# Macroeconomics

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# Introduction

- Structure of course
- Chapter 1 The date and methods of macroeconomics
- Chapter 2-4 The National Accounting system (not included)

# Introduction

- Structure of course
- Chapter 5 The Determination of Output, Income, Expenditure and a Model of Real Equilibrium
- Chapter 6 Money, Prices and the Interest Rate

# Introduction

- Structure of course
- Chapter 7 Labour Market, Employment, Unemployment
- Chapter 8 Economic Fluctuations

# Introduction

- Structure of course
- Chapter 9 The Keynsian Model of Short-Run Equilibrium
- Chapter 10 Aggregate Supply

# Introduction

- Definition

  "Macroeconomics was born as distinct in the 1940, as part of intellectual response to the Great Depression. The term then referred to the body of knowledge and expertise that we hoped would prevent recurrence of that economic disaster.."

  (R. Lucas)

# Introduction

- Definition

  Since then, economic science is divided into two fields

  **Microeconomics**, which develops the theories of individual behaviors: theories of producer, consumer, etc.

# Introduction

- Definition

  Since then, economic science is divided into two fields

  **Macroeconomics,** which develops the theories of collective behaviors

  The main goal of macroeconomics is to explain and predict the evolution of different economic variables, such as **output, employment, money supply, interest rates, prices, exchange rates, external balance, public budget deficit, public debt**

# Introduction

- Relationships between two sub-disciplines

  Examples

  - how agents see the future and build their expectations (micro) can influence the level of overall consumption (macro)

  - the level of public deficit (macro) can get people to change their saving behaviours (micro)

# Introduction

- An overview of the macroeconomic theories
- Two main theories:

  - **Classical theory** gives a central place to the notion of equilibrium

  - **Keynesian theory** – " sticky prices macroeconomics"

# Introduction

- An overview of the macroeconomic theories
- *Classical theory-* economic policies are not helpful. Market can be cleared in the short run without the necessity of external intervention.

# Introduction

- An overview of the macroeconomic theories
- *Keynesian theory* – economic policies are useful because the return to equilibrium for the economy is neither automatic nor immediate.

# Introduction

- An overview of the macroeconomic theories
- *Classical theory-*
- ***Hypothesis of flexible prices, macroeconomic theories may be useful to explain the functioning of the economy in the long run.***

# Introduction

- An overview of the macroeconomic theories
- *Keynsian theory* ***helps to explain the short-run fluctuations in the level of activity that generate disequilibrium.***

# Introduction

- The Empirical Aspects of the Macro-economics
- *The macro circuit means a non-theoretical representation of economic activity.*
- **Three macroeconomic aggre-gates: global output, global income, global expenditure.**

# Introduction

- The Empirical Aspects of the Macro-economics
- *The output* is the value, expressed in money. This is a monetary consideration of the production activity.
- *Income* means the monetary value of resources received by agents

# Introduction

- The Empirical Aspects of the Macro-economics
- *Expenditure* means the money value of purchases of goods and services made by economic agents.

# Introduction

- The Empirical Aspects of the Macro-economics
- Macroeconomic subjects

# Introduction

- The Empirical Aspects of the Macro-economics
- OUTPUT=INCOME=EXPENDITURE

# Introduction

- The measurement of macroeconomic facts
- Economic variables

-*Stock variables* measure a quantity at a given date (number of unemployed in March 31).

-*Flow variables* measure a magnitude between two dates (consumption expenditure of households in 2010).

# Introduction

- The measurement of macroeconomic facts
- Measurement of output
- The nominal output

$QV\ AL_t = q_{At} \times p_{At} + q_{Bt} \times p_{Bt}$

- $QV\ AL_t = \Sigma q_{it}\ p_{it}$

# Introduction

- The measurement of macroeconomic facts
- Measurement of output
- The real output

- $QVOL_t = \Sigma q_{it} \times p_{i0}$

# Introduction

- The measurement of macroeconomic facts
- Measurement the changes

- Measurement of price changes
- $I\,(P)_{t/t-k} = (P_t / P_{t-k}) \times 100$

- Measurement of living standard in the country

# Introduction

- The measurement of macroeconomic facts
- Measurement the productivity
- Y/H  hourly labour productivity

# Introduction

Methods and Assumptions of Macro-economic

What is a model?

Model is a theoretical construct designed to provide a simplified presentation of reality.

# Introduction

Methods and Assumptions of Macro-economic

What is a model?

Example- a model of economic equilibrium

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply

- Y=F (K,L)
- Output will depend on amounts of factor use but also on returns to scale

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- $F(\lambda K, \lambda L) = \lambda^z Y$

- $z=1$ constant returns to scale
- $Z<1$ decreasing returns to scale
- $Z>1$ increasing returns to scale

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- $Y=K^{a} L^{(1-a)}$ - Cobb-Douglas function
- Aggregate supply =F (K, L)□Y

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- Profit maximization
- Profit= PY-WL-RK
  = PxF (K,L)-WL-RK

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- MPL marginal product of labour
- MPL=F(K, L+1)-F (K,L)

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- Demand for labour
- MPL=W/P

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The production function and aggregate supply
- Demand for capital
- MPK=F(K+1,L)-F(K,L)
- MPK=R/P

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The distribution of national income
- The national income is used to pay labour and capital
- $Y=MPL_xL+MPK_xK$

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The distribution of national income
- $Y=K^{a} L^{(1-a)}$
- $MPL=(1-a)Y/L$
- $MPK=aY/K$

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The distribution of national income
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# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The distribution of national income
- (1-a)=MPLxL/Y
- a=MPKxK/Y

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income
- Income=Expenditure
- Y=C+I+G

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income
- The consumption function
- Classical economists consider that savings is determined by the rate of interest.

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income
- The consumption function
- Keynesian economists consider that most influent variable for consumption is level of income. (Psychological fundamental law).

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income
- The consumption function
- In keynesian economics
- MPC=ΔC/ Δ(Y-T) marginal propensity to consume

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income
- The consumption function
- $C=C_0 + c\ (Y-T)\ 0<c<1$
- $APC=C/(Y-T) = C_0/(Y-T)+c$
- APC is decreasing with higher Y

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income

- The investment function
- The decision to invest at the micro level
- The decision rule

  For a given project the investment will be achieved only if r>r*

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income

- The investment function
- The decision to invest at the macro level
- Selection of investment projects with $r>r^*$

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income

- Public spending
  - operating expenses
  - capital expenses
  - expenditure of social security
  - debt service

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The expense of national income

- Public spending

  The government must fund these expenses. Expenditures must be offset by equivalent receipts obtained

  - by taxes
  - borrowing through net issuance of debt securities
  - printing money

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The equilibrium in the market for goods and services

- Y=E (Expenditure)
- Y=C+I+G
- C (Y-T) +I (r) +G  Y, T , G are exogenous
- Y=C(Y-T)+ I(r)+G
- Y=F(K,L)

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The equilibrium in the financial market: the role of the interest rate
- A) Savings
- S=Y-C-G
- S=(Y-T-G) +(T-G)
- (Y-T-C)- private savings
- (T-G) –public savings

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The equilibrium in the financial market: the role of the interest rate
- B) Investment
- Investment is the demand for loanable funds and negatively linked with the interest rate
- C) The market for loanable funds
- S=I (r)
- Y=C+I (r)+G
- Y-C-G=I (r)
- S=I (r)

# The determination of Output, Income, Expenditure and a model of Real Equilibrium

- The impact of budget policy on saving and investment

- A) The effect of higher public spending
- $Y=C+ I (r)+G$

- B) The effect of tax cut

# Money, prices and interest rates

- What is the impact of change in the quantity of money on the functioning of economy
- What connection is there between the interest rate, demand for money and price trends
- What problems between too large fluctuations in the price level.

# Money, prices and interest rates

- Money is one of the asset which is the easiest to mobilize to carry out transactions (very liquid asset).
- 3 Functions of money
- Money is a store of value.
- Money is a unit of account, a measurement standard.
- Money is an instrument of payment

# Money, prices and interest rates

- Agents will want to have a greater or lesser amount of these asset as needed. So there is a *demand for money, as well as for any good or asset.*
- *The money supply* is controlled the banking system, consisting of regular banks under the authority of central bank.

# Money, prices and interest rates

- *The Quantity theory of money*
- *MV=PY*
- *V=PY/M =nominal GDP/Money stock*

# Money, prices and interest rates

- *The Quantity theory of money*
- *Demand for money*
- $M^d=(1/V)PY \quad 1/V=k$
- $M^d = kY$
- *QTM is the theory of determining the price level by the quantity of money.*

# Money, prices and interest Rates

- *The Interest Rate, the demand for money and Inflation*

- *The nominal interest rate (NIR)* is the rate of change of an amount of money during a period when the is the subject of a loan.
- *The real interest rate (RIR)* is the rate of variation in the purchasing power of money.

# Money, prices and interest Rates

- *The Interest Rate, the demand for money and Inflation*
- *NIR and RIR are connected* *π-Inflation rate*
- *(1+i)= (1+r)(1+ π)*
- *1+i=1+r+ π +πr*
- *i≈r+ π*

# Money, prices and interest Rates

- *The Interest Rate, the demand for money and Inflation*
- *NIR depends on:*

  *-the real interest rate, itself determined between savings and investment*

  *- expected inflation*

$i = r + \pi^e$

# Money, prices and interest Rates

- *Interest rate and money demand*
- $M^d/P = L(i, Y)$
- *Demand for real money balances depends on nominal interest rate and on real GDP*

# Money, prices and interest Rates

- *The money supply and expected price level*
- $M/P = M^d/P$
- $M/P = L(i, Y)$

# Money, prices and interest rates

- *The money supply and expected price level*
- $M/P=L\,(r+\pi^{e},\ Y)$
- $P=M/L(r+\pi^{e},\ Y)$

# Money, prices and interest rates

- *The Problems with Too Large Fluctuation in Price Level*
- *Inflation is a general rise in prices of goods and services.*
- *Its effects on money functions*
- *Inflation creates many distortions*

# Money, prices and interest rates

- *The Problems with Too Large Fluctuation in Price Level*
- *Deflation is the symmetrical situation of inflation.*

# Labour market, employment, unemployment

- Labour demand comes from com-panies that want to produce.
- Labour supply comes from indi-viduals who wish to earn an income.

# Labour market, employment, unemployment

- The labour force is an aggregate that includes the employed labour force (ELF) and the population that is seeking a job (Unemployed Labour Force; ULF).
- The participation rate is defined as follows:

  a =(ELF+ULF)/15-64 years population

# Labour market, employment, unemployment

- The labour force is an aggregate that includes the employed labour force (ELF) and the population that is seeking a job (Unemployed Labour Force; ULF).

- u (unemployment rate)
- ULF/ELF+ULF

# Labour market, employment, unemployment

- The labour force is an aggregate that includes the employed labour force (ELF) and the population that is seeking a job (Unemployed Labour Force; ULF).

- e (Employment rate)
- ELF/15-64 years population

# Labour market, employment, unemployment

- N=E+U+I  N=15-64 years old
- a= (E+U)/N
- e=E/N
- u=U/(E+U)
- a=e/(1-u)

# Labour market, employment, unemployment

- Share of long length unemployed (those unemployed for one year and more) in the total unemployed.
- Average duration of unemployment

# Labour market, employment, unemployment

- The flow of workers
- It is the number of people who, over time, get in and out of employment status.

- Flow of jobs

- Net job flow=flow of job creation-flow of job destruction

# The Long-Run Rate of Unemployment

- L =E+U
- u=U/L
- Job acquisition rate a=A/U
  percentage of unemployed during a given month who gains employment

# The Long-Run Rate of Unemployment

- L =E+U
- u=U/L
- Job loss rate p=P/U
  percentage of employees who lose their jobs in a given month.

# The Long-Run Rate of Unemployment

- Natural rate of unemployment=long-run rate of unemployment
- A=P

# Economic fluctuations

- The economy is experiencing fluctuations that result in variations in the level of output around its long-run trend. The existence of these fluctuations leads to talk about *business cycle.*

# Economic fluctuations

- *Acceleration phases (economic boom)*
- *Contraction phase (economic recession)*

# Economic fluctuations

- *Changes in output and unemployment*
- *When the economy is bad, cyclical unemployment, adds to structural and frictional unemployment.*
- *The relationship between output level and unemployment is known as "Okun's law"*

# Economic fluctuations

- *Changes in output and unemployment*
- *When the economy is bad, cyclical unemployment, adds to structural and frictional unemployment.*
- *Okun consider that: the unemployment rate is negatively linked to the level of output.*

# Economic fluctuations

- *Changes in output and unemployment*

- *When the economy is bad, cyclical unemployment, adds to structural and frictional unemployment.*
- $u_t = a - \beta((Y_t - Y^*)/Y^*)$
- $u_t - u^* = -\beta((Y_t - Y^*)/Y^*)$
- *The unemployment gap is negatively linked to the output gap expressed in percent".*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *The aggregate demand is deduced from the quantity aquation of money.*
- *The AD curve is the curve reflecting, at the macroeconomic level, the relationship between the demanded quontities of goods and price level (for a given level of money supply and velocity).*

# Economic fluctuations

- *Aggregate demand and aggregate supply*

- *The aggregate supply*
- *The long-run aggregate supply (LRAS)*
- *Production function Y=f (K,L)*

- *The short-run aggregate supply (SRAS)*
- *Rigidity of prices*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*

- *Long-run effect of change in AD*
- *In the long run only the price level is effected.*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*

- *Short-run effect of change in AD*
- *In the short run, an AD decrease reduces the activity level of the economy which can fall in a recession. Prices are pushed down. An increase pushes output up and prices too.*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*
- *The Effect of Monetary Policy*
- *The Central bank can reduce the money supply*
  - *The M decrease reduces AD, which affects the level of output Y and the economy enters a recession.*
  - *Over time, given the weak demand, prices will decrease. The prices decrease brings the economy towards its long-run equilibrium.*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*
- *The Effect of Monetary Policy*

*1) a decrease in output in the short run, then a return to the long-run value*

*2) price stability in the short run and lower prices over time*

# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*
- *The Effect of Monetary Policy*

*1) a decrease in output in the short run, then a return to the long-run value*

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# Economic fluctuations

- *Aggregate demand and aggregate supply*
- *AS-AD model*
- *The Effect of Monetary Policy*

*1) a decrease in output in the short run, then a return to the long-run value*

*2) price stability in the short run and lower prices over time*

# Economic fluctuations

- External shock –an event that affects suddenly the economy and rules out output of his equilibrium level.
- *Demand shocks* affect the main components of demand: con-sumption, investment, exports.
- Supply shocks cause changes in production costs for firms.

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Keynesian Macroeconomics (KM)

- prices are sticky in the short run
- the short run equilibrium does not necessarily correspond to full employment and the level of employment is determined by the level of aggregate demand
- the quantity of money has an impact on the level of real output

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Keynesian Macroeconomics (KM)

$C=c(Y-T)$

$E=c\,(Y-T)+I+G$

$E=cY+(I+G-cT)$

Keynesian equilibrium

Real Output=Planned Expenditure

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- The impact of budget policy
- $\Delta Y=(1/1-c)/ \Delta G$

- $\Delta Y=(-c/(1-c)) \times \Delta T$

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- The impact of budget policy
- Balanced budget
- $\Delta Y = \Delta G \Delta$

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- I =I(r)
- **IS curve** shows all possible com-binations of income and interest rate that are consistent with equilibrium in the market for goods and services.

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM

- Budget policy and IS-curve

- An increase in public spending or a decrease in taxes moves IS to the right
- Lower public spending or higher taxes moves IS to the left.

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM

- Money market and LM Curve
- The money supply
- -the money supply is exogenous and depends on the central bank;
- -prices are fixed in the short run

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM

- Money market and LM Curve
- The demand for money
- $M^d/P=L(i,Y)$

- transaction motive
- a care motive
- speculative motive

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Definition: the LM curve represents all possible combinations of interest rate and income levels that meet the equilibrium of money market.

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Short-Run Equilibrium
- $Y=C(Y-T)+I(r)+G$

- $M/P=L(i,Y)$

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Economic Policy through the IS-LM model.
- The stabilization of the economy through budget policy

-The case of a rise in public spending

-The case of tax-cut

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- Economic Policy through the IS-LM model.
  - The stabilization of activity by monetary policy
  - The interaction of budget and monetary policies

# The Keynesian Model of Short-Run Equilibrium

- Model IS-LM
- IS-LM and aggregate demand
- IS-LM and deflation

# Aggregate Supply

- LRAS –level of output is determined only by amounts of factors available.
- SRAS is based on the assumption of sticky prices in the short run
- $(Y-Y^*)=a(P-P^e)$

# Aggregate Supply

- Nominal wage rigidity
- $w = W/P^e$
- $W/P = w \times P^e/P$

# Aggregate Supply

- The effect of a change in prices expectations
- $Y=Y^*+a(P-P^e)$
- $u=u^*$ $_{1-}$ *π* =*π*
- *When u=u* inflation is stable (not accelerating).*
- *Phillips-curve.*