac{D}{Y}\right)_{-1}$$

Important definitions

- The accumulation equation for the debt ratio is a first-order difference equation

- $$\left(\frac{D}{Y}\right)_t = (1 + i - g) \left(\frac{D}{Y}\right)_{t-1} + \left(\frac{G-T}{Y}\right)_t$$

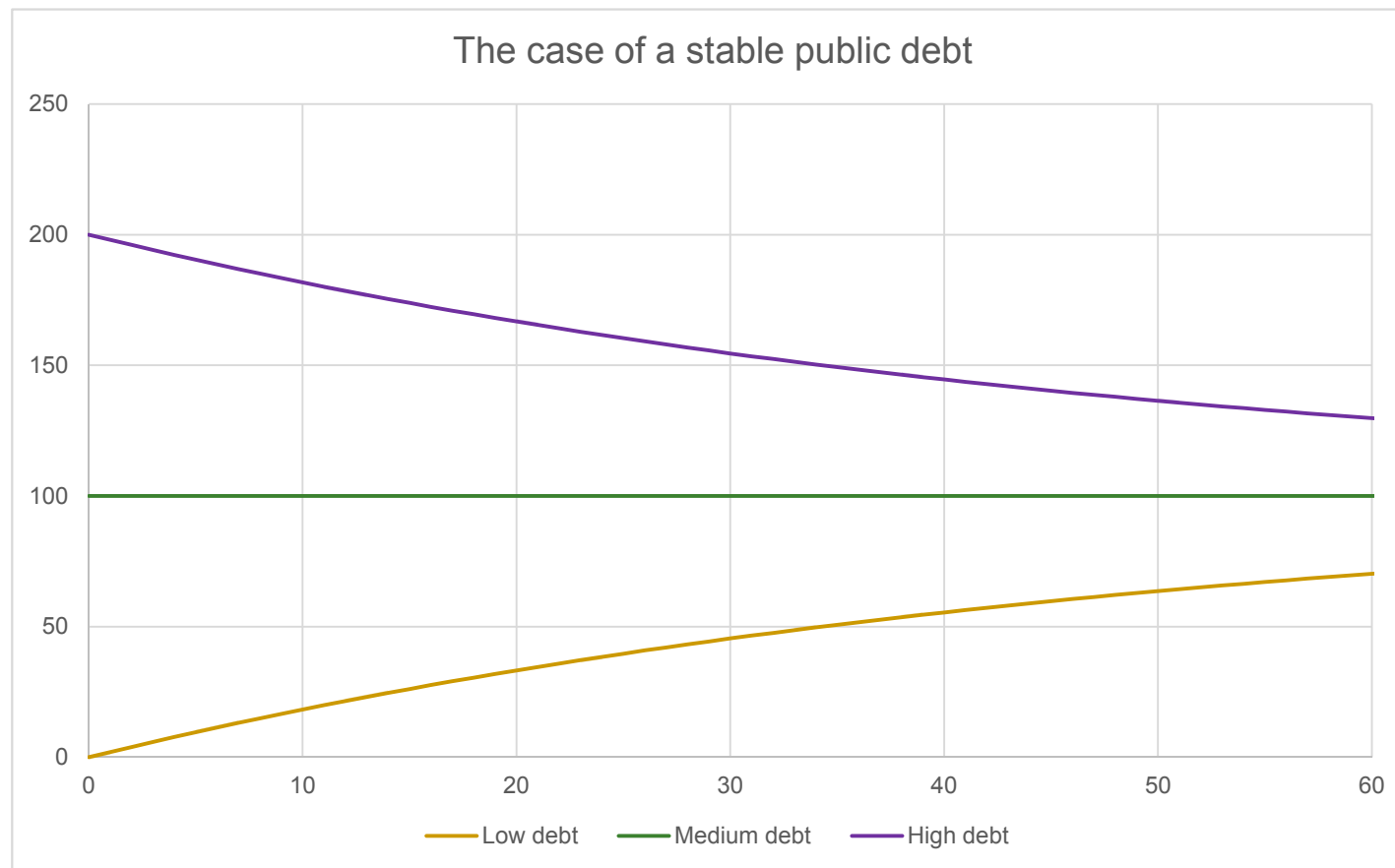
- Equilibrium value of debt ratio

- $$\left(\frac{D}{Y}\right)^* = \left(\frac{T-G}{Y}\right)_0 / (i - g)$$

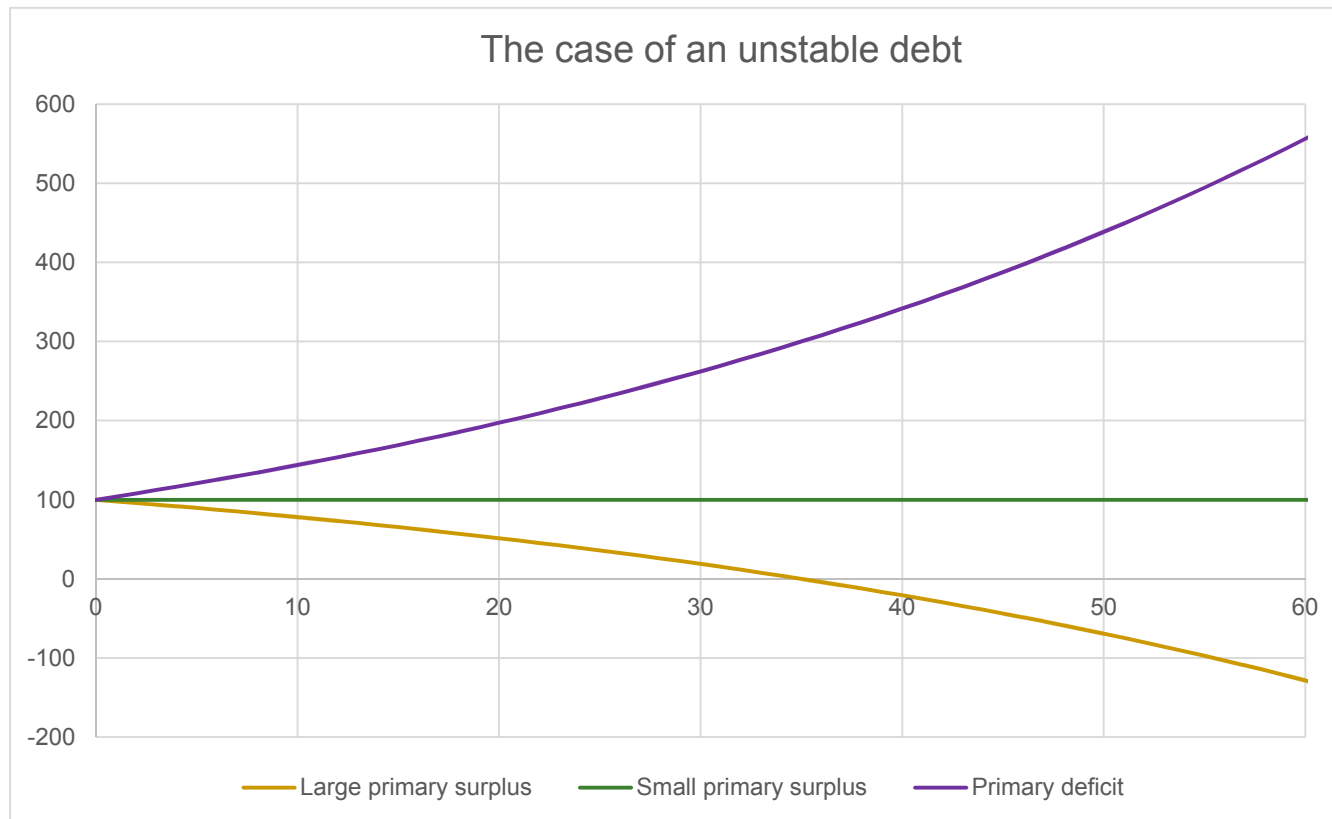
Important definitions

- If $i < g$ ($i > g$), the debt ratio is stable (unstable)
- If $i > g$ and $\left(\frac{D}{Y}\right)_0 = \left(\frac{T-G}{Y}\right)_0 / (i - g)$, the debt is sustainable
- If $i > g$ and $\left(\frac{D}{Y}\right)_0 > \left(\frac{T-G}{Y}\right)_0 / (i - g)$, the debt is unsustainable

Stable public debt



Unstable public debt



Important definitions

- For the case $i > g$, $\left(\frac{D}{Y}\right)_0 > \left(\frac{T-G}{Y}\right)_0 / (i - g)$, define s , the sustainability gap:

- $\left(\frac{D}{Y}\right)_0 = \left(\left(\frac{T-G}{Y}\right)_0 + s \right) / (i - g)$, or

- $s = \left(\frac{D}{Y}\right)_0 (i - g) - \left(\frac{T-G}{Y}\right)_0$

Effects of a larger public deficit

- Keynesian view: IS/LM model
 - Higher deficit shifts the IS curve → Output ↑, Interest rate ↑
 - Effect of higher public spending can exceed effect of lower taxes (difference between spending multiplier and tax multiplier)

Effects of a larger public deficit

- After some time, the Phillips curve will shift (see week 2's lecture)
 - In the end, output will have returned to its original value, whereas prices will have increased

Effects of a larger public deficit

- Mundell-Fleming model
 - Higher deficit shifts the IS^* curve → Exchange rate appreciates ($e \uparrow$), output does not change, composition output does change

Effects of a larger public deficit

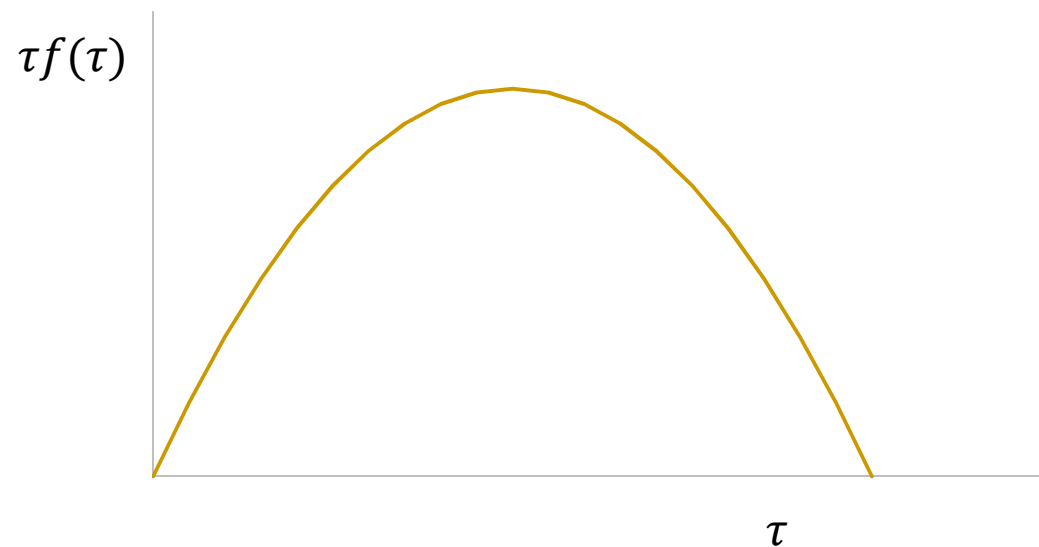
- ❑ If the deficit increase takes the form of a tax cut
- ❑ Supply-side economics:
 - ❑ Taxes distort economic decisions
 - ❑ Labour income tax can reduce labour supply (a consumption tax as well)
 - ❑ Ronald Reagan presidency

Supply-side economics

- ❑ Some argue that lower tax rates may increase tax revenues ('Reaganonomics')
- ❑ This requires that the economy is on the right-hand side of the Laffer curve
- ❑ Under the Reagan presidency, the public deficit increased

The Laffer curve

Tax revenues as a function of the tax rate



Ricardian equivalence

- ❑ Consumption based on lifetime income (lifecycle hypothesis)
- ❑ The effect of a tax cut today will be higher taxes in the future (unless government spending would be reduced)
- ❑ Hence, the household needs to save for the future tax rise
- ❑ The extra saving equals the amount of the tax cut

Ricardian equivalence

- Ricardian equivalence named after David Ricardo
- Concept of Ricardian equivalence revived after work by Robert Barro
- Implication is that a tax cut today will have no effect upon planned expenditure and thus output
- The tax multiplier, if Ricardian equivalence applies, is thus nil

Why Ricardian equivalence may fail to apply

- Myopia
 - People may be irrational

- Borrowing constraints

- Future generations
 - Bequests
 - Negative bequests not possible

- Heterogeneity
 - Tax rise may fall on other people's children
 - Tax rise may fall on firms

Why do people leave bequests?

- Barro: altruism

- Strategic bequest motive:
 - to get their children's attention

- Bernheim, Shleifer and Summers (1985):
 - The more wealthy the parent, the more often the children visit the parent
 - The relationship breaks down in case of wealth that cannot be bequeathed (like pension wealth)

Why not balanced budget policies?

- Balanced-budget policies would impose a cost upon too high (inefficient) public spending
- Idea popular under right-wing economists, like James Buchanan and Martin Feldstein
- The case of the Netherlands:
 - It may be useful to have a constraint, not necessarily a balanced-budget constraint

Why not balanced budget policies?

- ❑ Higher risk premium in interest rate (risk of bankruptcy)
- ❑ Reinhart and Rogoff (2010):
 - ❑ Too high debt will lower economic growth
- ❑ Loss of political influence in international affairs

Why not balanced-budget policies?

- Stabilization of the economy (business cycle)
 - Through automatic stabilizers
 - Discretionary policies
- Tax smoothing
 - Reduces the welfare loss of taxation
 - Budget deficits in case of war
 - What about population ageing?
- Intergenerational risk sharing

Price inflation

Price inflation: facts and figures

- Often low, but also quite often high or very high
- During the seventies, double-digit inflation rates in the industrialized world (Figure 11.6, p. 564)
- The Netherlands were no exception



Price inflation: facts and figures

- Hyperinflation (>40% a year) is more of a problem and is universal
- Reinhart and Rogoff (2009)
- Data on inflation in many countries in the world dating back to 1800

Price inflation: facts and figures

■ <u>Country</u>	<u>(1)</u>	<u>(2)</u>	<u>(3)</u>	<u>(4)</u>
■ Nigeria	22.6	9.4	72.9%	1995
■ Indonesia	18.6	9.6	939.8%	1966
■ Russia	35.7	26.4	13,534.7%	1923
■ Germany	9.7	4.3	2.22E10%	1923
■ Hungary	15.7	3.6	9.63E26%	1946
■ Argentina	24.6	15.5	3,079.5%	1989

- (1): Share of years in which inflation exceeded 20%
- (2): Share of years in which inflation exceeded 40%
- (3): Maximum annual inflation
- (4): Year of peak inflation

Why price inflation?

- The intriguing question is: why do countries produce so much inflation? Inflation is costly. What are the motives?
- Especially intriguing with the Phillips curve in mind:
 - It is vertical in the long run

The theory of time-inconsistent monetary policies

- Kydland and Prescott (1977): the inability of policymakers to commit themselves to a low-inflation policy produces sub-optimally high inflation
- Stylized model based on the following assumptions:
 - Monetary policies have real effects
 - Inflation expectations affect the level of output
 - Absent any surprise inflation, output is below the level that is socially optimal: $y^n < y^*$
 - Interpretation of the latter assumption

The theory of time-inconsistent monetary policies

- Aggregate supply curve:
 - $y = y^n + b(\pi - \pi^e) \quad b > 0$
 - y is the log of output
 - y^* is log of structural output
 - π is the rate of inflation
 - π^e is the expected rate of inflation
- Interpretations:
 - Lucas supply curve
 - Nominal contracts

The theory of time-inconsistent monetary policies

- Social welfare *loss* function:
 - $L = \frac{1}{2}(y - y^*)^2 + \frac{1}{2}a(\pi - \pi^*)^2 \quad a > 0$
- Inflation is considered an instrument of monetary policies

The case of rules

- In the case of rules, the central banker commits himself to producing inflation as announced
 - $\pi^e = \pi$
 - $\rightarrow y = y^n$ (aggregate supply curve)
 - $\rightarrow L = \frac{1}{2}(y^n - y^*)^2 + \frac{1}{2}a(\pi - \pi^*)^2$
- Minimizing the loss function implies that the inflation rate equals its target level
 - $\pi = \pi^*$
 - $y = y^n$

The case of discretion

- In the case of discretion, the central banker cannot commit himself to producing inflation as announced
- First step of the game
 - Central banker announces monetary policies; the public forms inflationary expectations
- Second step of the game
 - Given these expectations, the central banker minimizes the social welfare loss function
- We solve the model by backward induction

Game between central banker and the public

■ Solution of the second step of the game

$$\square \frac{dL}{d\pi} = 0 \rightarrow \frac{\partial L}{\partial y} \frac{dy}{d\pi} + \frac{\partial L}{\partial \pi} = 0 \rightarrow [y^n + b(\pi - \pi^e) - y^*]b + a(\pi - \pi^*) = 0$$

$$\square \rightarrow (b^2 + a)\pi + b(y^n - y^*) - b^2\pi^e - a\pi^* = 0$$

$$\square \pi = \frac{b^2\pi^e + a\pi^* + b(y^* - y^n)}{a + b^2}$$

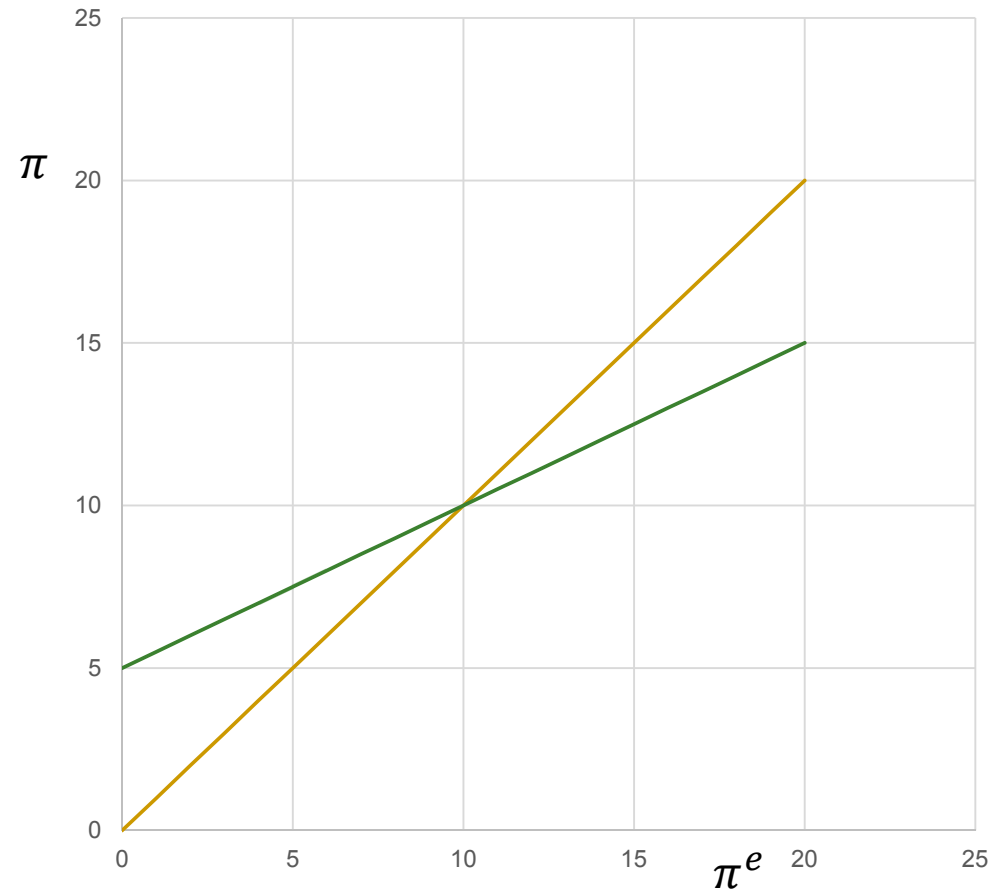
$$\square \frac{d\pi}{d\pi^e} = \frac{b^2}{a + b^2} < 1$$

$$\square \text{Intercept } \frac{a\pi^* + b(y^* - y^n)}{a + b^2} > 0$$

Game between central banker and the public

- Solution of the first step of the game
 - $\pi^e = \pi \rightarrow \pi = \pi^e$
 - $\frac{d\pi}{d\pi^e} = 1$
 - Intercept 0

The case of discretion



Rules versus discretion

- $\pi = \pi^e = \pi^* + \frac{b}{a}(y^* - y^n)$
- $\pi > \pi^*$: inflation is higher than socially optimal
- $y = y^n$: output equals the level absent surprise inflation
- This reminds us of the long-run Phillips curve:
 - No trade-off between output and inflation

The time-inconsistency of discretionary monetary policies

- ❑ Reason is the inability of the central banker to commit to a certain monetary policy
- ❑ After expectations have been formed, the central banker has an incentive to renege on its announcement
- ❑ The public anticipates this and sets expectations higher
- ❑ Ultimately, due to the inability to commit, the rate of inflation will be sub-optimally high
- ❑ Indeed, monetary policy that is optimal ex ante, will not be optimal ex post: the time inconsistency of optimal policies

Time-inconsistent policies

- Kydland and Prescott (1977) call their theory that of the time-inconsistency of optimal policies. Why?
- Child-parent relationship
 - Child not going to have a candy if (s)he is not silent
 - After the period in which the child ought to be silent, the parent argues why not give the child a candy, the period has finished
 - Child will anticipate this and will not be silent
- A capital tax
 - Investors will not be taxed
 - After entrepreneurs have invested, the government may break its promise and tax capital, which is a lumpsum (non-distortionary) tax
 - Entrepreneurs will anticipate this and will not invest

Rules versus discretion

- $\pi = \pi^e = \pi^* + \frac{b}{a}(y^* - y^n)$
 - $\pi > \pi^*$: inflation is higher than socially optimal
 - $y = y^n$: output equals the level absent surprise inflation
-
- The cases of rules and discretion
 - Differ in terms of inflation
 - Share the result for output
 - Differ in the implied level of social welfare

Rules versus discretion

- Social welfare loss under rules

- $L_{RULES} = \frac{1}{2}(y^* - y^n)^2$

- Social welfare loss under discretion

- $L_{DISCRETION} = \frac{1}{2}\left(1 + \frac{b^2}{a}\right)(y^* - y^n)^2 > L_{RULES}$

The role of reputation

- ❑ In reality, the assumption of rational expectations may be too strong
- ❑ Instead, the public may have to learn about the central banker's preferences
- ❑ How? By observing actual monetary policies
- ❑ This gives the central banker a motive to pursue low-inflation policies; this gives it a reputation as an inflation fighter
- ❑ This in turn implies low inflationary expectations, which ease monetary policymaking

Solutions to the time inconsistency problem

- Rules (rather than discretion)
 - Disadvantage: rules may be very bad in certain circumstances
- Delegation to a very inflation-adverse central banker
 - Requirement: the central banker has to have independency
 - This solution has some realism
 - Disadvantage: preferences of independent central banker who is very inflation-adverse and society may deviate too much

Empirical evidence

- Theory: The higher the degree of central bank independency, the lower the (average) rate of inflation
- CB independency difficult to measure. Researchers therefore use data on aspects of independency, like:
 - Rules for appointment and dismissal of the governor and the board of the central bank
 - Rules that establish the government's ability to control the central bank's decisions
 - The attendance of government representatives on the board of the central bank
- Some empirical evidence in support of theory
 - Alesina and Summers (1993), Grilli, Masciandaro and Tabellini (1991)

Caveats

- The government may choose the level of central bank independency and the central banker's preferences simultaneously
 - High degree of independency may be correlated with central bankers who are not too much inflation-averse
- Central bank independency and inflation may both be related to a third variable, e.g. inflation preferences of society
- The empirical relationship is rejected for non-industrialized countries

Inflation in the seventies

- ❑ Due to time-inconsistent monetary policies?
 - ❑ Changes in inflation not correlated with institutional changes
 - ❑ Changes in inflation may be driven by other factors:
- ❑ Romer is sceptical of all explanations
 - ❑ Fundamental problem in economics that we do not have the required data to establish whether a view is correct or incorrect

Price-indexed bonds

- ❑ Issued by the UK, the US and several other countries, not the Netherlands
 - ❑ Reduces inflation risk for debt holders and debt issuers
 - ❑ Reduces the inflation risk premium and thus interest outlays
 - ❑ May reduce expected inflation (time-inconsistent monetary policies)
 - ❑ Provides data on inflation expectations
 - ❑ Increases the stability of the debt ratio
 - ❑ Decreases the stability of the deficit ratio (Fiscal Compact)