

## 1. MACROECONOMICS FOR THE LONG RUN AND THE SHORT RUN

- What is the **subject matter** of macroeconomics? What **methods and simplifying assumptions** do macroeconomists use in their efforts to explain how the economy works? These are the issues addressed in this introductory lecture.

- We start by discussing **how to define macroeconomics**. We then go on to explain why it is **useful to develop separate macroeconomic theories for the long run and for the short run**. Finally, we end by summing up the different assumptions underlying macroeconomic models for the short run versus macro models for the long run.

### What is macroeconomics?

- The economist and Nobel Prize winner **Gary Becker** once said that “**economics is the study of the allocation of scarce resources to satisfy competing ends**”. The idea behind this definition goes back to the nineteenth century, and the first scholar to give a

comprehensive statement of it was Lionel Robbins in his famous *Essay on the Nature and Significance of Economic Science* (London, Macmillan, 1st edition, 1932).

- This certainly says something essential about what (mainly micro) economics is. However, **some parts of macroeconomics are concerned with situations where resources are not scarce**, because the available supplies of **labour and capital are not fully utilized**. These important real-world situations would not fall within the realm of economics according to the above definition.
  
- Given the difficulties of providing a brief and accurate definition of economics, one should not be surprised that **a perfectly clear subdivision into micro- and macroeconomics is also elusive**. It is sometimes said that **macroeconomics is that part of economics which is concerned with the economy as a whole**.
  
- This suggests that **microeconomics focuses only on the small elements of the economy** such as the single agent or the market for a particular product. Although much of macroeconomics is concerned with the economy in the large, **this distinction between**

**macro and micro is inaccurate. Important parts of macroeconomics** are not (directly) concerned with the whole economy, but rather with understanding particular markets such as the **labour market** or the **credit market**. And a large and important **part of microeconomics, general equilibrium theory**, is concerned with the interaction among markets, that is, with the economy as a whole.

- Therefore the **best characterization of macroeconomics** is one that simply states the main questions asked in this branch of economics.

### **A definition of macroeconomics by subject**

- **What creates growth** in aggregate output and income per capita in the long run? And **what causes the fluctuations** in economic activity that we observe in the short run? These are the **basic questions in macroeconomics**.
- At the risk of oversimplifying, we may therefore say that **macroeconomics is the study of economic growth and business cycles**. As we shall see later on, to explain the movements in

total output we must also understand the movements in total consumption, investment and the rate of unemployment, as well as the interaction of these real variables with nominal variables such as the general level of wages, prices, nominal interest rates, foreign exchange rates, etc.

- Hence macroeconomics also includes the study of these variables.

### **A definition of macroeconomics by method**

- What we have offered above is a definition of macroeconomics by subject: **macroeconomics is defined by the issues studied by macroeconomists.**
- A strict “**empiricist**” version of this definition, which also involves the choice of method, is to say that **macroeconomics is concerned with explaining observed time series for economic variables** like GDP, consumption, investment, prices and wages, the rate of unemployment, etc. This reflects the view that **a scientific discipline should be defined in terms of the data it seeks to explain.**

- To secure the link between theory and the real world, **theories should be evaluated by holding them up against the facts.**

### **Why do macroeconomists aggregate?**

- **The variables entering into macroeconomic models are typically aggregate variables** covering the economy as a whole. For instance, in macroeconomics we often describe the entire **production side of the economy as if a single commodity were produced** by the use of just **two different inputs, capital and labour**, both one-dimensional variables which can be represented by a number. By contrast, microeconomics studies disaggregated models in which it is typically not “allowed” to aggregate the production of, say, oranges and apples into the production of fruit.
- The **aggregation** undertaken in macroeconomic models **raises obvious problems**. Take the concept of the **aggregate capital stock**, for example. Capital is defined as produced means of production, so it includes, for example, **buildings as well as computers**. How

should the quantities of these two capital goods be added into one number representing their **combined productivity**?

■ In practice, the **aggregate real capital stock** is measured by **multiplying the quantities of the different capital goods by their respective prices** in some base year, and then **adding up the values** of the stocks of buildings, computers, etc., calculated **at the fixed base-year prices**.

■ This would seem to be a **sensible way of measuring the quantity of aggregate capital input** provided the **relative prices** of the different capital goods remain **reasonably constant over time**. But we know that over the past decades the **relative price of computers has decreased** enormously, and at the same time **computers have become tremendously more productive**. Using relative prices to obtain an aggregate measure of capital representing the productivity of produced inputs is therefore a **dubious procedure**.

■ Nevertheless, the **assumption that capital input as well as total output can be represented by single numbers is standard in macroeconomics**. How can we defend, for

instance, letting the production of myriads of different goods and services being represented by one number called “aggregate output”? There are **several lines of defence**:

1. Over time the **outputs of a lot of goods and services** – including capital goods – do in fact **tend to move in the same direction**. Given that the **production volumes of most industries tend to be positively correlated**, it seems **defensible to use concepts like aggregate output** or aggregate investment, even if we do not have a method of measuring these aggregates which is fully correct in all circumstances.
2. The **economy is such a complex mechanism** that we cannot hope to explain and describe it all in detail. To understand at least some of the economic regularities observed, we have to make **strong simplifications by abstracting** from many details. Aggregation of variables is one convenient way of simplifying.
3. Whether a certain highly **simplifying assumption is useful or not is ultimately an empirical question**. If a model built on strong simplifications yields predictions which accord with observed movements in some economic variables, then that model seems useful for understanding (some of) the determinants of those

variables. Presumably, it will then also be useful for evaluating the effects of economic policies intended to affect the variables considered.

- Economist Robert Solow has put it the following way:

**All theory depends on assumptions which are not quite true. That is what makes it theory.** The art of successful theorizing is to make the inevitable **simplifying assumptions in such a way that the final results are not very sensitive** (Robert M. Solow, “[A Contribution to the Theory of Economic Growth](#)”, *Quarterly Journal of Economics*, 70, 1956).

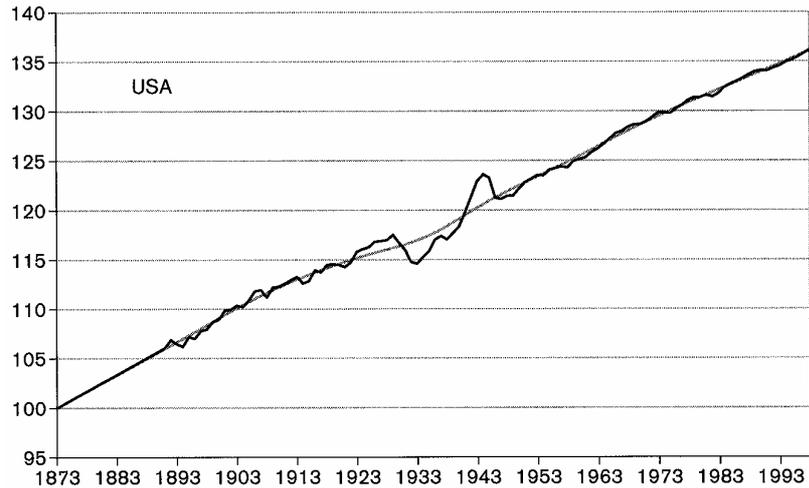
### **The long run versus the short run**

- As we have noted, macroeconomics seeks answers to the questions “**what creates growth in GDP per capita in the long run?**” and “**what creates fluctuations in GDP in the short run?**” It also tries to answer some related questions like “what explains the level of **long-run unemployment?**”, and “what explains the **short-run variations in unemployment?**”.

- Because **these questions relate to different time horizons**, the lectures will be split into two large parts, where the first is concerned with the long-run questions above, and the second is concerned with the short-run questions.
- Both parts of macroeconomics are very important, but one can argue that the **issues addressed in long-run macroeconomics are the most important ones**. For a poor country the most important policy issue in long-run macroeconomics is how could it initiate a growth process that would gradually take it up to the level of prosperity of economically advanced nations?
- A typical **policy issue in short-run macroeconomics is what could a government do to avoid an increase in the rate of unemployment**, which would otherwise follow after a negative shock to the economy? The latter question is also important, but for anyone concerned with the long-run welfare of human beings, the first type of question seems more essential.

## Long-run and short-run economic phenomena

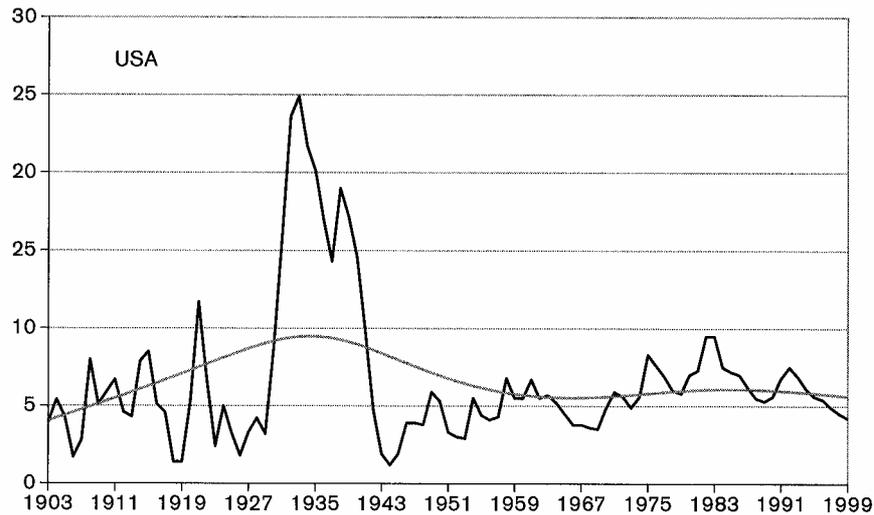
- The **distinction between long-run and short-run macroeconomics** is first and fundamentally a **distinction between the phenomena we want to understand**. This leads to a **distinction between the fundamental characteristics of the models we use, and of the policies we analyse**.



**Figure 1.1: Logarithm of real GDP in the USA, 1873-1995 (1873 = 100).**

Source: Angus Maddison, *The World Economy: Historical Statistics*, Development Centre Studies, OECD, 2003.

- In Figure 1.1 the **natural logarithm of the annual real GDPs** of the USA is drawn up for the period from 1873 to 1995, with the value in 1873 indexed to 100. Figure 1.2 shows the **average annual rates of unemployment** for the US during the past century.
- These figures also include **curves which are much more smooth**. These are meant to express the **trends of the relevant series**. Later we will learn about the techniques for constructing such a trend.



**Figure 1.2: Annual unemployment rate in the USA in the twentieth century**

Source: R.B. Mitchell, *International Historical Statistics*, Macmillan, 1998; US Bureau of Labour Statistics.

- The figures suggest that **one way to interpret the movements** of each of the series is to view them as being **made up of two components**: a **trend component** representing the overall evolution and captured by the smooth curves, and a **cyclical component** representing the year-to-year fluctuations and captured by the shifting **vertical deviations between the actual data curve and the trend curve**.
  
- **Macroeconomics for the long run** is about **understanding the trends** in series like those just shown, representing the **long-run growth in GDP** and the long-run or so-called **structural unemployment**, respectively.
  
- **Macroeconomics for the short run** is about understanding the **annual or quarterly fluctuations** in, for instance, the GDP and the rate of unemployment.
  
- Most economists believe that an **understanding of the trend requires a different type of explanation** than an understanding of the fluctuations. The **different macroeconomic models are formal expressions of these different explanations**. The fundamental

**assumptions of the models for the long run and for the short run therefore differ**, and hence the models themselves become different.

■ But **why should there be different macroeconomic theories for understanding the trends and for explaining the fluctuations?** We will now consider this question in more detail.

### Macroeconomic theory for the short run: a preview

#### Exogenous shocks

■ One of the **standard macroeconomic explanations for the short-run fluctuations** are that “the economy was hit by a **positive or negative exogenous shock**”, that is, by a sudden event which is best seen as coming **from outside the local economic system**.

■ Such an event could be either a **supply shock** like a sudden increase in the **productivity of resources**, or a **demand shock** like a sudden **rise in domestic consumption or investment**

rooted, for example, in **more optimistic expectations** concerning the future, or in a more **expansionary fiscal or monetary policy**, or in a **sudden increase** in the demand for country's **exports**.

■ To say that the sudden increase in country's production was caused by an exogenous shock, basically an **unexplained event**, is not exactly deep. But note two things. First, **economies are hit all the time by events which are best considered as exogenous** from the viewpoint of economic theory. For example, **economists should not be concerned with explaining fluctuations in harvests due to shifting weather conditions**, and probably they should not try to explain all sudden changes in the moods of consumers and investors. Focusing on a small economy, a sudden increase in the demand for exports due to events in foreign countries should also be considered exogenous.

■ Second, the **occurrence of the shock is not the end** of the story. A shock may be what initiated the change in economic activity, but **it cannot itself explain all the subsequent economic reactions** of households and firms. There is more explanation to do.

## Nominal rigidities

- For an increase in the aggregate demand for goods and services to lead to an increase in production **it must be profitable for the firms to increase their supply** of output to accommodate the increase in demand. **In the short run the capital stock is more or less given, so production can only increase if more labour is used.**
- As **more workers** come to utilize the **given capital stock**, the **marginal productivity of additional hours worked is likely to decline**. If the marginal productivity of labour is indeed falling, it seems plausible that **firms will only want to expand employment if the real wage falls**.
- The **real wage** rate is defined as  $W/P$ , where  $W$  is the money wage rate and  $P$  is the price level. Presumably the **higher demand for goods and services will lead to some increase in  $P$** . If the nominal wage rate  $W$  is rigid in the short run, this **rise in prices will indeed cause a fall in the real wage**, inducing firms to hire more labour to increase their supply of output.

- Thus **another key ingredient** in our explanation of the fluctuation is the assumption of some **short-run nominal rigidity**, in this case a rigid money wage. The assumption that nominal wage rates are fixed for a certain period of time is **quite realistic**. Firms and workers **do not renegotiate their wage rates every day** or every month, because **negotiation is a time-consuming process** involving the risk of unpleasant and costly **industrial conflict**.
- But experience also indicates that the **nominal prices of most goods and services are only adjusted with certain time intervals**. In an empirical analysis of newsstand prices of American magazines, Stephen G. Cecchetti (“The Frequency of Price Adjustment: A Study of the Newsstand Prices of Magazines”, *Journal of Econometrics*, 31, 1986) found that under an average general inflation of 4 per cent per year **magazine prices were only changed every 6 years** on the average. This means that on average the real price of a magazine is eroded by about 25 per cent by inflation before the nominal price is changed.
- The rigidity of nominal magazine prices is not just a special case. In an empirical analysis of price rigidity, Alan Blinder (“On Sticky Prices: Academic Theories Meet the Real World”, in N.G. Mankiw, ed., *Monetary Policy*, Chicago, University of Chicago Press, 1994) asked a

sample of business managers: “How often do the prices of your most important products change in a typical year?” About **50 per cent of the managers responded that they only changed their prices once or less than once a year.**

- Explaining why (most) firms do not immediately adjust their prices in response to changes in demand and cost is an intriguing issue to which we will return.

- We argued above that a **rigid nominal wage in association with a flexible, upward adjusting nominal price could create the fall in real wages** that would make it **profitable for firms to supply more output in response to a positive demand shock.** If a fall in the real wage is the typical reason why firms want to increase their output in reaction to a positive demand shock, **we should expect to observe a negative relationship between output and real wages.**

- However, **output often increases without a simultaneous decrease in real wages.** It is therefore important to ask **if an increase in the demand for output can induce firms to increase their supply even if all nominal prices are fixed in the short run** (so the real

wage does not fall)? The answer is “yes”, **provided that prices are above marginal costs** before the demand shock hits the economy.

- In practice **most markets are characterized by imperfect competition** where firms have some monopoly power enabling them to charge prices which are indeed above marginal costs. In that case they will be able to **increase their total profit by increasing their output** in response to an increase in demand, even if they have to keep their prices temporarily fixed.
- The basic point is that **short-run nominal price or wage rigidity can explain why an exogenous increase in nominal aggregate demand leads to a short-run increase in real output and employment**. If nominal prices are fixed, **all of the increase in demand will be reflected in a rise in real output**, because imperfectly competitive firms will be happy to increase their supply **as long as their (fixed) prices remain above marginal costs**.
- And even if prices increase in response to higher demand, **a rigid nominal wage means that the price hike will drive down the real wage** which in turn will stimulate employment

and output. In practice, **both nominal wages and nominal prices are rigid in the short run**, although to different degrees in different markets.

### **Expectational errors**

- There is a **third ingredient** which is essential for a full understanding of the short-run fluctuations: **expectational errors**.
- **Suppose that there is some fall in the real wage during a boom**, as **some prices increased** in response to growing demand and **nominal wages lagged behind**. Faced with falling real wages, **why were workers nevertheless willing to increase their supply of labour**, thereby enabling firms to expand employment and output?
- One possible answer is that **trade unions** in the unionized labour market had **pushed real wages above the marginal disutility of work** so that **some workers were involuntarily unemployed** prior to the demand boom. By definition, a worker who is **involuntarily**

**unemployed is willing to take a job even if the real wage falls below its current level** (provided it does not fall too much).

■ But this hypothesis begs the question **why trade unions** faced with growing labour demand would **allow the real wage to fall**? The most **plausible answer** is that the **fall in real wages was unintended by unions**. If unions had perfectly anticipated the positive demand shock and its effect on the price level, they **would have bargained for a higher money wage rate** to secure their target real wage.

■ However, since (most) **wages had to be set before the occurrence of the shock**, and since the **shock was not perfectly foreseen**, the **negotiated money wage had to be based on the expected price level** which did not include the full inflationary effect of the shock. When the shock hit and prices increased above their expected level, **unions were locked into their nominal wage contracts**, and given the **employer's right to hire more workers at the negotiated money wage**, unions had to allow their members to supply additional labour even though the realized real wage turned out to be lower than the target real wage.

- This example illustrates the point that **business fluctuations typically involve expectational errors**, in this case errors made **by workers (trade unions)**.
  
- In the case where some prices as well as money wages are rigid in the short run, an **unanticipated shock will also cause some firms to err in their expectations**. When **firms pre-set their prices** for a certain period, they will **base their pricing decisions on their expected costs** which will be influenced by the expected general price level.
  
- When the unanticipated shock hits the economy, **some firms (Group 1) will be just about to adjust their prices** and will be able to account for the inflationary cost effect of the shock. But many **other firms (Group 2) which have recently reset their prices will choose to maintain their existing prices** for a while, even though the increase in the prices charged by **Group 1 firms drives the costs of Group 2 firms** above the previously expected level. As long as the **shock does not push marginal costs above the preset prices**, even **Group 2 firms will want to expand their output** to accommodate the unexpected rise in demand.

### **Macroeconomics for the short run: summing up**

■ We may sum up the points of this section as follows: **macroeconomic theory for the short run**, intended to explain the economic fluctuations from year to year or from quarter to quarter, typically includes the following **three modelling features**:

1. **Exogenous shocks**, i.e., sudden abrupt influences on the economy coming from changes in **preferences, technology**, or economic **policies**;
2. **Short-run nominal rigidity**, i.e., some period after the occurrence of a shock during which some **prices and/or wages are sticky**;
3. **Expectational errors**, i.e., a period after the occurrence of a shock during which some prices are different from what was expected before the shock.

■ **Some short-run macroeconomic theories do not assume price rigidity**, e.g. the theory of **Milton Friedman** presented in “The Role of Monetary Policy”, *American Economic Review*, 58, 1968, and related more formal contributions such as **Robert E. Lucas, Jr.**, “Expectations and the Neutrality of Money”, *Journal of Economic Theory*, 4, 1972, or the **real business cycle theory**.

■ A main point in these theories is that **fluctuations can be understood within a framework that only assumes shocks and possibly expectational errors**, but **today it is widely accepted that short-run price and wage rigidities are indeed important** for understanding the economy's short-run reactions to shocks and that **demand shocks are important**.

### Macroeconomic theory for the long run: a preview

■ While **exogenous shocks, temporarily sticky wages or prices and erroneous expectations** are required for an understanding of the changes from year to year in unemployment and GDP, most economists think that **these features are best disregarded** when we try to explain the **“gravity level” of the rate of unemployment** and the **trend-wise gradual growth** of GDP over long periods.

- The **smooth trend curves** in Figure 1.1 and Figure 1.2 **could not possibly reflect a succession of random shocks** over the more than 100 years considered. **By definition, shocks have to go in opposite directions from time to time.**
- **If technology improves constantly each year** to imply a 2 per cent increase in GDP per head, then this **annual shift in technology should not be considered as a shock**, but rather as a **foreseeable gradual movement**. Moreover, although **nominal wages and prices** may be sticky in the short run, they **do adjust in the longer run.**
- In **macroeconomics for the long run** we therefore **abstract from the three features** which define short-run macroeconomics.

### **Long-run modelling: the basic assumptions**

- In other words, **macroeconomic theory for the long run**, intended to explain the trend-wise movements of main economic variables around which the year-to-year fluctuations occur, **portrays the economy as if exogenous shocks do not occur**, i.e., the economic

**fundamentals like preferences and technology develop in a smooth and foreseeable way** over time; **prices are fully adjusted** in all periods in accordance with the economy's full long-run price flexibility; and **expectations are correct** all the time.

■ You should carefully note the “**as if**” in this definition. In **every year the economy will be reacting to shocks**, with prices still not fully adjusted and expectational errors still prevailing. This is **because new shocks occur all the time**. Nevertheless, **certain phenomena may be better understood** by considering the economy **as if shocks did not occur**, prices were always fully adjusted, and expectations always correct.

■ Among such phenomena we include the **long-run growth** performance and the **long-run gravity level of unemployment**. Thus macroeconomic models for the long-run describe the underlying long-run equilibrium towards which the economy is gravitating, **even though** recurring shocks and the time-consuming adjustment to these shocks imply that the **economy is never exactly in this long-run equilibrium**.

## Real rigidities and natural rate theory

- The assumption in long-run macroeconomics that all wages and prices are fully adjusted in all periods means that **there are no nominal rigidities in the long term**. But there may well be **permanent real rigidities** preventing real prices and wages from adjusting to the **values which would prevail under perfect competition**. The economy's **long-run wage and price flexibility** can be **different from the flexibility** assumed in the traditional model of **perfect competition**.
- **Real rigidities may arise from the market power of trade unions**, but even if unions are weak or non-existent, there are other mechanisms which may cause significant real rigidities.
- It is well known from microeconomics that a **profit-maximizing firm facing a downward-sloping demand curve with a constant price elasticity of demand** will set its price as a **constant mark-up over its marginal cost**. As we will see later, the **unemployment problem** is to a large extent **rooted in the market distortions reflected in this mark-up factor**.

- This is because **weaker product market competition implies a higher value of the price mark-up** and this will increase the unemployment level: **when firms drive down the level of real wages by pushing prices above marginal costs, the amount of involuntary unemployment must rise.**
- When economists speak of “**real rigidities**”, they often mean that **market imperfections permanently distort the real prices and real wages** claimed by firms and workers **away from the competitive relative (real) prices** which would ensure **full resource utilization**. **Even in the long run**, when all nominal wages and prices have had time to fully adjust to their desired levels, these **structural market distortions will persist**, leaving the economy in a **state of permanent unemployment**.
- According to established tradition in macroeconomics, the **long-run equilibrium unemployment rate implied by the economy's real rigidities is called the natural rate**. This is the rate of **unemployment** emerging **when all relative prices have fully adjusted** in accordance with the economy's long-run wage and price flexibility.

- In line with this tradition, we will use the term “**natural rate of resource utilization**” to denote the **rate at which factors of production are utilized in long-run equilibrium** when the economy has exhausted its potential for price adjustment. By definition, **there are no real rigidities if perfect competition prevails**, since real (relative) prices in a competitive economy adjust until the demand for each resource equals the full supply of that resource.
  
- We have suggested that the **degree of real rigidity may be measured by the level of the natural unemployment rate**. We should add that economists sometimes find it fruitful to work with a **slightly different concept of real rigidity**.
  
- In this alternative definition, the degree of real rigidity is measured by the **responsiveness of real wages and real prices to a short run change in the unemployment rate** away from the natural rate. If this responsiveness is low, the degree of real rigidity is said to be high. In any case, real rigidity in a broad sense refers to the fact that the economy's degree of relative price flexibility is less than it would be in an ideal world of perfect competition.

### **The crucial role of the supply side in long-run modelling**

- The **natural rate of employment is given from the supply side** of the economy, since the **mark-up** parameters, the **behaviour of trade unions** are characteristics of the economy's **supply side structures**.
- This has an important implication: **in macroeconomic models for the long run**, where wages and prices are assumed to be fully adjusted in all periods, **output is determined solely from the supply side**.
- In any given period there is a certain labour force  $L$ , and a certain (predetermined) capital stock  $K$ . Output is then completely constrained from the supply side, since it cannot exceed the volume which can be produced by means of the labour input  $(1 - u)L$  and the predetermined capital input  $K$ .
- By contrast, **in short-run macroeconomic models** nominal wage and price rigidities and/or expectational errors may cause **employment to deviate from its natural rate**. Hence

we **do not have the simple supply side determination of employment** just described. Instead, **employment is also influenced by the aggregate demand** for goods and services.

■ Thus, **in long-run macroeconomic models employment always corresponds to the natural rate**, whereas in **short-run models employment** is determined also from the demand side and **fluctuates around the natural rate**.

### Static versus dynamic models

■ A **macroeconomic model for the long run can be a single-period static model**. This may seem surprising, but sometimes it is useful to focus on a **single period which is an “end period”** in the sense that **no new shocks** have occurred for a long time and the **economy has finished all its adjustments**. The purpose is to characterize the **equilibrium towards which the economy is tending in the long run**, without complicating the theory with an explicit analysis of the **dynamic process** which takes the economy to the long-run equilibrium. The **models of long-run structural unemployment are of this nature**.

■ By contrast, **dynamic models for the long run describe the process of capital accumulation explicitly**, and typically they also **describe the evolution** of other important **stock variables such as the labour force**, the stock of **natural resources**, etc. These models, also called **growth models**, always contain the following **dynamic link between the current flow of investment and the increase in the stock of capital**:

$$K_{t+1} - K_t = I_t - \delta K_t \quad 1.1$$

where  $K_t$  is the amount of capital available in period  $t$ ,  $I_t$  is gross investment in period  $t$ , and  $\delta$  is the rate at which capital depreciates.

■ **In a closed economy the level of gross investment  $I_t$  must equal gross savings  $S_t$** . For a closed economy the capital accumulation equation therefore becomes:

$$K_{t+1} - K_t = S_t - \delta K_t \quad 1.2$$

- Thus **savings play a central role in growth models**. In many models it is simply assumed that households always **save an exogenous fraction  $s$**  of total income so that in any period  $t$  we have  $S_t = sY_t$ . The growth models using this assumption are called **Solow models**.
- There are **more advanced growth models** in which **savings are derived from maximization** of utility functions under appropriate budget constraints (Ramsey model, Overlapping Generations Model).
- **Solow models** are well suited and **widely used for understanding many growth issues**. However, for analysing the effects of economic policies, these models have the **shortcoming that they do not contain utility functions** and therefore **do not allow an explicit evaluation of the welfare consequences** of alternative economic policies. **In Solow models** one will just have to look at the policy implications for economic variables like **GDP** or the level of consumption, and simply **assume that it is “good” to have high per capita income** or consumption.

## Long-run versus short-run economic policies

- A **main motivation** for studying economic phenomena is the need **to improve the basis for economic policy advice**. For instance, we want to understand the **sources of economic growth** because this could be helpful in designing a **growth-promoting policy** for a low-income country trying to escape poverty.
- The division of macroeconomics described above leads to a parallel **division of economic policies into long-run policies** aimed at promoting **growth** and long-run prosperity and at reducing long-run **unemployment**, and **short-run policies** aimed at mitigating **economic fluctuations** and their harmful consequences coming, for example, from sudden increases in unemployment.
- However, the division of macroeconomics suggests more than this categorization of policies according to their aims. The basic and **different assumptions underlying the two parts of macroeconomic theory** have consequences for the **channels** through which long-run and short-run policies can affect the economy.

- For example, recall that long-run macroeconomics assumes full nominal wage and price adjustment. This implies that long-run unemployment is determined exclusively by the parameters which reflect the structural characteristics of labour and product markets. Because it is rooted in the basic structural features of the economy, the natural rate of unemployment is also referred to as the “structural” unemployment rate.
- It follows that a **policy intended to reduce long-run unemployment can only be successful if it affects the economy's basic structures**. Specifically, our analysis suggests that such a policy must try to **increase the degree of competition in labour or product markets** and/or **reduce the generosity of the system of unemployment insurance**.
- In richer models of the labour market there are other ways of reducing the natural unemployment rate, such as **improving the level and composition of work skills** through **education and training** to attain a better match between the skills possessed by workers and the skills demanded by employers.

- In a similar way, **policies aimed at promoting long-run growth and prosperity** must affect one or several structural characteristics of the economy such as the **long-run propensities to save and invest**, to engage in **education** and **R&D**, etc. In short, **policies for the long run must be structural policies**.
- A **short-run policy to mitigate business cycles**, on the other hand, can be a **monetary or fiscal policy of demand management**. Such a policy can affect the rate of employment in the short run **even if it does not influence the basic structures and incentives** in the economy. The reason is that **in the short run prices and expectations are not fully adjusted**, and hence **changes in nominal demand will affect real economic variables**.

## Summary

- The economy's long-run equilibrium is the combination of relative prices and quantities which would emerge in a general equilibrium where wages and prices have had time to adjust fully to past shocks and where no further shocks have occurred over a sufficiently long period.

- If the long-run equilibrium is the outcome of perfect competition, all economic agents have taken wages and prices as given and found their optimal price-taking supplies and demands, and prices have adjusted to equate these supplies and demands market by market.
- In practice empirical studies often find that prices are above marginal costs, indicating that most markets - including the labour market - are characterized by imperfect competition. Still we can think of long-run relative prices as being determined by an underlying general equilibrium system, although not one that ensures equality between price-taking supplies and demands.
- The natural rate is the rate of resource utilization emerging when relative prices have fully adjusted to their long-run equilibrium values. Imperfect competition typically means that the natural rate is less than 100 per cent. When this is the case, we say that real rigidities prevail. Real rigidities imply that individual agents do not wish to reduce their real (relative) wages and prices very much in response to unemployment or excess capacity. Hence real wages and prices do not adjust sufficiently to prevent permanent underutilization of resources.

- Macroeconomics for the long run aims at explaining the trends in main economic time series and the effects of structural economic policies. In long-run macroeconomics the economy is analysed as if relative prices are fully adjusted to their long-run equilibrium values in each period, the fundamentals of the economy such as preferences and technology evolve smoothly and predictably, and expectations are correct all the time. One implication is that in long-run macroeconomics aggregate output is determined from the supply side alone, as the level of output that can be produced when available resources are utilized at their natural rates.
  
- Short-run nominal wage and price rigidities mean that some money wages and/or prices are fixed over a certain period. Empirical evidence shows that most money prices and money wages are only adjusted with certain time intervals even under considerable inflation. Thus nominal rigidities prevail in the short run, and these may cause the rate of resource utilization to deviate from the natural rate for periods of sufficient length to be of interest.
  
- Individual agents adjust their nominal wages or prices with the purpose of changing their real wages or prices. Because real rigidities imply that agents do not want to change their real

prices very much in response to changes in economic activity, real rigidities also tend to generate nominal rigidities. When the degree of real rigidity is strong, short-run nominal wage and price rigidities can be privately optimal even if the menu costs of nominal wage and price adjustment are very small. At the same time the social cost of nominal rigidity can be many times as large as the perceived private cost for the individual agent.

- Short-run nominal wage and price rigidities may imply that some relative prices are also fixed in the short run. For instance, if both nominal wages and nominal prices are fixed, real wages are fixed. Short-run nominal rigidities can explain why it takes time for relative (real) prices to adjust to their long-run equilibrium levels.
- Macroeconomics for the short run seeks to explain the fluctuations in main economic time series around their trends and the effects of stabilization policies. Economists believe that exogenous shocks (sudden unpredictable changes in factors such as business confidence, preferences and technology), short-run nominal wage and price rigidities, and expectational errors are fundamental for understanding short-run fluctuations. Because of nominal rigidities and expectational errors, the actual rate of resource utilization can deviate from the natural

rate. In the short run aggregate demand is therefore just as important for economic activity as aggregate supply.