EFR summary

Macroeconomics, FEB11002X

2022-2023

Lectures 1 to 15

Weeks 1 to 7

Details

Subject: Macroeconomics 2022-2023

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Macroeconomics - IBEB - Lecture 1 - Week 1

What is Macroeconomics?

In this course, the aim is to develop a **simple general equilibrium macroeconomic model.** This helps us study the interactions of markets and the impacts of policy decisions and shocks. Macroeconomics also helps us develop a critical view on current policy debates, particularly **fiscal** and **monetary policy**.

Macroeconomics is the study of the economy as a whole. To study this, we must take into account that there are numerous agents that make simultaneous decisions. These decisions are not made independently of each other (A firm's decisions affect household decisions, and vice versa). This means that we must consider the interactions between markets.

Income and Output

Macroeconomics studies changes in an economy's **output** and **income**. This is most commonly measured by the **Gross Domestic Product (GDP)** ® value of all final goods/ services over a given period of time in a specific region.

Gross Domestic Product

The Gross Domestic Product (GDP) is the most common measure of the economy's output and income. It is formally defined as the "value of final goods and services produced within a geographic location during a specific period of time". This period of time often takes the span of a year. The GDP allows us to compare the performance of different countries. It also allows us to analyze a country's economy over time.

There is a positive correlation between GDP and well-being. Therefore, living in a country with a higher GDP can be a good thing. However, GDP is **not** a perfect indicator of the well-being of a country. It lacks many dimensions for well-being,

such as life expectancy, literacy rate, pollution, etc. Nevertheless, in the long run, many other indicators of well-being also improve with a higher GDP.

Indicators

In order to make valid comparisons between countries or different time periods, we use **GDP per capita** = GDP divided by the total population of the country.

However, GDP is not always the best measure of economic well-being. Some other measures that can be used are life expectancy and life satisfaction. Although GDP is not the perfect indicator of a country's well-being, it is readily available and comparable, thus it is most commonly used.

In the long run, higher GDP leads to improvements in many other indicators of well-being, such as higher living standards and better health. In the short run, changes in GDP are associated with fluctuations in unemployment and inflation.

Long run and Short run

In order to understand how **key economic variables** (GDP, inflation…) evolve, we need to distinguish between **short-run changes** (cycles) versus l**ong-run evolution** (trend). Macroeconomics tries to explain deviations (a short-run pattern) from the trend value, and how to smooth these fluctuations.

Short Run	Long run
Fixed Prices	Flexible Prices
Consists of business cycles	Consists of a trend line
Has bigger fluctuations	Is smooth
In case of a shock, the supply side usually has to adjust	The economy's capacity to supply enough for the population matters in the long run.

The key difference between the short run and the long run is the "flexibility of prices".

Measuring Growth

1. Long-run: When measuring growth, the GDP is taken by logarithms. The long-run trend is the average growth rate over a period of time, and its slope is the growth rate.
2. Short-run: The short-run examines business cycles and deviations from the long-run trends. There are Boom periods and Recession periods. In boom periods, the graph will transition from its lowest point (trough) to its highest point (peak). On the other hand, Recession (Bust) periods depict parts of the graph that transition from peak to trough.

Macroeconomic Accounts

GDP

GDP is a **flow variable**, which is measured per unit of time, compared to a **stock variable** which is measured at a given point in time. A country might have a higher GDP but not necessarily a higher capital stock.

GDP: definition 1: the sum of final sales within a country during a period of time. Final sales are the goods sold ultimately to the people using them. Here, we do not count intermediate or used goods.

$$= C + I + G + X - Z$$

where C= consumption, I = investment, G = government spending, X = exports, and Z = imports

GDP: definition 2: the sum of value added within a country during a period of time.

Total Expenditure = Total Production

GDP: definition 3: the sum of factor incomes within a country during a period of time. Factor incomes: wages (labor), return (capital) and rent (land). GDP includes all income earned within a country's borders – both by residents and non-residents.

GDP = Labor income(wages) + Capital Income rent (land, interest, dividends, profits) + Government income (taxes)

Hence, GDP = Consumption (C) + Savings (S) + Taxes of net Transfers (T)

KEY ACCOUNTING IDENTITY

Irrespective of the methods, the GDP calculation is always the same.

=> C + S + T = C + I + G + X - Z

Which implies (S - I) + (T - G) = (X - Z)
If (S - I) > 0; the private sector is a net saver else is a net borrower.
If (T - G) > 0; the government is a net saver else is a net borrower.
If (X- Z) > 0; the country exports more than it imports and vice versa.

Further notes on GDP:

The above-mentioned definitions are consistent with each other, because:

Final sale = Value added = Income

GDP measures official market transactions, not home production (e.g. cooking) or shadow/ underground economy (tax-avoiding or illegal activities).

In the case of public services (e.g. teachers), they are counted towards GDP as a cost to the government, not the selling price of the service.

When the GDP of a country increases it is mainly due to the following reasons:

a. The economy is producing more goods and services.
b. Goods and services are being sold at a higher price.

Nominal vs Real GDP

Nominal GDP is calculated using the current prices in the year t.

$$Nominal\ GDP_t = p_t^o Q_t^o + p_t^a Q_t^a$$

Real GDP is calculated using the price of a given base year (0)

$$Real\ GDP_t = p_0^o Q_t^o + p_0^a Q_t^a$$

GDP Deflator

GDP Deflator: Nominal GDP_t / Real GDP_t

- This measures the price of output relative to its price in the base year.
- Average prices of final goods where each good weighted by their share in the GDP.

Inflation rate = growth rate of GDP Deflator, or

$$\Delta\% \text{ GDP Deflator} = \Delta\% \text{ nominal GDP} - \Delta\% \text{ real GDP}$$

Consumer Price Index

The consumer price index measures the general level of prices that the consumers have to pay for goods and services.

Goods and services in the basket are weighted according to the proportion of the household spending they account for.

CPI inflation approximately measures the cost of living.

CPI	GDP Deflator
Only includes goods and services bought by the consumers.	Only includes the goods that are produced domestically.
Includes imports	Does not include imports
Laspeyres Index: fixed weights of goods	Paasche Index: varied weight of goods

GNP VS GDP

GDP is based on location, i.e. production within the geographic bounds of the country is taken into consideration.

GNP is ownership based, i.e. production by the country's nationals irrespective of their location.

Balance of Payments

Balance of Payments records all transactions between a country and the rest of the world.

The two main elements are:

a. Current Account: records the exports and imports of goods and services and international receipts or payments of income.
b. Capital or Financial Account: records transactions in financial assets between residents and non-residents.

Fundamental BoP identity states that CA= - FA

Current Account consists of:

A. Trade Balance: exports (+) , imports (-)
B. International income: net income receipts from assets and compensation of employees
C. Net Unilateral transfers: payments that are not associated with financial or commercial transactions. Example: sending remittances (-), receiving aid (+)

If CA > 0, the country is a net lender else is a net borrower.

Financial Account: sales of assets to foreigners and the purchase of assets located abroad.
Nonofficial FA: Direct investment + Portfolio Investment + Other investments

Official Interventions: refers to the sale and purchase of domestic currency which is conducted only by the central bank.

When the CA is in surplus, a country has two options:

a. Adjustment without official intervention (appreciation of the currency, acquisition of foreign assets by the residents)
b. Intervention by the central bank (purchase of foreign reserves)

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Fundamentals of Economic Growth

Economic growth is measured by GDP per capita; it is the cause of massive divergences in income creation across countries and over time.

Steady State

Steady state is the long-run equilibrium of the economy. Here, we see a balanced growth path, because each variable grows at a constant rate (trend line). Economies are never at the exact steady state, but always moving around it and towards it.

Solow Model

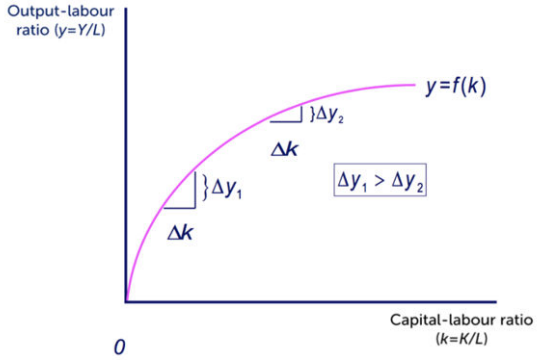
It explains why economies grow. The **Solow model** is a neoclassical growth model, developed by Robert Solow, which focuses on **capital accumulation**. The model attempts to explain sustained economic growth and has four key elements of the model are:

1. Saving (capital accumulation);
2. Population growth;
3. Technological progress;
4. Others (human capital, institutions, etc).

These key elements suggest causes for sustained economic growth.

- Production function
  At the country level, the production function is Y = (K, L)
  Y = real GDP, K = capital stock, L = labor = number of workers * hours per worker
  For labor, we assume that all workers are equally qualified, and one worker does not do better work than another.
- Cobb Douglas Function: $Y = K^{\alpha}L^{1-\alpha}$
  where the exponent ($^{\alpha}$) is the elasticity of output w.r.t. capital and $0 < \alpha < 1$

- Assumptions: Constant returns to scale; Diminishing marginal product for each factor.
- Intensive form
  To focus on capital relative to the size of labor, we divide both sides by L:
  Y/L = F(K/L, 1)
  => y = f(k)
  With y = Y/L (output labor ratio) and; k = K/L (capital-labor ratio)



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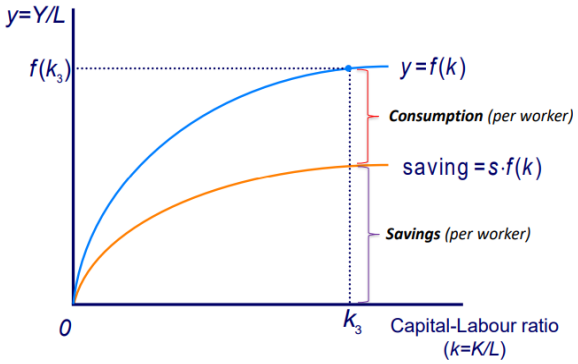
Saving, Investments, Capital Accumulation

In the long run, the budget is balanced so T = G = 0; in the closed economy, current account is zero so X − Z = 0. Therefore, Y = C + I + G + X − Z = C + I. At the same time, Y = C + S + T = C + S.

=> S = I , so capital is indeed financed by domestic savings.
=> Every year, people save a fraction s of their income.
=> i = sy = sf(k) ("savings schedule")



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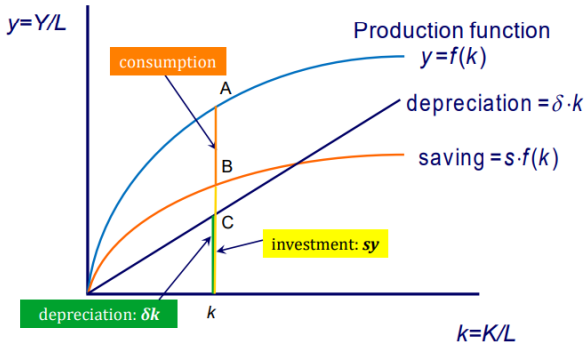
However, we also need to take into account **depreciation**. We denote the rate of depreciation of physical capital as δ , and total depreciation per worker **(depreciation line)** as δK. So, we measure the change in stock capital as:

$$\Delta K = sY - \delta K \text{ or } \Delta k = sy - \delta k \text{ (intensive form)}$$

Key issue is that higher K has two opposite consequences. With more k, we have higher output (y), because y = f(k). At the same time, with more k, we have higher depreciation (δk), so we need to invest a lot more (sy) to compensate.

Graphical representation of : sy > δk



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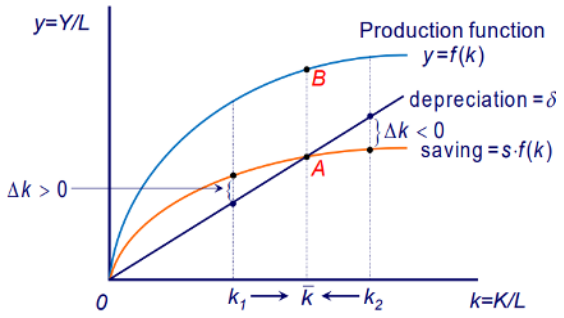
Capital Accumulation in the steady state

The steady state is the intersection of the savings schedule and depreciation line. Here, capital per worker does not change, and total investment equals total depreciation, or capital inflow equals outflow.

$$k = \bar{k}$$
$$\Delta k = 0 \text{ or } sf(k) = \delta k$$

Steady State k ($\bar{k}$) = point A; Steady State y ($\bar{y}$) = point B



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In the steady state, the capital per worker does not change:

$$k = \bar{k}$$

Hence, the steady state level of capital is written as:

$$\bar{k} = \frac{s}{\delta} f(\bar{k})$$

Growth rates around the steady state

If the economy is not at a steady state (point A in the graph above), it automatically moves there in the long run.

If $k < \bar{k}$ then $\Delta k > 0$:

Capital stock increases and the economy will have a catch-up growth. The further it is from the steady state, the faster it grows.

If $k > \bar{k}$ then $\Delta k < 0$:

Capital stock decreases and the economy will shrink. The further it is from the steady state, the faster it shrinks.

What happens if people save more?
An increase in the savings rate affects the level of GDP per capita, not the long-run growth rate of GDP per capita. This is because of diminishing returns - as soon as sf(k) meets the depreciation line, growth rate of y equals 0.

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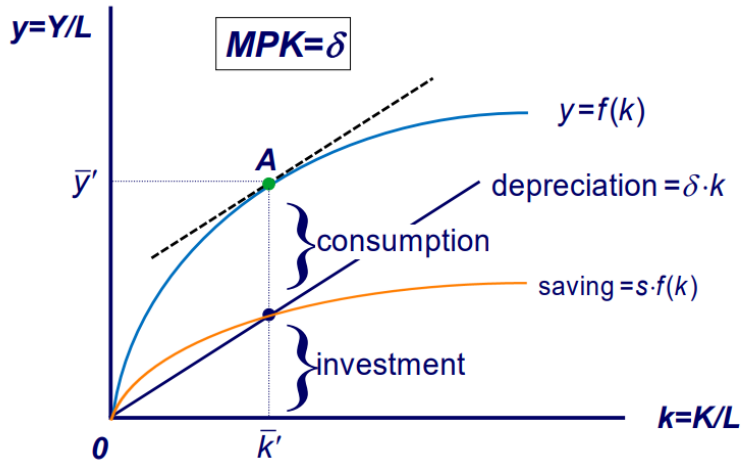
The Golden Rule

Saving more to invest and grow is not always good because it comes at the cost of present consumption. At the steady state, the consumption is given by:

$$\bar{c} = \bar{y} - s\bar{y} = f(\bar{k}) - \delta\bar{k}$$

Consumption is maximized if FOC = 0 or $f'(\bar{k}) = \delta$. In other words, where marginal productivity of the capital is equal to the depreciation rate.



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Around the Golden rule steady state

Dynamic inefficiency:

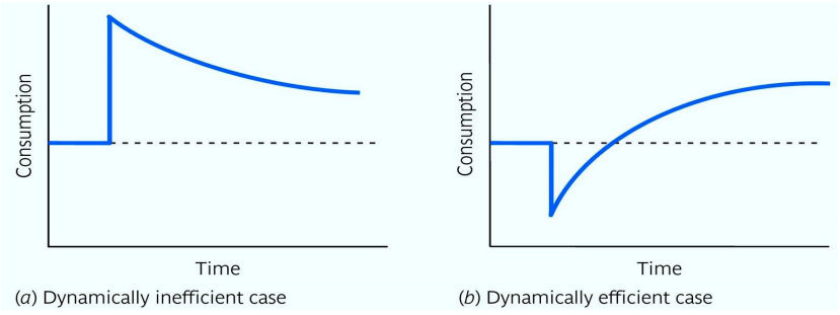
$$\bar{k}'' > \bar{k}'$$

If savings are reduced now, the consumption will increase today and tomorrow.

Dynamic efficiency:

$$\bar{k}'' < \bar{k}'$$

If savings are increased now, consumption is decreased and it takes a long time to bounce back, so the current generation will have to sacrifice for the future.



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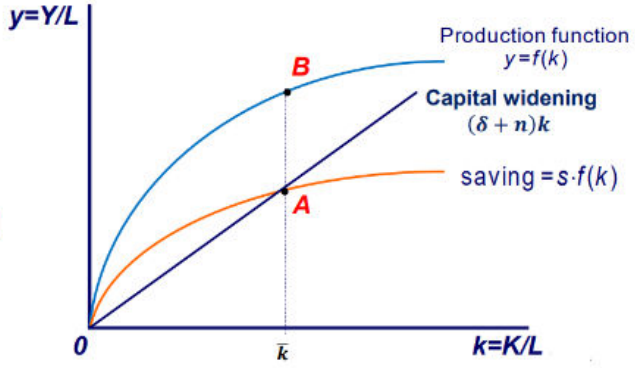
Population Growth

If we only look at capital accumulation, the Solow model cannot sustain growth of S/L in the steady state. Once we allow for **population growth**, we see that growth of Y and K can be permanently sustained; they grow at the same rate as L.

The labor input may grow for two reasons, namely: (1) an increase in the number of employed individuals, and (2) an increase in the average number of hours worked. For K/L to stay constant, investment now needs to compensate for both the **depreciation of K** and the **growth of L.** This dual compensation process is called **"capital widening"**, so the new capital accumulation condition becomes:

$$f'(\bar{k}) = \delta + n$$

As observed by the graph below, the capital widening line steepens as population growth rises. In the graph, "n" is the level of constant population growth.



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Modified Golden Rule

Here, the Golden Rule still aims to maximize consumption. However, it is now subject to a constraint that includes population growth (in addition to depreciation).

$$\Delta k = s\bar{y} - (\delta + n)\bar{k}$$

MPK = Population Growth + Depreciation

The rule now states that consumption is maximized when the marginal product of capital, net of depreciation, equals the rate of population growth. Because an

increase in population implies a lower capital to labor ratio, one can assume that the output per head will also be lower.

Technological Progress

Technological progress (A) is also added to the production function:

$$Y = F(A, K, L)$$

and is called **Total Factor Productivity (TFP)**, because an increase in A leads to an increase in Y even if other outputs remain the same. 'A' grows at a constant rate 'a' and is assumed "exogenous" – it comes from the outside and is not explained in the model. Contrary to other production factors, A has no marginal cost. Moreover, A cannot really be considered as a factor of production as companies do not normally purchase knowledge, but rather acquire it and use it to improve existing methods and techniques. Technological progress also allows for an increase in living standards.
Examples of technological progress: the use of computers, assembly-line production where each worker focuses on one task, etc.

Effective Labour

One way to augment technological progress into the production function is to assume that A is labor-augmenting, meaning that the change in A is the same as that in L. This yields the following production function:

$$Y = F(K, AL)$$

Here, AL is called "**effective labor**", which increases if either A or L increases. A grows at rate a and L grows at rate n, so AL grows at rate a + n.

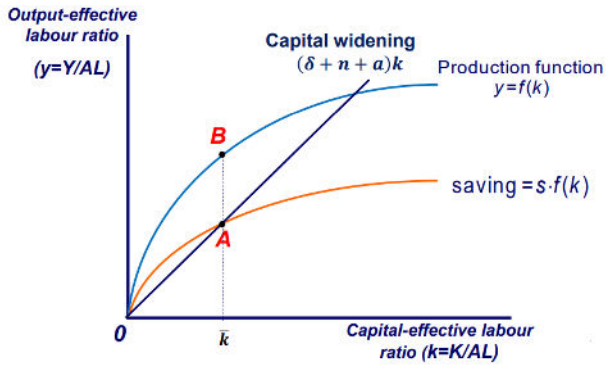
In the new intensive form y = f(k) to express it in terms of effective labor (AL):

$$y = Y/AL;\ k = K/AL$$

To reach the steady state, i.e. to keep y, Y must also grow at rate a + n. Then, as L grows at rate n, GDP per capita = Y/L grows at rate a.

The **capital widening line** becomes $(\delta + a + n)k$ and the **capital accumulation equation** is now:

$$\Delta k = sf(k) - (\delta + a + n)k$$



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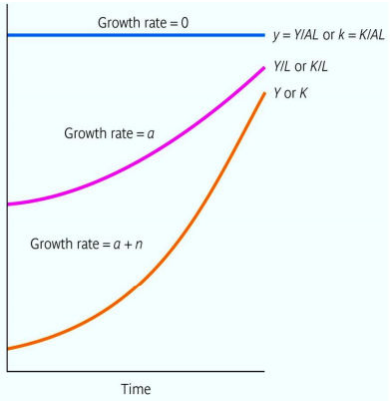
An increase in technological progress causes the capital widening line to grow steeper. However, a steeper capital widening line does not always have negative implications for individual well-being, as the individual income per person is reliant on Y/L, and not Y/LA. In fact, the higher a is in the steady state, the faster the individual income will grow.
=> Technological progress is key to sustained growth of GDP per capita: ΔY/L = a



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So, while an increase in population explains GDP growth, technological progress is able to explain the increase in standards of living over the centuries.

Modified Golden Rule

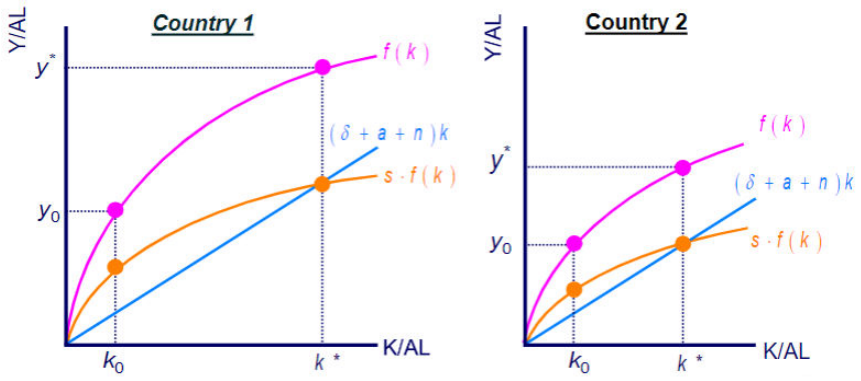
Consumption is maximized when Marginal Product of Capital is equal to the sum of depreciation rate, technical change and population growth, so:

$$MPK = (\delta + a + n)k$$

Convergence Hypothesis

The Solow model does not explain the source and differences in long term growth. The **convergence hypothesis** aims to explain these differences, and why income and growth rate vary. The hypothesis tells us that with δ and k similar across countries, if s, n, a are also similar, countries would reach one same steady state and have the same GDP per capita. Otherwise, if k is below the steady state, they will still catch up to that point eventually.

However, poor countries grow fast to catch up with others, but some seem stuck with low incomes or "growth traps". So far, we have assumed that all countries have the same production function, but in reality, these differ from one country to another. Then, even if s, δ, k,, a, n, k_0 are the same, their steady state output (income) diverges.



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Why do some countries catch up while others don't?
To answer this question, we need to move from unconditional to **conditional convergence.**

Countries with different production functions converge to different steady states, which are characterized by different levels of output per capita (y) and effective labor (AL). The conditional convergence indicates that between two economies with identical capital stock per effective labor, the economy with a higher availability of production technology will be more productive. Thus, as verified by the steady state, will become richer.

To converge to some steady state in a "growth club", we need to add more factors into consideration. They are:

(1) human capital
(2) public infrastructure
(3) social infrastructure

Human Capital

Human capital is humans' health as well as the stock of knowledge, skills, experience that determine **productive ability of workers**. Healthier and/or high-skilled workers are more productive than the ill and/or low-skilled.

With human capital H, the production function becomes: $Y = AF(K, L, H)$

There is correlation between better health and higher GDP, but not causation. Yet, if poor countries are to escape the "growth traps", they should focus on education and health so as to stimulate public investment.

Public Infrastructure

Publicly provided infrastructure (streets, bridges, public transport…) increases output. With public capital K^G, the production function becomes:

$$Y = AF(K, L, H, K^G)$$

Public infrastructure is cheap to use but costly to build. The government needs to balance tax so as to have enough public capital while not discouraging private investment.

Social Infrastructure

Social infrastructure, i.e. institutions or "soft factors", include: legal system, tax system, democracy, property rights, human rights, political stability, etc.

A good social infrastructure improves workers' productivity directly and indirectly. Besides, people are reassured and confident about their investments, so they invest more.

Externalities

Externalities affect the welfare of economic agents who are not participating in activities directly.

Negative externalities include: noise, pollution, etc, whereas positive externalities include: education, road safety, etc.

Kaldor's stylized facts

Nicolas Kaldor presented 6 "*stylised view of the facts*", namely:

1. **Labor productivity** (Y/L) has grown at a sustained rate.
2. **Capital per worker** (K/L) has also grown at a sustained rate.
3. The **ratio of capital to output** (K/Y) has been stable.
4. The **real interest rate**, i.e. return on capital (r), has also been stable.
5. **Capital** and **labor** have captured stable shares of national income.
6. Among the fast growing countries of the world, there is an appreciable variation in the rate of growth "of the order of 2-5 %"

The Solow model explains the first 5 stylized facts but does not explain the 6th one.

Growth Accounting

Because technological progress is difficult to measure, Robert Solow decided to utilize capital and employment growth to help quantify it. By deducting both the capital accumulation and employment growth from the total output growth, we are left with the Solow's residual. Solow's residual attempts to quantify how much of growth is accounted for by technological progress.

Using Solow decomposition, each factor and their growth rate measurements are:

Capital Accumulation	=> % change in physical capital stock
Employment growth	=> % change in total hours worked
Technological change	=> a **Solow's residual** = $\Delta Y/Y$ – output growth due to growth in capital and hours worked

Macroeconomics - IBEB - Lecture 4 - Week 2

Intertemporal budget constraints of households

When deciding how to spend and save, all agents face an intertemporal budget constraint. In the case of **intertemporal consumption,** individuals exchange resources over time. Assume that households are living in only two time periods: today and tomorrow; there is no initial inheritance or final debt.

Moreover, assume that these households do not make systematic errors and consume their full amounts of income. Households also receive an exogenous endowment.

Choice in period 1 (today): C1 + S1 = Y1 which can also be written as S1 = Y1 - C1 (S_1 can be positive (saving) or negative (borrowing), but not = 0)

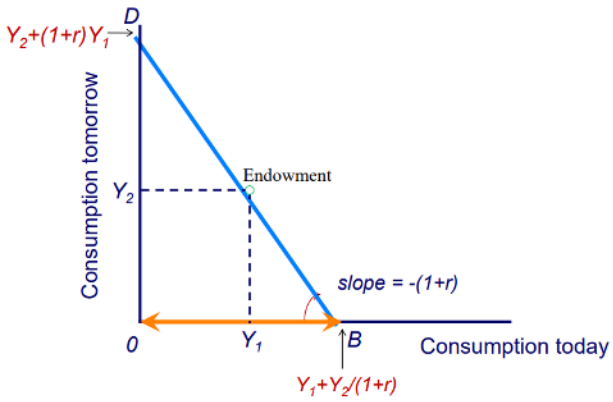
Choice in period 2 (tomorrow) – **the budget line**: C2 = Y2 + (1+r)(Y1 - C1)
where r is the **real interest rate** (the amount received (or repaid) in period 2 per unit saved (or borrowed) in period 1). The real interest rate is classified as given or exogenous and can measure the cost of waiting. It also represents the opportunity cost of investing. Thus, investments must yield at least 1 + r to be worth considering. For now, we assume households consume all remaining resources by the end of period 2 (i.e. no inheritance)

Budget constraint (from the Period 1 perspective):

$$C1 + \frac{C_2}{1+r} = Y1 + \frac{Y_2}{1+r} \equiv \Omega$$

where is the **total wealth from income**. This equation represents the sum of today's and tomorrow's consumption, valued in terms of goods today (discounting). The left-hand side of the equation is also called the present discounted value of consumption, and the right-hand side is the present discounted value of income.

Take note that if a consumer's future income increases, the endowment point will shift to be higher up in the Y-axis. If the interest rate for borrowing is greater than that of saving, a kink will form after the endowment point, causing a steeper part of the line.



Slide 5, Lecture 4 [Presentation Slides]

At the endowment point on the graph above, we choose to consume all of the income of a period in the same period; in other words, we consume without borrowing or lending. In other words, the combinations of consumption for today and tomorrow will always pass through the endowment point because the agent can always choose not to borrow or lend at all.

In case of:

a. Higher income: the endowment line shifts to the right
b. Interest rate for borrowing is different from the rate of savings, then there is a kink at the endowment point.

What determines the decision between consuming today or tomorrow?

- Preferences (the degree of impatience);
- price of saving and borrowing (interest rate);
- expectations about the future.

Rational Expectation Hypothesis

Given the available information, individuals do not make systematic errors about the future, meaning that we are, on average, correct. Even though this may sound over optimistic, it can still be applied to the real world, because we usually make changes

in response to reward from the right decisions or punishment from the wrong decisions; also, most large-scale decisions are made by specialists. The rational expectation hypothesis implies that, on average, optimistic and pessimistic individuals balance each other out. Thus, it is reasonable to assume that people are not systematically wrong.

Investment

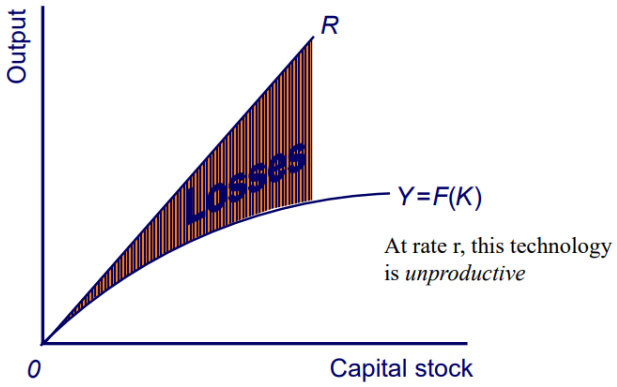
Investment (also called fixed capital formation) takes place in firms or self-employed individuals. Assume income is exogenous and savings left in banks yield return r (interest rate). How to earn a return higher than r? The answer to this question is through investments. The purpose of **investment** is to have more consumption tomorrow by forgoing (some) consumption today. The decision to invest depends on:

1. from the firm's **production function**;
2. the cost of the investment (the interest rate), i.e. the **opportunity cost**.
3. Expectations about the future

Key issue: Is the return on the investment higher or lower than r?

The production function

If the production function is below R, there are losses. However, the company can improve its situation through **technological innovation,** since this shifts the production function upwards.



Slide 19, Lecture 4 [Presentation Slides]

Present Value of the investment

A helpful way to know if an investment (K) is worth undertaking is by calculating for the net return (V) of the investment:

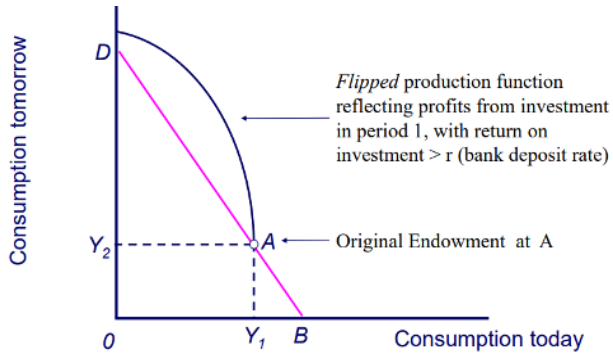
$$V = \frac{F(K)}{1+r} - K$$

If V > 0, K is profitable: future output F(K) gives higher return than banks K(1+r). Thus, the optimal condition for a profitable investment is F'(K) = (1+r).

The wealth effect states that firms are eventually owned by households. Thus, a profitable investment increases household wealth. The **total wealth** increases by V and the equation for it becomes:

$$\Omega = Y_1 + \frac{Y_2}{(1+r)} + V$$

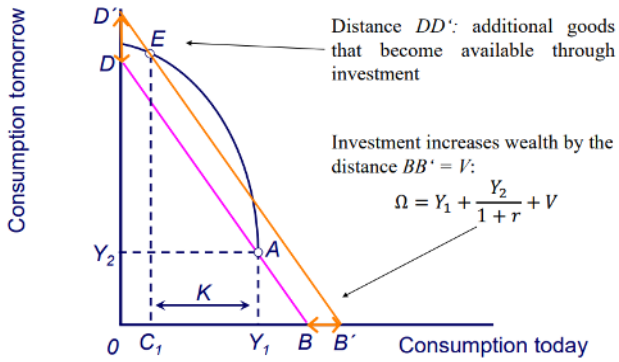
Investment and Wealth



Slide 24, Lecture 4 [Presentation Slides]

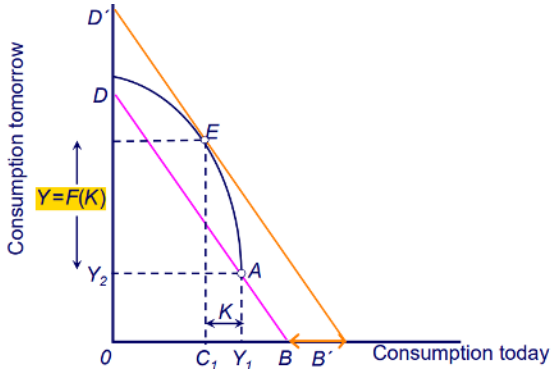
BD represents the budget line and point A is the original endowment point. The decreasing, concave curve that passes through A: "flipped" **production function**, which in this case shows the **return of investment.**

Wealth increase due to investment can be showcased by the following graph:



Slide 25, Lecture 4 [Presentation Slides]

Optimal investment can be represented as:



Slide 26, Lecture 4 [Presentation Slides]

Government's Intertemporal Budget constraint

The government decides the amount of tax revenues it wishes to spend.

- When T - G > 0; there is a primary budget surplus i.e. the government lends.
- When T - G < 0; there is a primary budget deficit i.e. the government borrows.

The IBC in 2 periods is as:

$$G_1 + \frac{G_2}{1+r_g} = T_1 + \frac{T_2}{1+r_g}$$

r_g refers to the interest rates faced by the government which is usually lower than the private sector.

Consolidated Budget Constraints

The consolidated budget constraint is derived from the budget constraints of the individuals and the government. It represents the interdependence of the private and the public budget constraints.

Individuals:

$$C_1 + \frac{C_2}{1+r} = Y_1 - T_1 + \frac{Y_2 - T_2}{1+r}$$

Government:

$$G_1 + \frac{G_2}{1+r_g} = T_1 + \frac{T_2}{1+r_g}$$

Combining the two constraints we get:

$$C_1 + \frac{C_2}{1+r} = (Y_1 - G_1) + \frac{Y_2 - G_2}{1+r} + \frac{r - r_g}{1+r}(G_1 - T_1)$$

Assuming $r_g = r$, the constraint simplifies to:

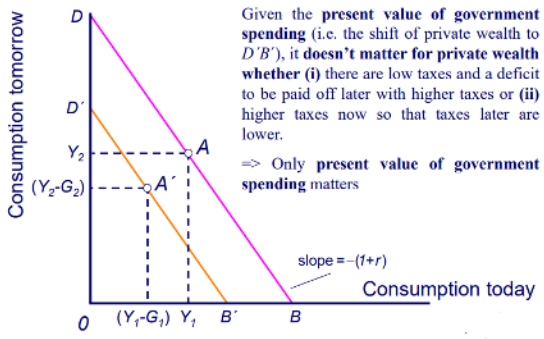
$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r} - (G_1 + \frac{G_2}{1+r})$$

The Ricardian Equivalence

The **Ricardian Equivalence** proposition is the hypothesis that the private sector fully internalizes the public sector's budget constraint. This means that when $r = r_G$, the **taxation pattern** does not affect consumption possibilities of households. What matters is the **total present value of public spending**. The Ricardian Equivalence assumes that households are forward looking. The equivalence also proposes that over time, the pattern of taxation has no effect on wealth.

With lower tax today, a deficit occurs and there will be higher tax tomorrow to pay back the debt and accumulated interest; and vice versa. In both cases, since we can freely save or borrow, we can consume any point of preference on the budget line.

Take note that at the end of the second period, there is presumed to be no debt left. This is because the purpose of taxes is to repaid said debts. Moreover, if the government increases taxes today, households will increase savings. This assumes that the government does not reduce its spending, and instead has a "predefined spending plan" that is exogenous of the model.



Slide 37, Lecture 4 [Presentation Slides]

When does RE NOT hold?

- when interest rates are different for households and the government ($r \neq r_g$);
- when individuals do not live long enough to incorporate the government budget constraint;
- when **distortionary taxation** exists, i.e. individuals change their behavior in response to a change in taxes;
- when there are **credit constraints.**

Budget Constraint for a Nation

To meet the budget constraint of the nation, the present value of its current and future primary current accounts must be greater than or equal to its current net external debt. The borrowing position of the country compared to the rest of the world is as follows:

$$C_1 + \frac{C_2}{(1+r)} = (Y_1 - G_1) + \frac{Y_2 - G_2}{(1+r)}$$

Which can be rewritten as:

$$(C1 + G1) + \frac{C_2 + G_2}{1+r} = Y1 + \frac{Y_2}{1+r}$$

	Borrowing from the rest of the world	Lending to the rest of the world
(C1 + G1) > Y1	CA deficit (period 1)	CA surplus (period 2)
(C1 + G1) < Y1	CA surplus (period 2)	CA deficit (period 2)

Debt Default

In general, countries respect their intertemporal budget constraint. However, when they cannot service their debts, foreign lending immediately stops, rescheduling or partial debt forgiveness may be negotiated, and the countries have to manage a current account surplus in the future.

Macroeconomics - IBEB - Lecture 5 - Week 2

This lecture covers two parts of aggregate demand: consumption and investment. Investment is known to be much more volatile than consumption. This is due to the fact that investment is dependent on wealth, which is in itself volatile, and because consumption is stabilized by a process called consumption-smoothing.

Consumption

Compared to investment, consumption is much less volatile. The **intertemporal consumption choice** helps explain the stability of consumption. Here, the choice an individual makes results from preferences combined with lifetime wealth. There is also a key assumption: that there exists diminishing returns. Because of this, the slope of indifference curves are convex. Higher indifference curves portray higher levels of utility. Their slope reflects the Marginal Rate of Substitution. Finally, preferences are such that consumption in both periods are positive (interior solution). There exists an interior solution because, when aggregated, the observed consumption of households is always positive in both C1 and C2.

The Borrower

The Borrower (also dubbed as “the student”) is a consumer who has a low income today but a higher income tomorrow (Y2>Y1). As indicated by his name, the borrower has a debt-financed consumption in the first period. By the time the second period

arises, the borrower must repay his debts, thus causing his consumption in period 2 to be less than his income in that period:

$$Y2 > C2, C1>Y1$$

The Lender

The Lender (also called “The athlete”) is the opposite of a borrower. The Lender is a consumer who’s income in the first period is higher than the second period (Y1>Y2). Because he has enough money to finance expenditures in the first period, the Lender tends to save his money, thus: C1 < Y1. In the second period, the lender will consume all that he has saved, thereby having a consumption (in the second period) to be greater than his income in the second period (C2 > Y2).

Optimal Consumption Point

Both the Lender and the Borrower will arrive at the same optimal consumption point. Given this, it can be concluded that it does not matter when income is realized, so long as the Present Discounted Value (PDV) of both agents’ income is constant, and the intertemporal budget line does not shift.

For both the borrower and the lender, an increase in the real interest rate will cause the intertemporal budget constraint to rotate clockwise around the endowment point.

However, the increase in the interest rate will subsequently cause a negative (-) substitution and income effect on the borrower's optimal consumption point. For the lender, it will cause a negative substitution effect and a positive income effect on the optimal consumption point. This means that increasing the interest rate has an ambiguous total effect on the lender and a negative total effect on the buyer.

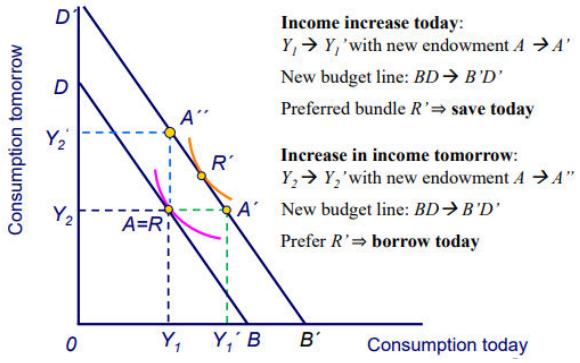
Removal of the real interest rate

If “r” is disregarded, the income of the Lender becomes less than that of the Borrower. This is because the Present Discounted Value of their income is disregarded and adding up the amounts without discounting will reveal that receiving more income in the first period will result in the lower (total) income amount. Therefore, (ignoring the real interest rate) Y1 and total income have an indirect relationship.

Changes in Income

TEMPORARY CHANGE

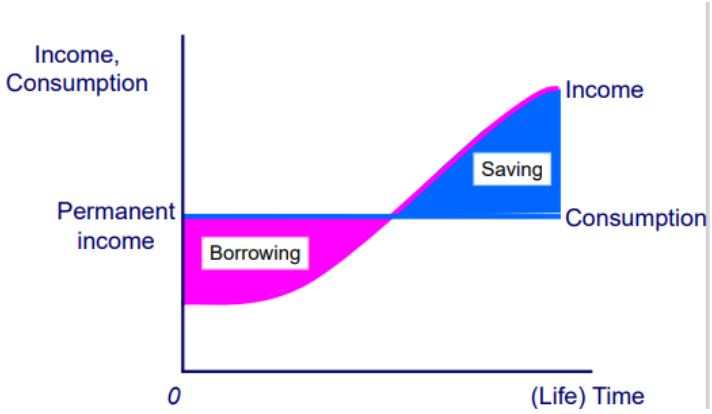
If Y_1 increases while Y_2 remains stable, consumers will move to a new budget line and save some part of the increase for the future. If Y_2 is sure to increase while Y_1 remains stable, consumers will borrow to increase today's consumption. This pattern is called **consumption smoothing** – save in good times, borrow in bad times.



Slide 16, Lecture 5 [Presentation Slides]

Life cycle consumption hypothesis

Incomes fluctuate over a lifetime. However, saving and borrowing allow us to smooth out consumption.



Slide 21, Lecture 5 [Presentation Slides]

Complete consumption smoothing implies that individuals spend a fixed amount every period, which is their permanent income (Y^P). Note that a permanent income (if

constant) will deliver the same present value of income as the actual expected income path. Such income is as follows:

$$Y_P + \frac{Y^P}{1+r} = Y_1 + \frac{Y_2}{1+r} = \Omega$$

Therefore, the permanent income is necessary for ***complete*** consumption smoothing because (complete) consumption smoothing requires a fixed amount of consumption per period.

Determinants of Consumption

Life cycle model and permanent income hypothesis show a strong correlation between consumption and wealth. However, John Maynard Keynes showed that consumption is also linked to **current disposable income** (Y^d)**:**

$$\mathbf{Y^d = Y - T}$$

Meaning that people save a fraction of their income, and spend the rest.

Why is there a stronger correlation of consumption with income than with wealth?

1. household wealth is difficult to measure;
2. wealth is more volatile than income;
3. credit constraints.
    a. Credit constrained households have a kink in their graph after the endowment point
    b. When tax is lessened, credit constrained households also have an increase in consumption because their disposable income increases.

Consumption Function

Since consumption depends on wealth, but also on disposable income, it can be concluded that consumption is a function of both:

$$C = C(\Omega, Y^d)$$

Consumption is driven by wealth: wealth and consumption grow together. However, current disposable income explains consumption better than wealth. Another important factor is **real interest rates.**

increase in r => decrease in Ω => decrease in c.

Investment

Investment is also **gross domestic capital formation**. It enables the production of goods and services today which can be consumed tomorrow. Investing is an intertemporal decision (again, a trade-off between consumption today or tomorrow).

Optimal Capital Stock

In order to find the optimal amount of K, we first derive the profit function:

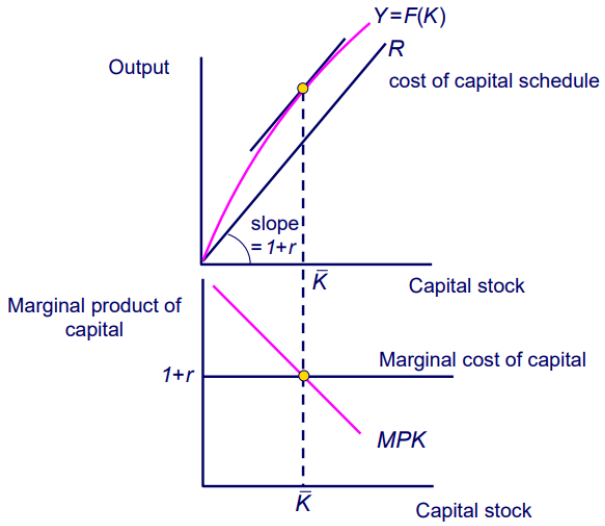
$$\pi = F(K) - K(1+r)$$

where K(1+r) is the cost of borrowing capital, or the cost of capital including the opportunity cost of 1+r. Maximizing the profit function leads to:

$$F'(K) = MPK = 1 + r$$

or marginal product of K = marginal cost of K

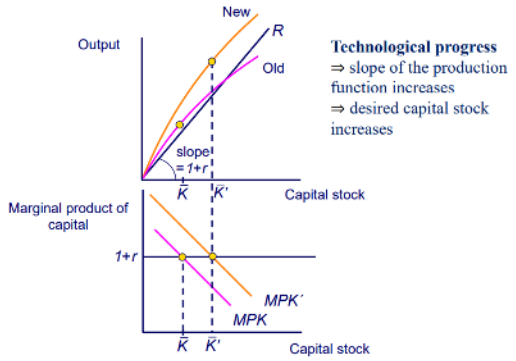
Thus, (1+r) is a marginal cost if the agent is borrowing, and an opportunity cost if the agent is investing.
If MPK > 1+r, firms should invest more K.
If MPK < 1+r, they should stop investing.



Slide 37, Lecture 5 [Presentation Slides]

Technological progress lifts the production function, which increases MPK, thus increasing the optimal capital stock. An increase in real interest rate, however, has an opposite effect, as it makes it costlier to invest.

Therefore, the interest rate has a negative effect on the optimal capital stock (indirect relationship), and technological progress has a positive effect (direct relationship) with the optimal amount of capital stock.



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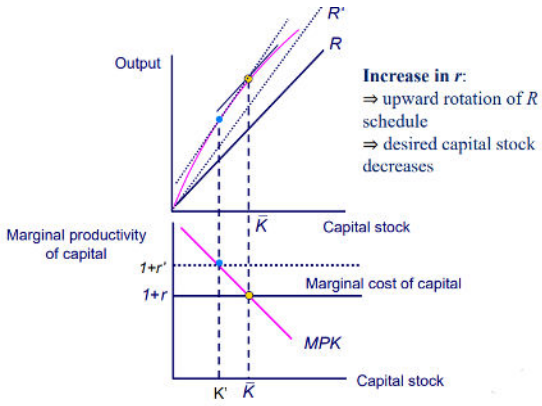


Slide 41, Lecture 5 [Presentation Slides]

Tobin's q

This model equates marginal product and cost of capital, and approximates the discounted value of a firm with its stock value on the market.

Tobin's q was brought about by two main observations. The first being that a firm stock price is simply the market's best estimate of the present discounted value of its

future profits. The second observation was that the value of a firm differs from the cost it would take to replace its physical capital

Tobin's q solves the issue that the market value of a firm may differ from the cost of replacement of its physical capital (cost of K), because of intangible assets and time required to build a new firm from scratch.

$$q = \frac{Market\ value\ of\ a\ firm}{Replacement\ cost\ of\ installed\ capital}$$

If q > 1, the future value of installed K is more valuable than purchasing new equipment. If q is greater than 1, then there is an incentive to invest in the firm.

If q < 1, selling off equipment (**divest**) is more desirable.
Factors affecting q:

1. Real interest rate
2. technological progress
3. Asset demand

Macroeconomics - IBEB - Lecture 6 - Week 3

Money

Money is a medium of exchange allowing the society to trade goods and services.
There are 3 main functions of money:

1. A medium of exchange
2. A store of value
3. A medium of account

An economy without money is classified as a *barter economy*.

We can distinguish between 2 types of money:
(1) commodity money: has intrinsic value (e.g. gold)
(2) fiat money: has no intrinsic value (e.g. paper notes as used today)

Money Supply

The monetary authority of the country– i.e. central bank – has ultimate control over the quantity of money that is issued into circulation.

Money demand

Money demand is how much money the economy needs, which can be represented through the **Cambridge equation:**

M = kPY

M: the demand for Money;
k: the proportion of income households save as money for transactions;
P: price level;
Y: real GDP => PY: nominal GDP = total income of an economy.

According to this equation, how much money we want to keep depends on the prices. The left-hand side is the supply and the right-hand side is the demand for money.
If the money supply M increases, PY has to increase with the same proportion to make demand=supply. For PY to increase, either P increases (inflation occurs) or Y increases (increase in real GDP). We thus have:

$$money\ growth = inflation + real\ GDP\ growth, \text{ or}$$
$$\frac{\Delta M}{M} = \frac{\Delta P}{P} + \frac{\Delta Y}{Y} \rightarrow \pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}$$

From this equation, P increases => more M is needed to purchase the same goods; Y increases => more M is needed to satisfy higher demand.

Inflation

Inflation is determined by the difference between money and GDP growth:

$$\pi = \frac{\Delta M}{M} - \frac{\Delta Y}{Y}$$

Based on the above equation, we can derive:

- *If GDP grows* ($\Delta Y/Y > 0$), money growth is larger than inflation;
- *If GDP shrinks* ($\Delta Y/Y < 0$), inflation is larger than money growth.

- **<u>THE NEUTRALITY PRINCIPLE</u>**

As this principle states that real GDP is unaffected by changes in the money supply, an increase in money supply is compensated by inflation.

- **THE DICHOTOMY PRINCIPLE**

An increase in money supply does not raise real GDP, but an increase in real GDP raises money demand. The Dichotomy principle states that the real and nominal values are independent of each other in the long run, thus they may be analyzed separately. Thus, long run growth is independent of money evolution.

Nominal Exchange Rate

Different countries use different **currencies.** For transactions between them, we need to convert currencies.

1. In **British terms** (used in this course): foreign per domestic unit.
2. In **European terms**: domestic per foreign unit.

Appreciation

An appreciation of currency X is an increase in the exchange rate S of that currency; i.e. I get more foreign currency units for one domestic unit.

Depreciation

A depreciation of currency X is a decrease in the exchange rate S of that currency; i.e. I get less foreign currency units for one domestic unit.

Purchasing power

The higher the price level, the less the purchasing power of a currency.
Though nominal exchange rates are able to help compare relative prices of different economies, they are unable to inform us about how much of an item we can purchase with each currency.

Real Exchange Rate

Assume: P = domestic price level; P* = foreign price level
Real exchange rate is the relative price of goods of two countries:

$$\sigma = S\frac{P}{P*}$$

It can appreciate either if the nominal exchange rate S increases or inflation is higher at home (P > P*). If S appreciates, domestic goods become relatively more

expensive – imports increase, exports decrease, so CA decreases. The other way applies if S depreciates.

We can also re-write the formula for the real exchange rate in terms of growth rates:

$$\frac{\Delta\sigma}{\sigma} = \frac{\Delta S}{S} + \frac{\Delta P}{P} - \frac{\Delta P*}{P*} \quad \rightarrow \quad \frac{\Delta\sigma}{\sigma} = \frac{\Delta S}{S} + \pi - \pi*$$

Purchasing Power Parity

The principle of PPP is that the real exchange rate is constant in the long run.

Absolute PPP (Law of One Price)

The Law of One Price states that the same good will eventually have the same price everywhere after converting currencies, meaning

$$\sigma = S\frac{P}{P^*} = 1.$$

This is because the cheaper price of a good in country A will raise demand there and decrease demand in country B. As a result, prices in country A go up while that in country B goes down. The cycle, called arbitrage, continues until SP = P*.

In practice, absolute PPP does not hold (possibly because of factors such as different taxes, labor prices, and demand in different countries).

Relative PPP

Countries with high inflation also possess currencies that depreciate at the same rate. If foreign inflation is a given, then the lower the domestic rate of inflation, the higher the rate of appreciation. In the long run, countries with higher inflation rate see their currencies depreciate, so when P increases, S decreases in order to have SP = P*. Therefore,σ is constant.

$$\frac{\Delta\sigma}{\sigma} = \frac{\Delta S}{S} + \pi - \pi*$$

This is because if the money supply increases making demand and prices higher, domestic goods first lose competitiveness compared to foreign goods but then the nominal exchange rate will lower to compensate. In accordance with the neutrality principle, the nominal exchange rate and price variables are not expected to affect the real variables in the long run.

In practice, relative PPP does seem to hold.

Macroeconomics - IBEB - Lecture 7 - Week 3

Money: Definition and aggregates

Money is considered the heart of any economy, because it facilitates commercial transactions that are both big and small. Besides the previously mentioned three functions *(unit of account, store of value, medium of exchange)*, money can also be defined as a stock **of assets** that is **readily available**. Yet, not all money in circulation is. Most of what macroeconomics consider to be money are those that reside in bookkeeping entries or bank ledgers, that is, bank accounts.

Aggregates

Money aggregates, in order of decreasing **liquidity**, are as follows:

- **M0 (***monetary base***)**: *currency in circulation + commercial banks reserves*
  M0 = C + R

Note that though they do not circulate outside commercial banks, bank reserves may be used immediately.

- ***M1:*** *the currency in circulation + demand deposits at commercial banks*

This is the only category that can be used for daily transactions. Examples of the M1 aggregate include coins, banknotes, and bank deposits.

$$M1 = C + D$$

The "D" section of the M1 aggregate has three main characteristics. First is that they may immediately be converted into cash should they be demanded by the depositor. Second is that checks can be written and bank transfers can be made against these deposits, and they must be accepted by other banks. The third characteristic is that any interest paid on the after mentioned deposits must be very low. Thus, though they are easily liquid, they are not the best option for growing wealth, especially due to the third characteristic.

- ***M2:*** *M1 + time deposits at banks with unrestricted access*

These are deposited for <2 years; can be converted into cash within 3 months).

M3: *M2 + larger, fixed-term deposits + accounts at non-bank institutions*

Money creation

Central Banks
Central bank is the public agency with legal mandate to:

- create and control currency in circulation (C) through commercial banks;
- control credit conditions;
- hold commercial bank reserves (R), which are their deposits (this is the key instrument to control money creation of commercial banks).

Commercial Banks
Commercial banks are the financial intermediary between borrowers and lenders. Commercial banks make deposits (D) and lend parts of them as loans (L) , thus creating money through this process. The *benefit* of doing so is that profits will be bigger when loans are paid back with interest. The *cost*, however, is bank failure in case too many loans are not paid back in full. Maturity transformation is the practice of taking short term liabilities and using them to gain long term assets. This is basically what commercial banks do to earn money.

Money Multiplier

Money multiplier is the process in which an initial deposit creates loan succession. This process is not infinite.

Reserve Multiplier

The fraction of deposits that are held as reserves are called the **reserve ratio** (rr).

$$R = rr * D \Leftrightarrow D = (\frac{1}{rr}) * R$$

Here, is the original amount in reserves and is called **reserve multiplier**. When decreases, increases and vice versa. By fixing , central banks take control over total bank deposits, i.e. over money creation by commercial banks.

Money supply M1 is proportional to M0 and by controlling M0, central banks have a good control over M. The lower , the higher M1. Thus, it is a very strong policy tool. If people substitute deposits with currency, i.e. make daily transactions more than making deposits, M1 drops. Banks do not prefer this.

Money control

The central bank has three ways of controlling M1:

1. **Reserve requirements:** By increasing , commercial banks have to keep a bigger part of the deposits as reserves, so they can lend less money, and thus create less money, so M1 decreases and vice versa.
2. **Open-market operations:** The central bank can purchase and sell bonds to/from the public, which increase and decrease M1 respectively.
    a. **CB buys bonds** => pays with Euro => increase in Reserves => increase in M1
    b. **CB sells bonds** => gets paid with Euro => decrease in Reserves => decrease in M1
3. **Interbank rate:** by decreasing (rate that CB charges when lending to commercial banks), reserves become cheaper. The demand for loans thus goes down and M1 increases.

However, the central bank never has total control over M1.

Money market

Money demand is W. Now, k is not a constant anymore, but it depends on the nominal interest rate (*i*):

- If I borrow money, *i* is the **reimbursement cost;**
- If I hold money, *i* is the **opportunity cost.**

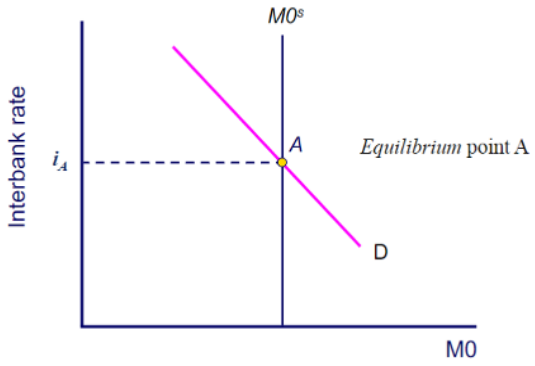
Therefore, k is negatively related to the interest rate and the new money demand equation is:

$$W = k(i)PY$$

*In the long run, K is constant.

Short-run equilibrium

There is an equilibrium when the demand for money equals the supply of money.
$M0^d = M0^s$
To set the **interbank rate** where it wants, the central bank supplies the quantity of M0* demanded at that rate.



Slide 25, Lecture 7 [Presentation Slides]

The central bank has two ways of determining the money market equilibrium:

1. **Interest rate targeting**: Fix the interest rate and supply money $M0^S$ as demanded.
2. **Money supply targeting:** Fix the amount of money supply $M0^S$, then let exogenous changes in money demand determine the interest rate.

Monetary Policy

Monetary Policies at the Zero Lower Bound

1. Quantitative Easing (QE) – When the Central Bank (CB) purchases securities with longer maturity dates, with the goal of lowering long-term interest rates
2. Forward Guidance – When the CB makes known its plans for future policies, again with the goal of lowering long-term interest rates
3. Monetary Financing (see chap.17) – the CB credits the government's account at the Central Bank, in order to expand the government's fiscal budget constraint.
4. Helicopter Money – When the CB gives new money to citizens, with the goal of stabilizing incomes and demand.

The **central bank** has two <u>main objectives</u>:

1. Price stability;
2. Growth and employment.

These objectives conflict, as a higher M also leads to higher inflation in the LR. To resolve this, central banks are independent from the government in most countries.

*Note that the central bank does not want inflation because it causes instability.

Instruments and Targets

Two main instruments of the central bank are the **interest rate** and **supply of reserves**, while the main targets are:

1. **MONEY TARGETING** *(through size of reserves)*
   Achieving price stability requires a stable **demand equation**; if demand abruptly rises and the central bank wants to keep supply constant, *i* will increase.
2. **INFLATION TARGETING** *(through changes in interest rates)*
   If expected inflation is high, central banks increase interest rate; if inflation is low, they decrease interest rate. It is easier to target interest rates than reserves.

Taylor Rule

Tells us how to achieve stable prices, avoiding fluctuations in output/unemployment:

$$i = \bar{\imath} + a(\pi - \bar{\pi}) + b\frac{Y - \bar{Y}}{\bar{Y}}$$

where $\bar{i}$ is the natural nominal interest rate and coefficients a and b give the relative importance of price stability and output stability respectively.

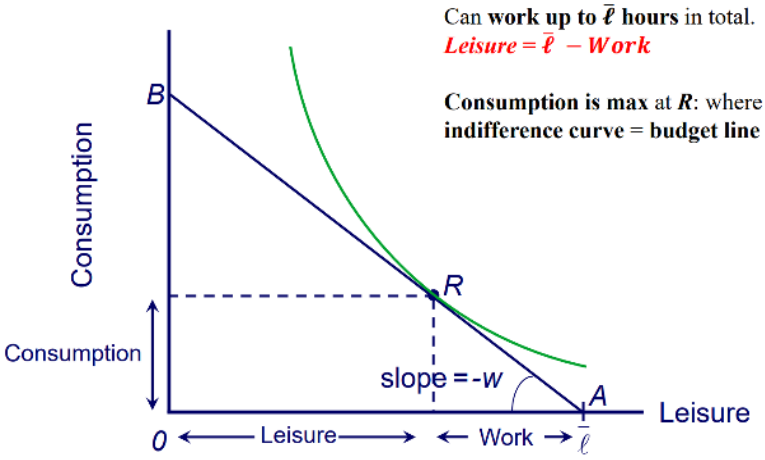
Macroeconomics - IBEB - Lecture 8 - Week 3

Labour markets and unemployment

Individual consumption-leisure trade-off

The slope of his constraint is -w. The slope measures how much an individual trades off his consumption for leisure. When real wage w increases, the budget line will turn steeper, and there can be two effects on individual work hours:

1. **substitution effect:** people work more; the pay of another hour of work allows them to consume more.
2. **income effect:** people work less because even so, they still earn the same amount of money as before.



Slide 9, Lecture 8 [Presentation Slides]

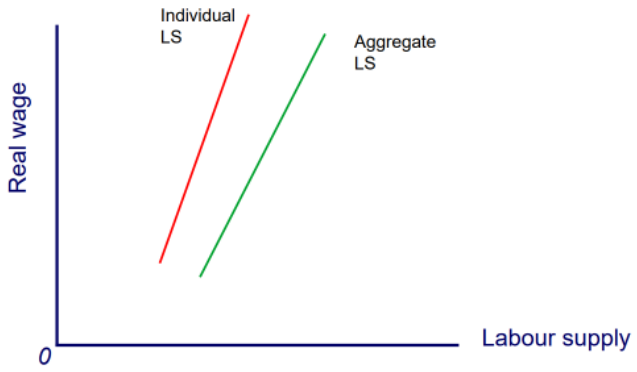
When the substitution effect dominates, there will be an increase in labor supply. When the income effect dominates, there will be a decrease.

For individual labor supply curves, the income effect is most likely to dominate the substitution effect. This is because it is assumed that the higher the real wage is, the less the individual would choose to work. On the other hand, aggregate labor supply curves are characterized by a higher substitution effect because a higher real wage would cause a higher supply.

Aggregate Labor Supply

This is the total number of hours worked by all workers in the economy, measured in person-hours.

The individual supply curve is steeper than the aggregate curve as the aggregate is dominated by the substitution effect.



Slide 13, Lecture 8 [Presentation Slides]

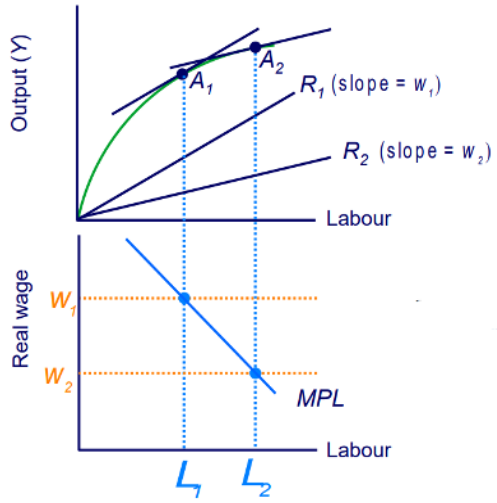
Labor Demand

How to find the amount of labor demanded by firms?
Firms maximize their profit function:

$$pF(L,K) - wL$$

where is the price of goods produced and WL is the cost of labor (W is the nominal wage). In order to maximize profit, firms hire labor such that:

$$FOC\ w.r.t\ L = 0 \iff pF'(L) = W \iff F'(L) = W/p \iff MPL = w$$



Slide 19, Lecture 8 [Presentation Slides]

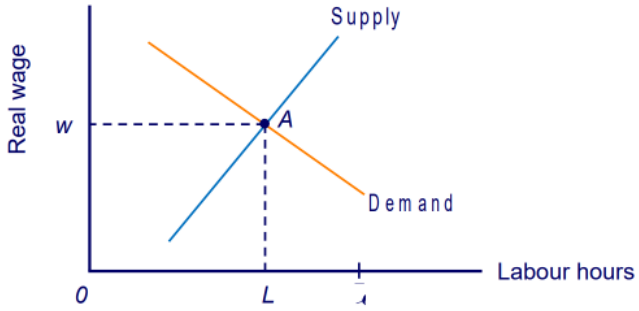
The labor demand curve is the MPL curve.

Increases in the labor demand can occur because of education, technological progress, etc. As productivity is raised, the MPL curve shifts upward. When there is an

increase in labor productivity due to things like capital accumulation or technological progress, employment increases and the labor demand curve shifts outwards. The supply curve will remain unaffected, and there will be an unambiguous increase in w.

Equilibrium

The market clears at the equilibrium wage w when labor supply equals labor demand.



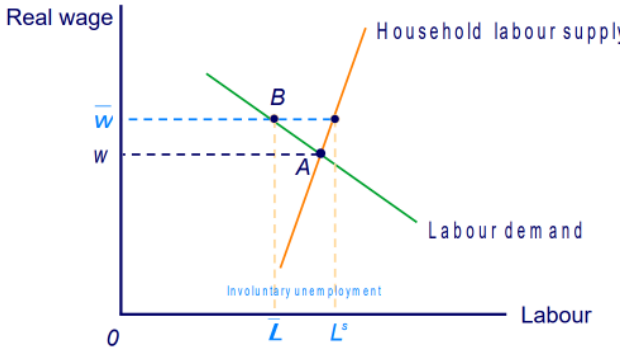
Slide 19, Lecture 8 [Presentation Slides]

Unemployment

Individuals can be out of work voluntarily or involuntarily. Voluntary unemployment means they are not seeking jobs, whereas involuntary means they are seeking but cannot find a job. Involuntary unemployment also occurs when the supply of labor is much greater than the demand. The labor force includes the employed and unemployed:
LS = L + U

The unemployment rate (u) is therefore the fraction of the labor force that is out of work: U/ LS

U is a disequilibrium phenomenon which occurs when $\bar{w}$ demanded by certain households is higher than the equilibrium w.



Slide 26, Lecture 8 [Presentation Slides]

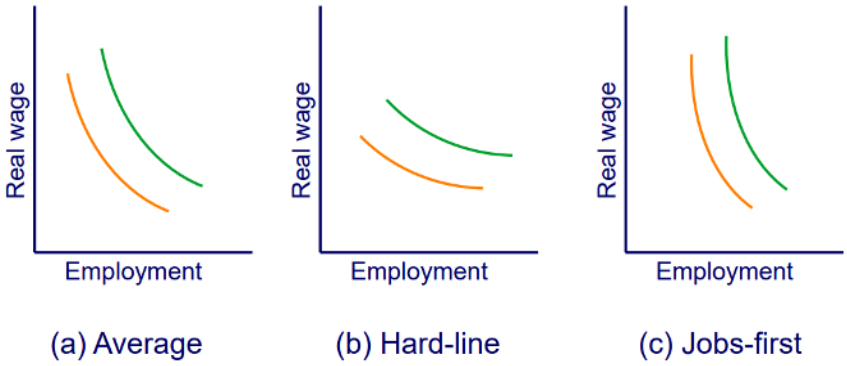
Wage rigidity

Wage rigidity causes a failure to adjust to changes in the equilibrium. There are three main causes of wage rigidities, namely:
(1) collective bargaining of labor unions;
(2) wage regulation, such as the minimum wage;
(3) firms choosing to pay "efficiency wages".

Collective bargaining

Wage is negotiated by labor unions (LS) and employers' associations (LD).

Objectives of unions: higher wages and/or more jobs. They are willing to trade wages for more jobs or vice versa at a rate given by the marginal rate of substitution.



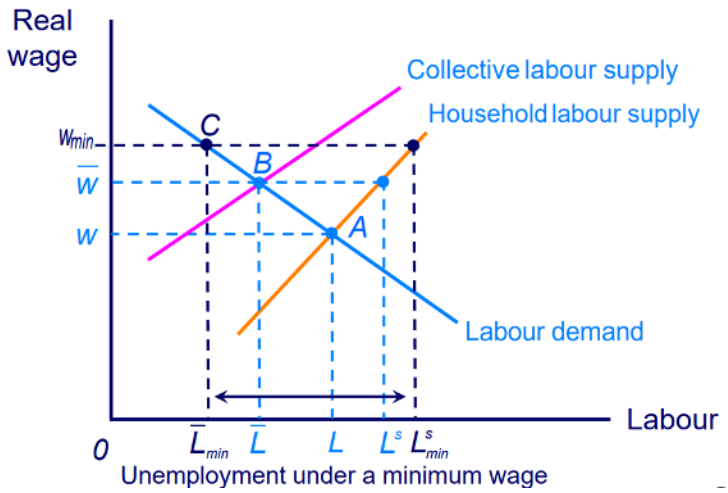
Slide 29, Lecture 8 [Presentation Slides]

The reason why unions negotiate for higher wages is that most of the time, the employed people (**insiders**) dominate unions compared to the unemployed (**outsiders**), and what the insiders usually care the most about is higher wages for themselves.

Wage regulation

The government imposes a minimum **wage** that is usually higher than the equilibrium. This is one of the main causes of unemployment. It does this for three reasons, namely:

1. To protect the youth from exploitation
2. To avoid companies from paying too low, and
3. To discourage firms from hiring people with low MPL.



Slide 36, Lecture 8 [Presentation Slides]

Efficiency wages

Firms are willing to pay for their workers higher than the equilibrium to increase productivity and thus cut certain costs. This is because with higher wage:

- workers' nutrition and health are improved;
- they have less incentive to change jobs, thus labor turnover is lower;
- they are encouraged to put more effort in work which reduces moral hazard;
- they are able to self-select into the most suitable jobs.

For firms who pay efficiency wages, w >MPL.

Unemployment rate

$$\Delta U = sL - fU$$

L: number of workers with a job
U: number of unemployed
s: separation rate, i.e. the rate of workers losing jobs over a period (layoffs)
f: job finding rate, i.e. the rate of unemployed finding jobs over a period

We define the unemployment rate as:

$$u = U/L^S$$

The **equilibrium (natural) unemployment rate** is the rate towards which the economy gravitates in the long run.

$$u_n = \frac{s}{s+f}$$

u^n = structural unemployment + frictional unemployment

- **structural unemployment**

Involuntary unemployment as a result of wage rigidities. It is a result of fundamental mismatch between vacancies and the number of people willing to work, reflecting that $L^S > L^D$.

- **frictional unemployment**

This is the natural consequence of job creation and job destruction, which always exists even at equilibrium because it takes time for people to find new jobs.

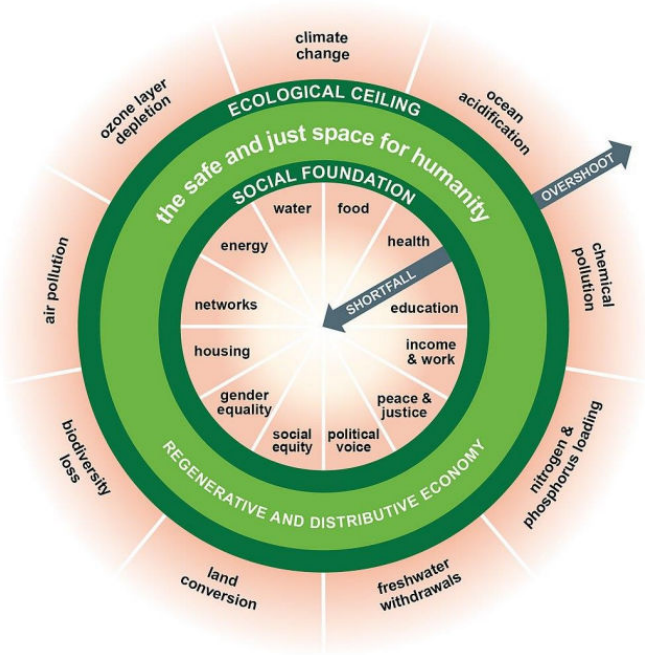
The more efficient the matching process is, the lower the frictional unemployment. On the other hand, the higher the separation rate (s) and the finding rate (f) are, the higher the frictional unemployment. Therefore, frictional unemployment depends on the efficiency of the labor market and the eagerness of people to find job matches.

Macroeconomics - IBEB - Guest Lecture - Week 4

The doughnut thinking

According to the doughnut thinking approach, you focus on the things that actually matter and not on the GDP.

The doughnut consists of two rings: a social ring that ensures people possess all of life's essentials and an ecological ring that ensures sustainability.



Slide 36, Guest Lecture [Presentation Slides]

The economy

The economy is the sum of all goods and services exchanged for a price. The exchange of goods in return for a given price started with specialization and accumulation, in other words, the birth of agriculture.

Reasons for a growth spurt in the 1800s:

- **Smithian model**: based on ever greater specialization and trade. Innovation, but slow.
- **Schumpeterian model**: based on rapid innovation feeding growth, which feeds further innovation.

Innovation has its genesis in our desire for more. It can be defined as the result of humans using tools and knowledge in order to address a present need.

GDP

The questions that circled around gdp are as follows:

- Do you count the public sector into the size of the economy?
- Do you count all public sector spending items?
- Public services are not traded on the open market, where should they enter?

The problems of gdp include:

- Digital economy
- Inequality
- Environment

The gdp does not truly reflect the nature of wellbeing but correlates highly with the factors that measure well being: life expectancy, health care etc.
GDP is also used as an input tool for policy making as it is easier to "maximize the pie" than spend on a particular headline expenditure where people have contradicting views.

Democracy and Capitalism

Capitalism refers to the phenomena that fosters efficient growth in innovation and growth whereas democracy is the phenomena that fosters the efficient growth of the "things we care about."

Green Growth

Green growth refers to the path of economic growth that is environmentally sustainable.

The critiques of green growth include: needs and wants, technology and inequality.

The only question that remains is if we can sit and let technology handle the situation?
No, as time is of crucial importance. The longer it takes, the more we are exposed to heightened risks of weather events sowing chaos within our societies.

Macroeconomics - IBEB - Lecture 9- Week 5

So far, we have focused on long-run models. However, these cannot explain the **cyclical deviations** of **business cycles** around the **trend**. In order to study macroeconomic equilibrium in the short run, we use the **IS-TR model**.
It is important to note that there are two types of variables, namely:
1. Endogenous variables – Variables that are determined inside the model based on model structure. (output)
2. Exogenous variables – Variables that are assumed to be given and predetermined. An example of such a variable is price level. (input)

The IS curve gives us the equilibrium in the goods market whereas the TR curve gives us the equilibrium in the money market. Both of these markets influence each other.

Aggregate Demand

$$GDP: \quad Y = C + I + G + NX$$

Where the left-hand side of the equation (Y) is the **aggregate supply,** and the right-hand side represents **aggregate demand.** In the short-run, prices are **sticky,** so supply adapts to demand.
Note: **net exports** (NX) are only added in the case of an open economy.

Determinants of Aggregate Demand

a. Investment

Investment depends *positively* on the Tobin's q and *negatively* on the real interest rate *i* (because we assume prices to be sticky, so the function becomes ($I = I(q,i)$)
Though the real interest rate is usually denoted as *r*, it can be labeled as *i* because,

price is sticky in the short run, therefore the nominal and real interest rate are the same.

b. Government spending

In this model, government spending (and tax receipts) is *exogenous* which means public spending is independent of economic conditions.

c. Net exports

The demand for exports depends positively on foreign income and negatively on the real exchange rate. The demand for imports depends positively on the income at home as well as the real exchange rate.

NX function is: $NX = \underset{+}{X}(\underset{+}{Y^*},\underset{-}{\sigma}) - \underset{+}{Z}(\underset{+}{Y},\underset{+}{\sigma}) = \underset{-}{NX}(\underset{-}{Y},\underset{+}{Y^*},\underset{-}{\sigma})$

d. Consumption

Consumption depends positively on wealth and negatively on disposable income. the consumption function becomes: C = C(Ω, Y-T).

If we assume it only depends on disposable income:

$$C = c_0 + c_1 (Y-T)$$

Where c_0 represents the y intercept (autonomous consumption) and c_1 represents the marginal propensity to consume. The higher the c_1, the higher the proportion of disposable income is spent on consumption.

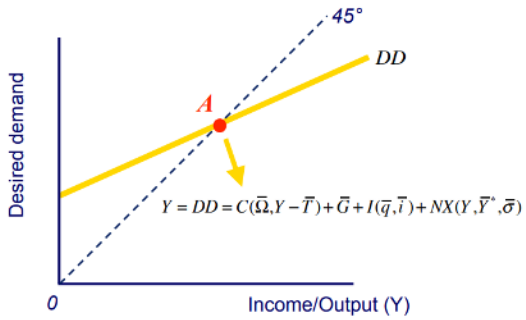
Desired demand (DD) or planned expenditure: the amount economic agents would like to spend given their incomes; this depends on endogenous variables in the model itself. The function is derived by adding the previous demand functions:

$$DD = \underset{+}{C}(\bar{\Omega}, Y - \bar{T}) + \bar{G} + \underset{-}{I}(\bar{q}, \bar{i}) + \underset{-}{NX}(Y, \bar{Y}^*, \bar{\sigma})$$

Take note that an increase in income will indeed increase demand, but not by the same level. This is because a portion of the income will go to savings. Moreover, the increase in consumption offsets the increase in imports, therefore the desired demand still rises with an increase in income. In equilibrium, actual income = planned expenditure.

The Keynesian cross

In the **Keynesian cross** diagram, the **45° line** represents aggregate demand as a function of income (output). At point A where this line meets the DD curve, the market is in equilibrium.



Slide 19, Lecture 9 [Presentation Slides]

If there is an excess supply, **Y'>Y**. In this event, businesses will decrease production until point A is reached. On the other hand, if there is excess demand Y'<Y, firms will increase production until point A is reached.

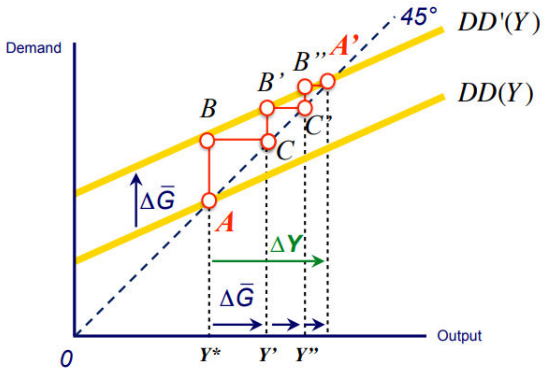
The Keynesian demand multiplier

What happens in the case of an **exogenous increase** in public expenditure?

a. Desired demand increases
b. Y also increases.

The change in Y will be greater than the change in G. Specifically, the increase of Y will be a multiple of the initial exogenous increase in DD. This is called the **multiplier effect**.

The keynesian multiplier is thus given by: $\partial Y / \partial G$



Slide 19, Lecture 9 [Presentation Slides]

How does the multiplier effect work?
We start at point A, with output Y. Due to the exogenous increase in public expenditure, the DD schedule moves from DD to DD' and demand moves from A to B. At point B, desired demand exceeds output. Producers will raise their output to match the new demand and we move to point A'. However, due to the increase in Y, consumption increases and desired demand is raised to point B'. Firms will again raise output and we move to point A''.

This keeps going until we reach point E, where the DD curve crosses the 45° line. The **total multiplier effect** tells us how much income rises in response to €1 increase in G. The multiplier can be estimated using the following formula:

The ***Keynesian Multiplier:*** $\frac{\Delta Y}{\Delta G} = \frac{1}{1 - c(1 - z)}$

where c_1 is the proportion of income spent on consumption and z is the proportion of this consumption that goes towards imports. For a large multiplier, we need a large c and a small z. A steeper DD schedule also results in a larger multiplier. c is the derivative of the consumption function/ slope of the consumption curve.

Disequilibrium

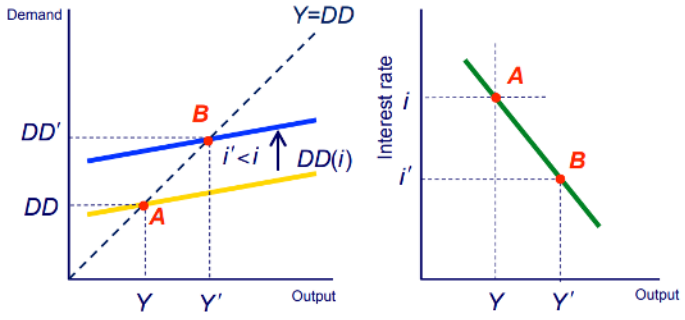
What causes disequilibrium in the economy?

- policy: shifts in taxes and government spending
- Shocks: shifts in firms' confidence, wealth, interest rate, real exchange rate, …

IS curve

The **IS curve** gives all combinations of interest rate (i) and output (Y) in the **goods market equilibrium**, *assuming fixed price*. This downward-sloping curve is derived by finding the level of Y for each level of interest: I = I(i).
The lower the i, the higher the I, and consequently, the higher the output (Y).

IS curve is derived by finding *equilibrium Y* for all *i*'s
Each point on ***IS Curve*** (A, B, …) = Equilibrium in Goods Market



Slide 55, Lecture 9 [Presentation Slides]

Macroeconomics - IBEB - Lecture 10- Week 5

Shifts in the IS curve

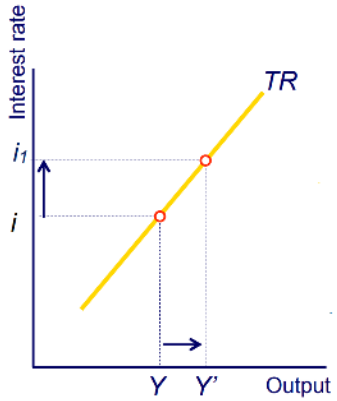
A. Increase in Government Spending
   An increase in government spending increases the desired demand, and consequently the IS curve shifts to the left.
   Hence, there is an increase in output at the same level of interest rate.
B. Increase in Investment
   An increase in investment results in a higher desired demand which leads to a downward movement along the IS curve. There is hence an increase in output and a decrease in the interest rate.

TR curve

The TR curve represents the equilibrium in the money market. It depicts the Taylor rule but without the inflation gap. This is because in the short run, there exists no inflation because prices are fixed. In the SR, prices are fixed. Thus, rewriting the Taylor Rule we get the equation of TR curve:

$$i = \bar{\imath} + b\left(\frac{Y - \bar{Y}}{\bar{Y}}\right)$$

Note: Only an increase in Y leads to an increase in i, and not the other way around.



Slide 21, Lecture 10 [Presentation Slides]

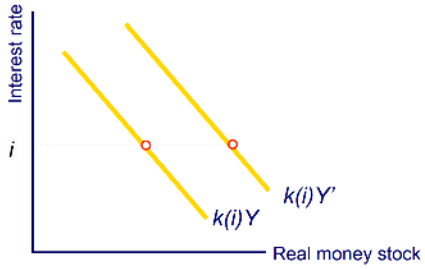
The slope of the TR schedule (*the b parameter*) shows how strongly the CB reacts and changes the interest rate. There are three possible scenarios:

1) **b = 0 =>** CB holds interest rate constant. The money supply curve is *totally elastic* (slope is zero). The TR curve is flat.
2) **b < 0 =>** CB responds to an increase in Y by raising interest rates moderately. The money supply curve: positive slope.
3) **b > 0 =>** CB responds to an increase in Y by raising interest rates strongly. The money supply curve: *perfectly inelastic*. The TR curve is now very steep.

When the target "i" increases, the TR curve shifts upwards and vice versa.

TR and Money Demand and Supply

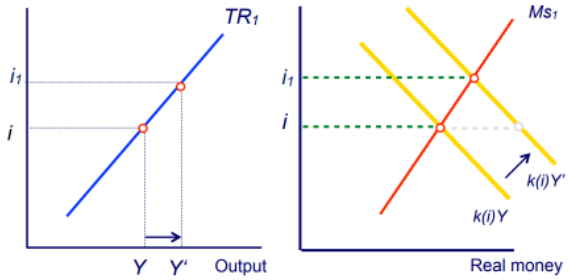
When the output increases, there is an upward shift of the demand curve at the same level of interest.



Slide 28, Lecture 10 [Presentation Slides]

Suppose there is an increase in output, but the central bank does not change "i". This will lead to a completely elastic money supply curve.

When there is an increase in output, and the central bank decides to moderately increase the interest rate, the graph looks like:

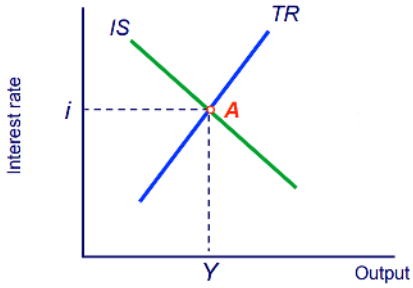


Slide 31, Lecture 10 [Presentation Slides]

A steeper TR curve leads to a steeper money supply.

Market Equilibrium

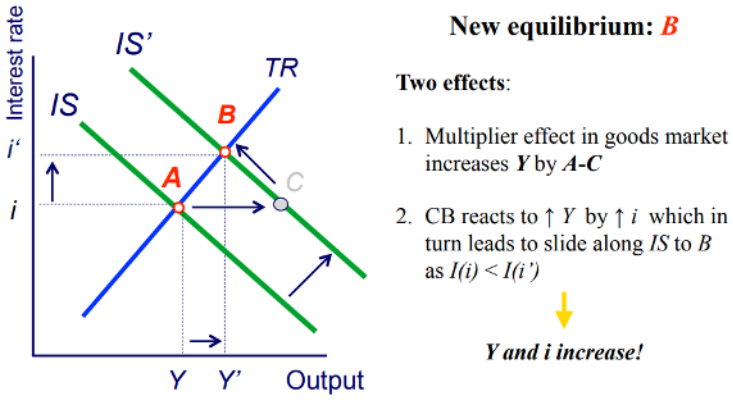
It occurs when both the goods and the money market are in equilibrium.



Slide 38, Lecture 10 [Presentation Slides]

Demand shocks – shifts of the IS curve

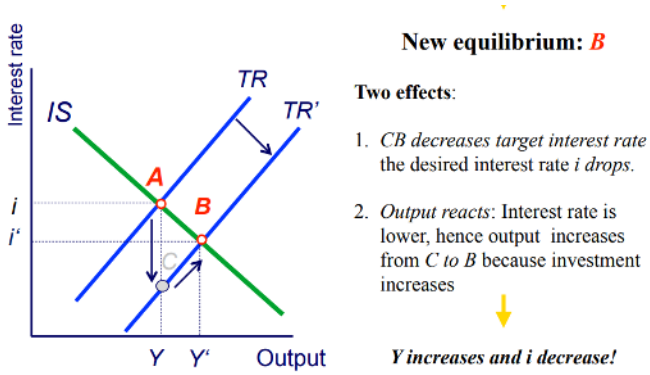
Suppose there is an increase in G, then the IS curve shifts to the right.



Slide 41, Lecture 10 [Presentation Slides]

Monetary policy shocks – shifts of the TR curve

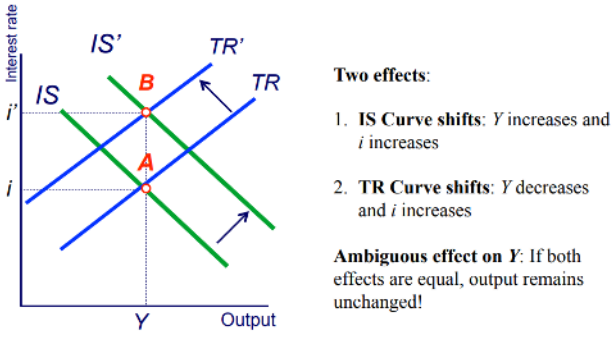
Suppose there is a decrease in, then the TR curve shifts to the right.



Slide 42, Lecture 10 [Presentation Slides]

Policy mix

A **policy mix** is a combination of exogenous changes on both the goods and money markets. It can lead to a higher or lower GDP at the same level of , or a higher or lower interest rate at the same level of.



Slide 43, Lecture 10 [Presentation Slides]

Zero lower bound

Interest rate cannot be negative, so zero is the lower limit of if the economy falls to a recession. In order to escape this, fiscal policy is adopted to shift to the IS curve rightward, increasing output without increasing interest rate. This could mean running public deficits for long. Thus, **zero lower bound** is one of the main limitations of monetary policy.

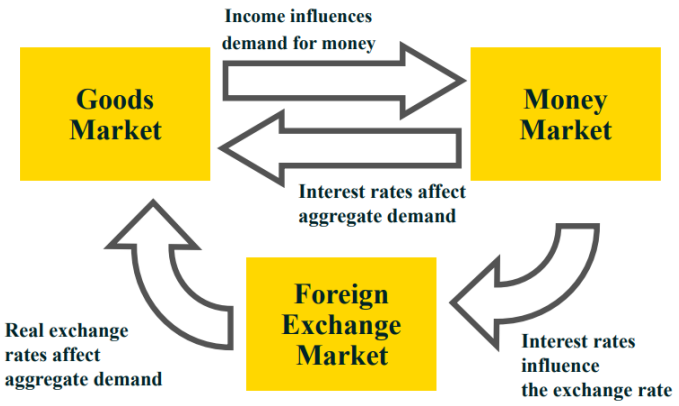
What are some possible sources of exogenous change?

- Government expenditure/ Fiscal policy
- Investment, driven by expectations
- Consumption via household wealth or disposable income
- Foreign disturbances

"More" of these sources lead to an **outward shift** of the IS curve, while "less" to an **inward shift.**

Macroeconomics - IBEB - Lecture 11- Week 6

So far, we have only considered a closed economy. However, in the real world, **international trade** is a crucial part of understanding Macroeconomics. Thus, we need to derive a macroeconomic equilibrium in the case of an **open economy,** where we also have the **foreign exchange market.**



Slide 17, Lecture 11 [Presentation Slides]

The Mundell-Fleming Model

An extension of the IS-TR model for small, open economies with internationally integrated financial markets. The key variable is the exchange rate.

Assumptions of the model:

1. sticky prices;
2. small economy (affected by the changes in the rest of the world but does not impact the rest of the world);
3. open economy (free trade and capital mobility).

If international capital markets are perfectly integrated*, the rate of return on the same investments is the same everywhere.

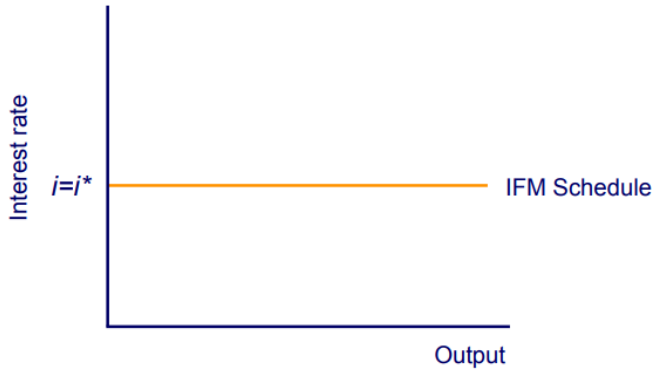
$$i = i^*$$

where the domestic interest rate is the international rate of return. In other words, the interest rate at home must be equal to the interest rate abroad. If this equation does not hold, arbitrage would occur; i.e. investors would borrow from one market and lend in another in order to make money. Unlike the purchasing power parity concept discussed in the previous lectures, the interest rate parity is more likely to stay valid in the short run because arbitrages can occur quickly since money moves quickly as well.

*An international capital market is perfectly integrated if there are no barriers in trading (i.e. when countries can freely trade with each other).

IFM schedule

The Financial integration line (IFM) represents the equilibrium on the International Financial Markets.



Slide 20, Lecture 12 [Presentation Slides]

If the domestic interest rate is currently above the international required rate of return, more capital will flow in because investors will invest in the home country. If capital flows in, the currency appreciates. On the other hand if the domestic interest rate is below the IFM line, capital will flow out and cause an increase in scarcity, which will in turn cause the interest rate to go up.

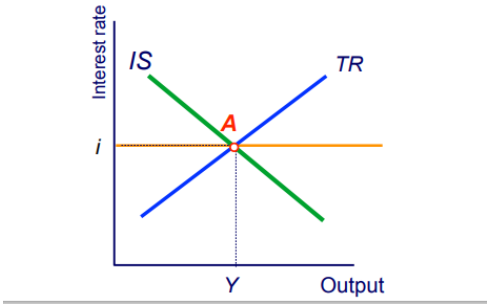
However, differences in the level of interest rates among countries may occur. This is because the interest rate parity condition may only hold for assets with the same:

1. Risk Profile
2. Maturity

General equilibrium

In the case of an open economy, besides deriving the IS and the TR curve, we also have the IFM line (representing the foreign exchange market).

IFM Schedule: i = i*



Slide 26, Lecture 11 [Presentation Slides]

In the GOODS MARKET (IS curve):

$$Y = DD = C(\bar{\Omega}, Y - \bar{T}) + I(\bar{q}, i) + \bar{G} + NX(Y, Y*, \sigma)$$
$$\qquad\qquad\quad +\qquad\quad -\qquad\qquad\quad -\ +\ -$$

Net exports (NX) moves:

a. negatively with income at home Y;
b. positively with income abroad Y*;
c. negatively with real exchange rate

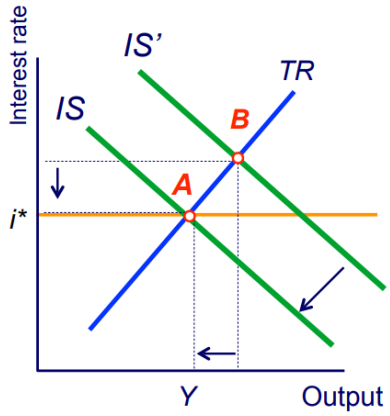
What happens in the goods market with changes in the exchange rate?
σ decreases = there is a decrease in the relative price of my goods => net exports increase => IS shifts to the right

In the MONEY MARKET (TR curve):

$$i = \bar{\imath} + b\frac{Y - \bar{Y}}{\bar{Y}}$$

Flexible Exchange Rate

Here, the central bank allows the exchange rate to adjust until the supply equals demand.
-There is capital inflow where there is an appreciation of the currency.
-There is a capital outflow in case of the depreciation of the currency.



Slide 33, Lecture 11 [Presentation Slides]

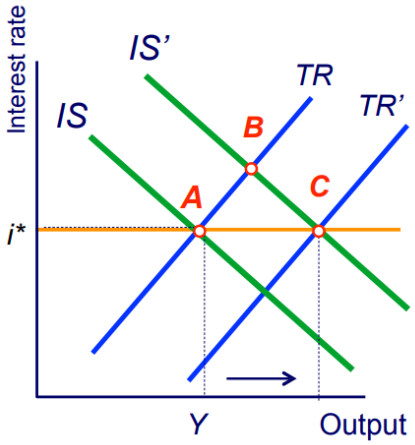
Effect of shocks under the flexible exchange rate:

a. Good market: Positive demand shock, an increase in Y and hence, a rightward shift in the IS.
b. Money Market: when Y increases, there is a higher demand for money, i consequently increases and there is a movement along the TR curve.
c. FX Market: *i (>i/)** leads to currency appreciation as a result of capital inflow.
d. Goods Market: currency appreciation leads to a leftward shift in the IS curve.

This brings us back to the equilibrium level.

Fixed Exchange Rate

Here, the central bank determines the exchange rate in the economy.



Slide 35, Lecture 11 [Presentation Slides]

Demand Shock under fixed exchange rate system:

1. Goods Market: Y increases and the IS shifts to the right.
2. Money Market: there is a higher demand for money, thus *i* increases which leads to a movement along the TR curve.
3. FX Market: Higher *i(>i)** leads to a currency appreciation.
4. Money Market: Central Bank increases money supply and *i* decreases.

New equilibrium is the same but with a higher output.

Impossible trinity (trilemma)

However, with capital controls, the interest rate parity may not hold. Countries may impose capital controls for several reasons, among them being that the forces of international financial integration are too powerful, and huge movements of capital can interfere with the central banks conduct of monetary policy.

The impossible trinity theory tells us that a country cannot have at the same time:
1) fixed exchange rate
2) independent monetary policy
3) free capital movements

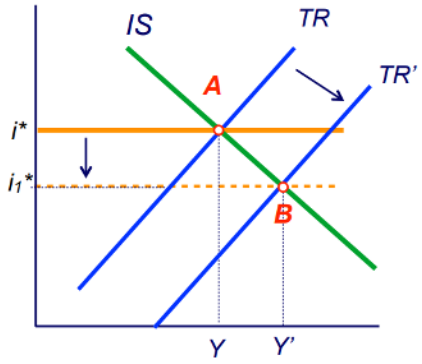
Instead, it has to give up on one of the three. Thus, we can conclude that the behavior of an economy changes when internationally integrated, and that it depends on its choice of the exchange rate regime.

Countries want to have independent monetary policies for two reasons: (1) The control of monetary policy helps control inflation and deflation, and (2) independent monetary policies may allow the interest rate to be decreased to boost the economy during a financial crisis. On the other hand, countries like fixed exchange rates simply because it allows for more stability.

Beggar thy Neighbour Effect

This effect refers to when one country benefits at the expense of the other.

- $i > i_1^*$: Exchange rate appreciation: CB increase money supply
- **Increase in Y** as investment increases due to lower interest rate.



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Macroeconomics - IBEB - Lecture 12- Week 6

As a recap of the concepts of short run and long run, we know that the prices are sticky in the long run and that the nominal and real side of the economy interact with each other.

The aggregate demand is not equal to the aggregate supply and the supply adjusts to the demand. However, in the long run, the prices are flexible and the prices adjust to achieve equilibrium.

Phillips Curve

Consider the consumption-leisure trade-off. In a diagram with the real wage on the y-axis and the labor supply on the x-axis, if the substitution effect is < the income effect, the individual labor supply curve is upward sloping.

According to the Phillip's trade off lower unemployment can be achieved but at the cost of higher inflation. It forms one of the strongest bases of decision and policy making.

Neutrality principle: money growth causes proportional changes only in prices and income and should not have an impact on unemployment.

Theoretical framework

How do firms set up prices?

Unlike in perfect competition, where firms are price takers (P = MC), firms in imperfect competition use mark-up pricing and are thus price makers. We denote the mark-up with (1 + θ), so the equation for pricing becomes:
[(1 + θ)*MC]

For the equation above, markup and the level of market competition have an inverse relationship. An increase in market competition will lower the markup, and if theta (θ) = 0, then the firm is in a perfectly competitive market.

Instead of measuring marginal costs, approximate them with average costs, which is easier to measure.
Average cost = total costs / total production
For simplification reasons, we will only consider labor costs, and we reach the equation:
Unit cost = unit labor cost + unit non-labour cost

This further proves that an increase in wage will result in an increase in price level.

How are wages set?

Unions want to maximize their labor share in the GDP.

WL/PY = labor share of output.

$$S_L = WL/PY = (1 + \gamma)\,\overline{S}_L$$

where ɣ is the workers bargaining power and $\overline{S}_L$ is the "normal" labor share.
Several things affect a worker's bargaining power. Among them include:

1. The nature of the job and worker skills – How costly would it be to replace a worker?
2. Outside options – How difficult it is to find jobs
3. Labor market conditions

Since the current prices both depend on (1+ɣ) and (1+θ), inflation is determined by the changes in both markups and expected prices.

$$\pi = \frac{\Delta\theta}{(1+\theta)} + \frac{\Delta\gamma}{(1+\gamma)} + \pi^e$$

The mark-ups are procyclical because they raise the actual price level above its expected level in boom periods, while pulling it down in recessions. Therefore, W and P rise faster in periods of growth.

Using the assumption that expected inflation is equal to **underlying inflation**, we can modify the Phillips curve.

Expectation augmented Phillips curve

The unemployment gap is the difference between unemployment and the natural rate of unemployment (lower inflation if unemployment is higher than the natural rate of unemployment).

$$\pi = \tilde{\pi} - bU_{gap} = \tilde{\pi} - b(U - \bar{U})$$

The underlying inflation rate consists of:

- backward looking component ($\boldsymbol{\pi}$ (t-1))
- forward-looking component (long-run inflation rate)

We make the assumptions that expectations are adaptive (mostly realistic in the short or medium run and focused on backward looking component) and rational (can be correctly estimated in the long run regardless of the short run errors)

We now consider non-labour costs. Sometimes, such costs can cause unexpected increase in production costs which raises prices above the expected level.

These unexpected costs are often exogenous and can include:

- Changes in the price of raw materials (e.g. oil shocks);
- Depreciation, causing imported inputs to become more expensive;
- Productivity shocks…

These supply shocks are incorporated into the model as the variable S and on average, S=0. If there is an adverse shock, S > 0; if there is a favorable shock, s < 0.

Now, the expectations-augmented Phillips curve becomes:

$$\pi = \tilde{\pi} - bU_{gap} + S$$

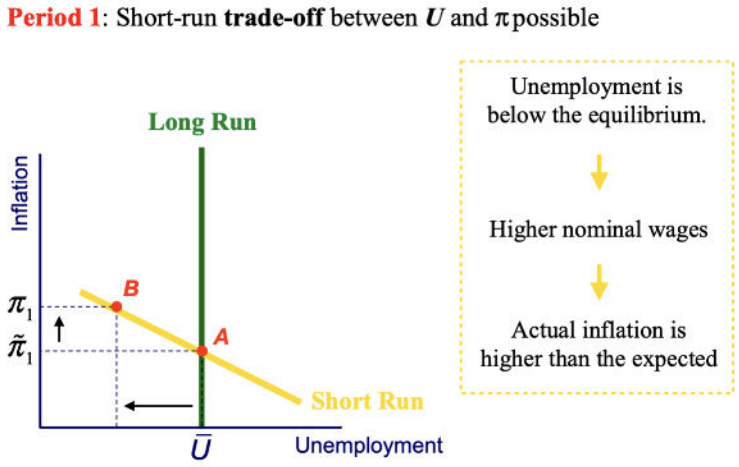
In case of an adverse shock, the PC moves upward.

Long run Phillips curve

If inflation in the long run is equal to its trend value and the average value of the shocks are 0, then the long-term unemployment is equal to its trend as well:

$$S = 0 \quad \& \quad U = \bar{U} \quad \longrightarrow \quad \pi = \tilde{\pi}$$

Hence, the Philip's curve is vertical.



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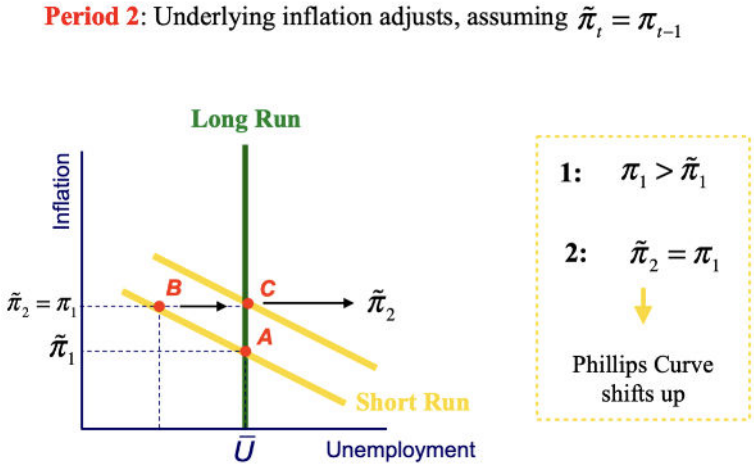

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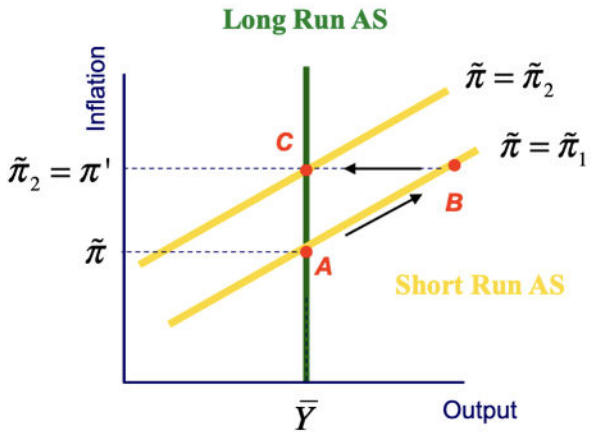
Okun's law

Okun's law states that there is a negative relation between the output gap and the unemployment gap, so higher output will lead to less unemployment.

Aggregate Supply curve

Combining the two curves we get a positive relation between output and inflation, which gives us the Aggregate Supply curve (AS).



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Macroeconomics - IBEB - Lecture 13- Week 6

Aggregate demand

The AD curve represents all combinations of output and inflation such that both the goods market (IS) and the money market (TR) are in equilibrium.

Fisher's equation

As we no longer assume fixed prices, we have to distinguish between nominal interest (i) and real interest(r) rates:

$$r_t = i_t - \pi_t$$

where r is the real interest rate relevant for spending decisions, i is the nominal interest rate relevant for the money market, and pi is the ex-post observed inflation between year t and year t+1.

Inflation in the IS-TR equilibrium

When inflation increases, the central bank will increase the nominal interest more than the inflation (a>1), hence the real interest rate also increases. In the IS-TR equilibrium, this means that the Fisher equation is therefore inserted into the TR curve, and causes the r to have the equation:

$$r = \bar{\imath} + (a-1)\pi - a\bar{\pi} + bY_{gap}$$

where (a-1) is greater than 0. Any expansionary monetary fiscal/monetary policy causes an outward shift to the graph.

Moreover, unless otherwise stated, we may assume:

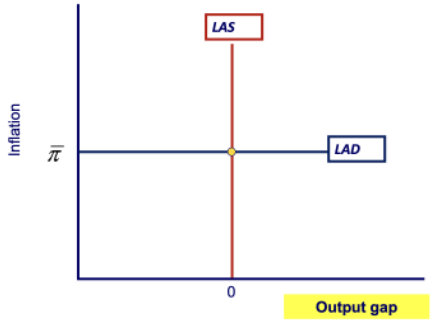
1. There begins a long run equilibrium with disturbance in year t
2. There will exist adaptive expectations, which may shift the AS curve, if inflation changes
3. Interest rate and inflation expectations may cause adjustments of the economy, which need to be observed.

AD in the long run

Natural real interest rate is given by the real economy where the return of investments will equal the marginal cost of capital (1+ r = MPK). The nominal interest rate is equal to in the long run, when both inflation and output gaps equal zero. Since the central bank sets the inflation rate, the long-run inflation rate is equal to the inflation target.

$$\bar{\pi} = \bar{\imath} - \bar{r} \text{ and } Y_t = \bar{Y} \text{ and } E(\epsilon) = 0$$

LAD curve is thus a horizontal line in the targeted inflation rate.



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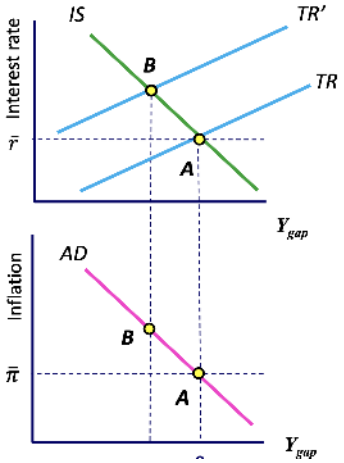
AD in the short run

When actual inflation changes, CB changes interest rate according to the Taylor Rule, shifting TR curve. Suppose that inflation rises; interest rate rises for the same Y, so the TR curve shifts upwards. At the new equilibrium IS = TR, output is lower while inflation is higher, so there is a negative relation between output and inflation.



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The equation for Aggregate Demand hence becomes:

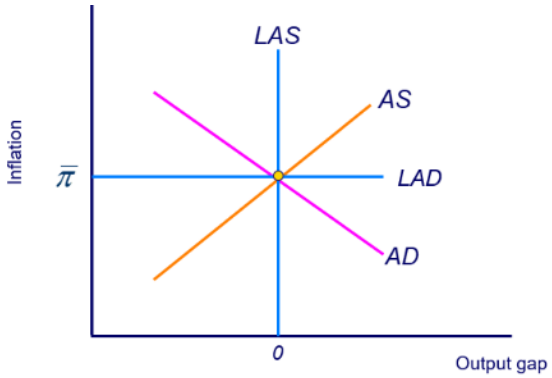
$$Y_{gap} = -A(\pi - \bar{\pi}) + B\varepsilon$$

The two reasons why the aggregate demand curve shifts is:

a. Inflation target
b. Demand shocks

AD-AS framework: explaining fluctuations

Now, we can combine long run and short run AD and AS curves to derive the initial AD-AS framework:



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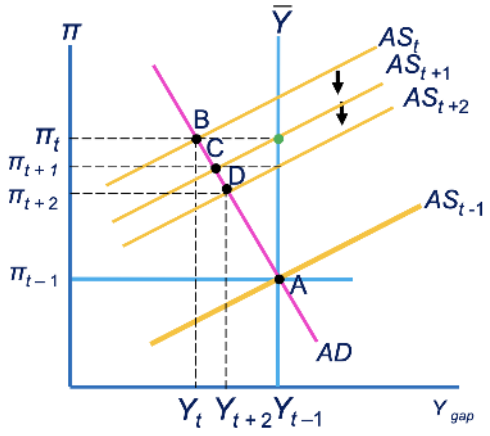
We use this model to see the effects of:

1) supply shock
2) demand shock
3) monetary policy

We always start from the point of LR equilibrium and see how the economy adjusts to disturbances through changes in interest rate and inflation expectations. There is also the assumption of adaptive expectations:

$$\tilde{\pi}_t = \pi_t^e = \pi_{t-1}$$

Supply shock



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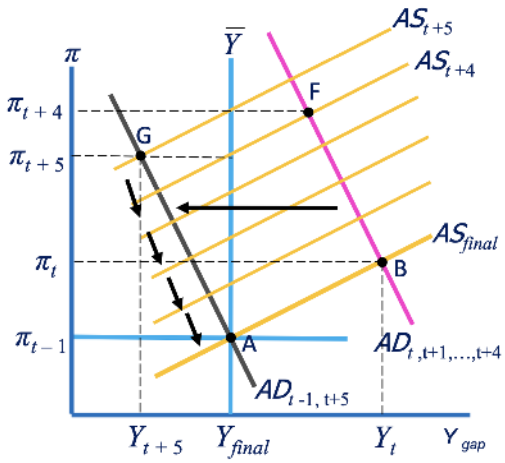
An adverse supply shock leads to an upward shift in AS, from AS_{t-1} to AS_t. The actual inflation rate rises so the CB raises the interest rate and output falls. At the new equilibrium point B, inflation is higher but output is lower.
When the supply shock is over, AS does not automatically return to initial equilibrium because inflation expectations are higher now. Slowly, as inflation decreases, the backward-looking component of underlying inflation decreases actual inflation, and AS shifts downwards until output rises to its natural rate again.

Demand Shock and Monetary Shock

Similarly, the demand and monetary shocks can be represented in the following way;



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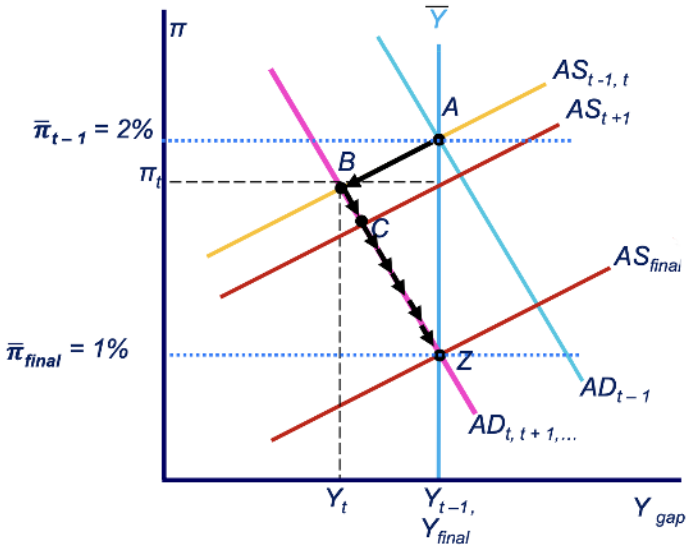
A positive demand disturbance shifts the AD curve to the right. At the new equilibrium point B, output and inflation are higher. The higher inflation raises inflation expectations and thus the underlying inflation, so AS shifts up. Output decreases but inflation increases more. The higher inflation in the previous period keeps rising inflation expectations, thus the AS curve continues to shift upwards. When the demand shock ends, the AD curve shifts back to the left and also goes through the original equilibrium. As inflation is lower in the new equilibrium than before the demand shock ended, the AS curve slowly moves down again, due to lower underlying inflation, until it is in the initial equilibrium.



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If CB lowers the target inflation rate, it raises i and r to reduce π. The AD curve then shifts left, and output and inflation fall. Equilibrium becomes B instead of A. As a result, inflation expectations and thus the underlying inflation are lower. The AS curve shifts down, increasing output and decreasing inflation. This process continues until output reaches its natural rate again and inflation reaches the new target.

Macroeconomics - IBEB - Lecture 14- Week 7

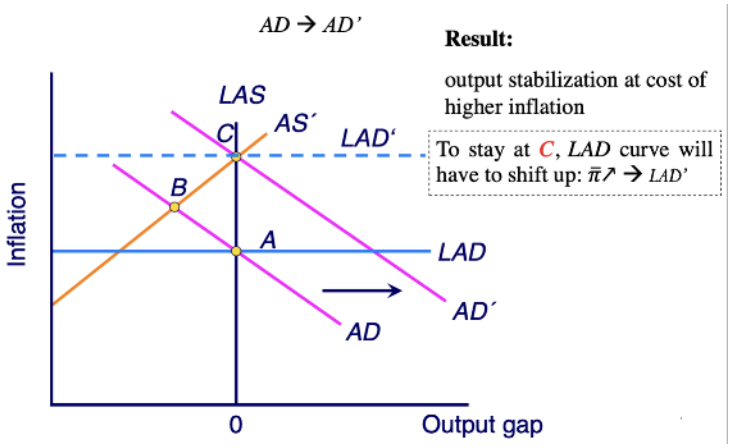
Effects of policy in theory

Adverse supply shock

How can governments react in the case of a supply shock – for example, in the case of stagflation, when the AS curve shifts to the left?

- OPTION 1: Expansionary Demand Policy

A government can decide to increase spending, thus shifting the AD curve to the right. As a result, the LAD curve will also have to shift. A problem with this policy is the increase in the inflation level.



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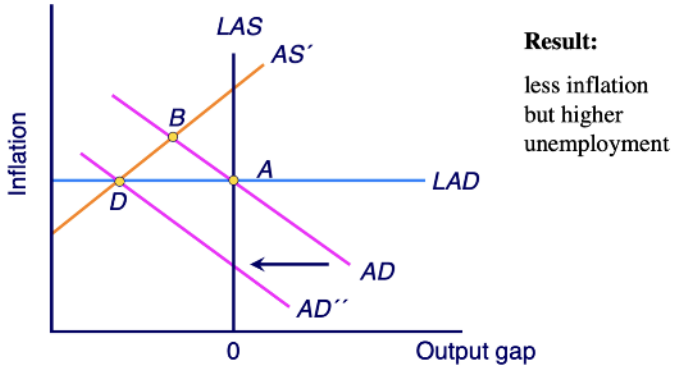
- OPTION 2: Contractionary Demand Policy

If the government wants to prevent the upward shift of the LAD curve (thus an increase in long term inflation), they can decrease their spending and thus shift the AD curve to the left. As a result, inflation expectations will go down and the AS curve will also shift to the left. A big problem with this policy is that it comes with a heavy cost of increased unemployment.



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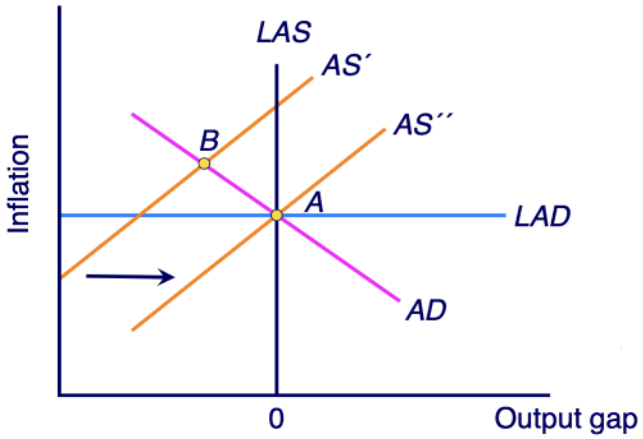
- OPTION 3: Lowering Inflation Expectations

Here, the CB credibly announces that inflation will be at its target level. For this to happen, inflation expectations need to become independent from past inflation. If people expect inflation to be as targeted, AS curve will shift back to its original position, thus going back to the original long term equilibrium.



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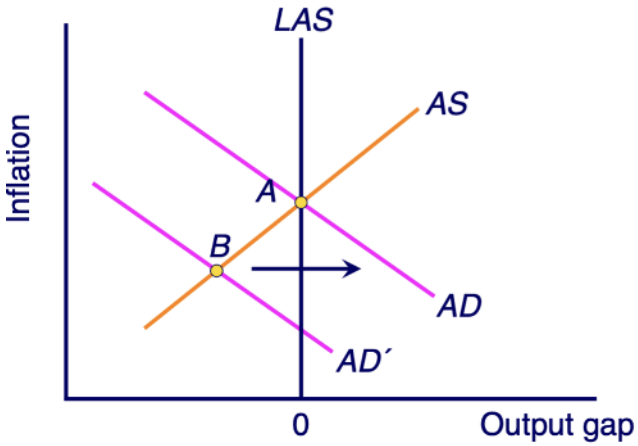
Adverse demand shock

What are the scenarios when a negative demand shock occurs (AD curve shifts to the left)?

1) expansionary policy



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2) No intervention

Neo Classicals vs Keynesians

When discussing the role of demand management policies in practice, there is still a debate between two different schools of economic thought: Keynesians (John Maynard Keynes) and Neoclassicals (Milton Friedman)

Main points of this debate are on the questions: What is the speed of adjustment? Do we need to adjust? What is the precision at which the curves shift?

Speed of price adjustment

This depends on the expectation formation mechanism about inflation. We distinguish two possibilities:

1) Backward looking
- depends only on the past
- adjustment may take long time

2) Rational expectations
- no systematic errors
- adjustments can be very fast

Keynesian case

Prices are sticky, so the adjustments of prices and wages takes time. Backward looking component of inflation predominates. The consequence of this is that the short run AS curve shifts very slowly.

According to this economic view, we are not always on the LAS curve; we have free capacities that can be used.

Neo-classical case

Prices are flexible, implying fast adjustments of prices and wages. Forward looking component of inflation predominates. The consequence is that the short run AS curve shifts quickly back to the LAS equilibrium point.

According to this economic view, we are never far away from the long run equilibrium; thus, there is no free capacity and no room for demand management policies.

Macroeconomic policy and business cycles

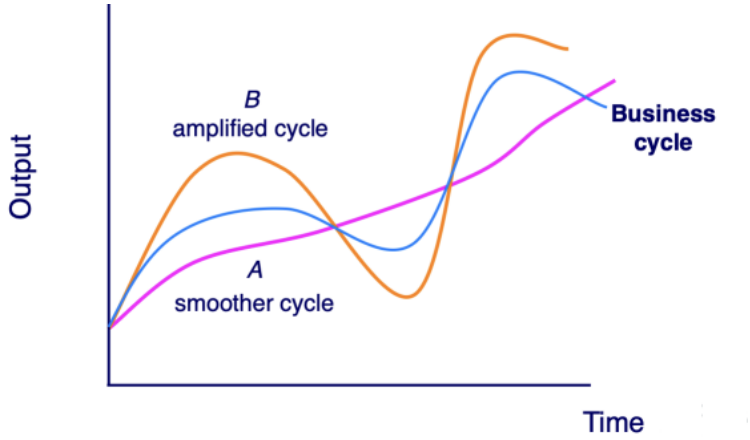
Impulse-propagation mechanism

As an economy is hit by a random shock (whether demand or supply), it takes time for it to respond. Thus, there are lags in the shift of AD and AS curves.
AD shifts slowly because it takes time for a policy to affect the real economy, while the AS shifts slowly because the underlying inflation adjusts only gradually.

Uncertainty and policy lags

Economic policy is characterized by a series of lags:
1. recognition lag;
2. decision lag;
3. implementation lag;
4. effectiveness lag.

These lags can increase the risk of amplifying the business cycle (orange line below), instead of smoothing it out (purple line).



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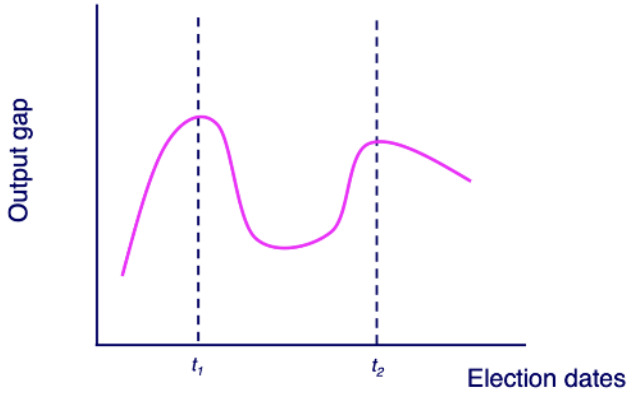
The Friedman critique

Milton Friedman, a Neoclassical economist, is highly critical of government intervention. This is because policy intervention at wrong timing can disrupt business cycles; thus, he argued that in some cases it is better to do nothing.

Political business cycles

Governments are not always welfare-maximizing. If they mostly care about being re-elected, they may use demand management policies in a politically opportunistic way.

Electoral business cycles: expansionary policies before elections; contractionary policies afterwards.



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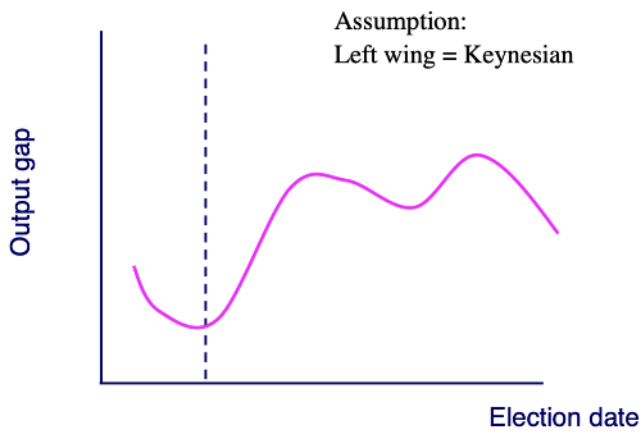
Partisan business cycles: the business cycle may also be altered by the government defending the interests of their constituents.



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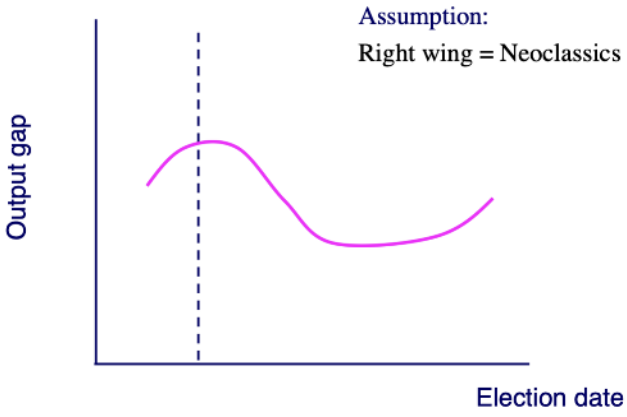

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Macroeconomics - IBEB - Lecture 15- Week 7

Reasons for government intervention

The main reasons why governments intervene in the economy are:

a) Provision of public goods;
b) Redistribution;
c) Macroeconomic stabilization.

- PROVISION OF PUBLIC GOODS

Public goods have two main characteristics – they are non-rival (supply of it does not get smaller as it is consumed) and non-excludable (available to everyone). Some examples include national defense, internet and knowledge. Most of these goods are characterized by positive externalities.

However, these goods are also associated with the free-rider problem. This implies that, as no one can be excluded from using the good even if they do not pay for it, nobody wants to pay. Thus, market failure would occur as leaving market forces to work on their own leads to under-provision of the good. This is why governments intervene and provide public goods.

Examples of non-rival goods include club goods (excludable) and public goods (non-excludable), while rival goods include private goods (excludable) and common-pool goods (non-excludable).

- REDISTRIBUTION

Governments decide how to redistribute income, but this leads to a trade-off between efficiency and equity.

Since efficiency requires a wage equal to marginal productivity, and not everyone is as productive, unequal income distribution occurs. On the other hand, if governments prioritize equity, taxpayers might decide to work less. Also, transfer payments can decrease incentive to work for low wages. In reality, however, more equity actually leads to more aggregate income.

- MACROECONOMIC STABILIZATION

Main ways in which governments try to stabilize the economy are:
- output and employment smoothing;
- consumption and tax smoothing.

In order to smooth consumption of public goods, governments try to provide a steady flow of public goods and services (e.g. schools). This implies that in times of recession, there is higher government spending.

Tax revenues vary as they depend on how the economy performs, meaning that government income varies over time. So, governments use automatic stabilizers.

How do automatic stabilizers work?
higher tax revenue & lower spending in “good times”,
lower tax revenue & higher spending in “bad times”

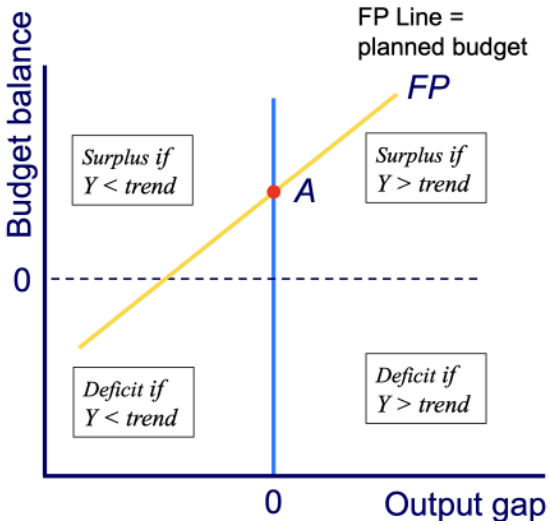
The problem occurs as lower tax revenue and higher spending in “bad times” makes the budget unbalanced, increasing deficit and public debt.

How to interpret budget figures

Governments decide on their spending in advance without knowing the exact value of tax revenue.

There are two components of the government budget:
1) CYCLICAL – depends on the business cycle;
2) STRUCTURAL – depends on governmental policy. This is the budget we would see if the output gap was equal to 0.

If the structural budget (T-G, given that Y_{gap} is 0) is greater than 0, there exists a structural surplus. If it is below 0, there exists a structural deficit.



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Debt stabilization

- CASE 1 – no growth, no inflation

Here, the change in debt is equal to the total budget deficit:

$$\Delta B = (G - T) + rB$$

Looking at debt as a percentage of GDP, the above equation becomes:

$$\frac{(T - G)}{Y} = r(\frac{B}{Y})$$

- CASE 2 – growth, no inflation

$$\frac{(T - G)}{Y} = (r - g)(\frac{B}{Y})$$

This equation is the same as the previous case, with the addition of g – rate of growth of GDP. If g>0, it is easier to stabilize debt or GDP ratio. But is g > r, budget surpluses are not needed for debt stabilization.

- CASE 3 – growth, inflation

Another way of funding a deficit is through money supply. The process of financing a budget deficit through printing money is called seigniorage. Including this, the initial equation becomes:

$$\Delta(B/Y) + \Delta(M0/P)/Y = (G - T)/Y + (r - g)B/Y$$

Seigniorage is the additional revenue of the government because the money that is created is worth more than costs to produce it. Part of this revenue can be financed for government expenditure.

Short- and long-term solutions

Stabilization methods in the short run

There are 3 main ways to do this, all of which involve costs for the private sector:

1) DEFICIT CUTS (Increasing taxes or reducing public expenditure)
   - This is often unpopular politically.
2) PRINTING MONEY (Effective only if inflation not anticipated)
   - Printing money can be done to pay back bond holders and is potentially inflationary.
3) DEFAULT ON DEBT (Makes borrowing in the future harder)

- Internal defaults are politically unpopular. Instead, external defaults are utilized.

There can be reputational effects when debt is defaulted. Such effects include that the government will not be able to borrow (causing T-G to be greater than or equal to 0), and that the country cannot borrow externally (causing CA to be greater than or equal to 0).

Stabilization methods in the mid and long run

1) INTEREST RATE RELIEF (r)
   - borrow at lower rates (example: Greece)
   - Interest rate relief is often considered as a self-fulfilling prophecy issue, as a higher default risk will cause a higher interest rate and in turn causes yet an even higher default risk.
   - Financial repression requires banks to hold government bonds for a given price.

2) ECONOMIC GROWTH (g) – increase growth to increase GDP.

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