



Course: Economics I (macroeconomics)

Study text

3rd Chapter

Macroeconomic Equilibrium

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3 Macroeconomic Equilibrium

In this chapter aggregate demand and aggregate supply will be defined and illustrated. The AS/AD, the model of macroeconomic equilibrium, will be introduced. The emphasis will be placed on the resolution of short and long term and the related resolution of short- and long-term aggregate supply. Two basic concepts of two controversial macroeconomic equilibrium - classical and Keynesian will be explained. There are assumptions of macroeconomic equilibrium resulting in different interpretations of macroeconomic problems and subsequently in different recommendations for choosing tools of macroeconomic policy.

All effects on macroeconomic outcomes are transferred through aggregate supply and aggregate demand. Aggregate supply and aggregate demand determine the equilibrium level of output and the price level. An economy leads to an equilibrium output and equilibrium price level, which is formed on the basis of the intersection of aggregate supply and aggregate demand.

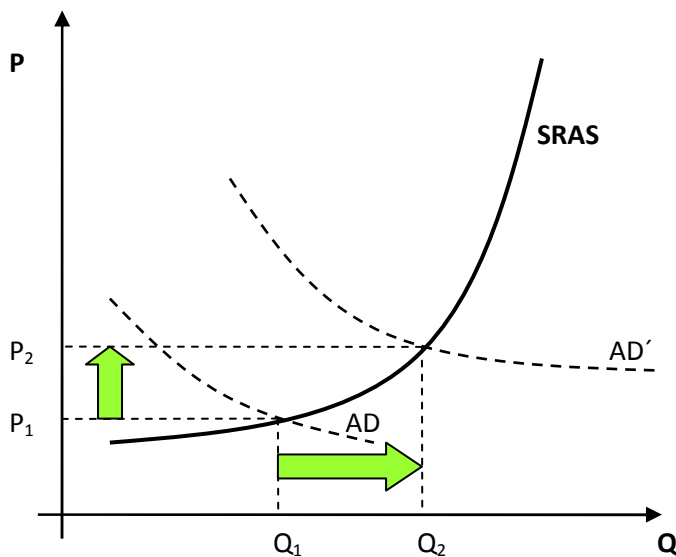
3.1 Aggregate Supply

Aggregate Supply (AS) is used to express the aggregate output in the economy. Aggregate supply curve determines the relationship between the total quantity of production supplied and the price level in the economy. Aggregate supply curve is the sum of individual market supply curves. The shape of the AS curve is explained by different economic schools in different ways. Most economists agree the opinion that in the short run aggregate supply is increasing from left to right and in the long run AS is vertical.

Aggregate supply in the short run

Aggregate supply is denoted as SRAS (SR - Short Run). It expresses a positive relationship between the quantity supplied and price level. The relationship can be written as follows: $Q_s = f(P)$, where Q_s represents the quantity supplied and P represents aggregate price level in the economy. SRAS curve is increasing from left to right and the law of supply means that companies are willing to increase their output only if they can raise the price of their products.

Fig. 3.1 Short run aggregate supply curve SRAS



In the short term, especially in situations where the product is very low, the short-run aggregate supply (SRAS) is very flexible (almost horizontal). It reflects the dependencies between products and prices, asserting itself in the time horizon 1-2 years. As can be seen in Fig. 3.1, if the aggregate demand rises from AD to AD' , companies are willing to increase their output (from Q_1 to Q_2), if they can increase the prices of their production (from P_1 to P_2) simultaneously. SRAS is very flexible where the economy does not use its resources fully, so economic output (Q) growth is greater than the price level (P) growth.

What does cause that the short-run aggregate supply is sloped positively?

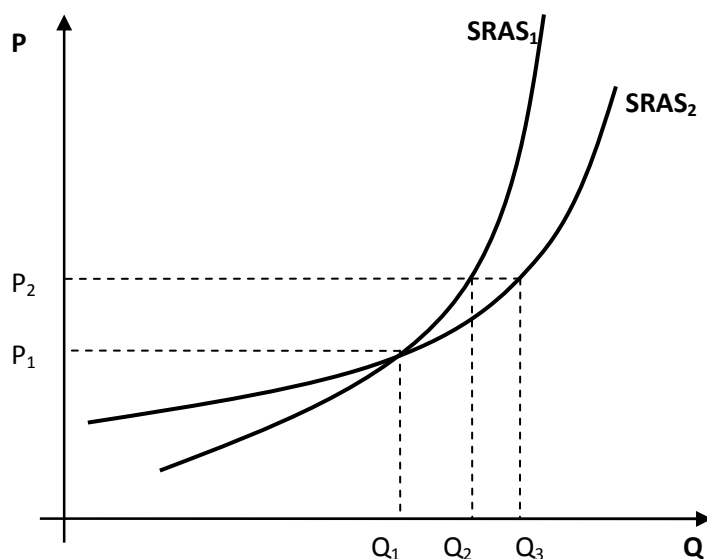
One way to explain the positive slope of the aggregate supply curve in the short term is the approach of monetarism. SRAS curve is increasing, because in a short period households or firms perceive the price level incorrectly. This is called *money illusion*, mainly households respond to changes in nominal, not real variables. On the basis of a monetary illusion, economic operators misinterpret changes in nominal variables such as changes in the real variables resulting in change of their economic performance.

Another concept explaining the positive slope of the SRAS is the **Keynesian concept**. Its assumption is that within a short period wages and prices are not flexible – they are characterized by certain rigidity. In this context, it must be said that both price and wage rigidity, have significant impact on the profitability of individual firms, and thus on their economic output in a short period. The main reasons for rigid wages and prices, indicating in particular long-term contracts between employees and employers on the amount of nominal wage and price rigidity in the case of particularly the reluctance of companies to bear the costs that are associated with the revaluation of the goods (called *menu costs*).

We will accept **some costs are constant in the short run**, and therefore firms are willing to produce additional output at higher prices.

We will also examine the slope of SRAS curve. In the short term, firms can increase the volume of production. They have to increase amount of inputs. The slope is dependent **on the marginal productivity of labor**. The flatter (steeper) the curve of marginal productivity of labor (MPP_L), the flatter (steeper) the short run aggregate supply curve (SRAS).

Fig. 3.2 Slope of the short run aggregate supply curve SRAS



In Fig. 3.2 firms produce Q_1 at the price level P_1 . When increasing AD curve, firms are willing to produce more. $SRAS_2$ curve is flatter than $SRAS_1$, we can see that the growth of the price level from P_1 to P_2 is a curve with $SRAS_2$ where firms supply a higher amount of total production compared to Q_3 of $SRAS_1$ curve, where firms are able to produce a smaller amount of output Q_2 . The labor productivity is higher in the case of a flatter curve $SRAS_2$.

Supply shocks (shifts)

Supply shifts or shocks are **movements of SRAS or LRAS curve to the right or to the left**. First we will examine shifts of SRAS. We distinguish between:

- **positive supply shocks** when the SRAS curve shifts to the right; there are rising volume of production in the economy and the price level falls when stable AD curve. In other words, we say that SRAS grows;
- **negative supply shocks** when the SRAS curve shifts to the left; the real output decreases and the price level is growing when stable AD curve. In other words, we say that SRAS decreases.

In economic theory, we distinguish:

Nominal supply shocks that are associated with a change in costs, and these changes are usually caused by increasing or decreasing:

- **nominal wage rates, social security contributions from employers or changes in expectations regarding the future development of the price level.** For example, the decline in wage rates will lead to a decline in the total costs of firms and thereby SRAS curve shifts to the right (SRAS rises);
- **commodity and energy prices,** this change may be associated both with the change of commodity and energy prices at world markets (e.g. a significant rise in oil price) and the appreciation or depreciation of the domestic currency (including the change of import duties. For example, the decline in commodity and energy prices or appreciation of the domestic currency causes SRAS shifting to the right (SRAS rises);
- **changes in tax rates,** including direct and indirect taxes. If the rate of value added tax (VAT) decreases, it is like costs decreasing and SRAS curve will shift to the right (SRAS rises).

Real supply shocks are associated with a change in the production function, which primarily affects the level of growth or decline of:

- **labor productivity,** usually caused by a change in workforce skills. If employees raise their qualification, then in most cases, labor productivity increases and it will be reflected in the growth of profit. Labour productivity growth will lead to a shift in the production function upward and SRAS will shift to the right (SRAS rises);
- **capital stocks,** i.e. the extension or disposal of certain manufacturing equipment. For example, when a firm expands its production equipment, it will lead to growth in the volume of production and it is reflected subsequently in a shift of SRAS to the right (SRAS rises);
- **the number of population.** This change may be associated with natural population growth or population decline, and with the influx and outflow of labor. If a number of population rises, this growth will lead to a shift of the production function upward and SRAS curve will shift to the right (SRAS rises);
- **changes in technological progress,** i.e. changes associated with the improvement of the technical level of production facilities, increasing soil fertility or by going to use resources with better quality. When a company introduces a new production technology, we can assume that this change will lead to growth in the volume of production and thus the SRAS curve will shift to the right (SRAS rises).

Fig. 3.3. The positive supply shock or growth curve SRAS

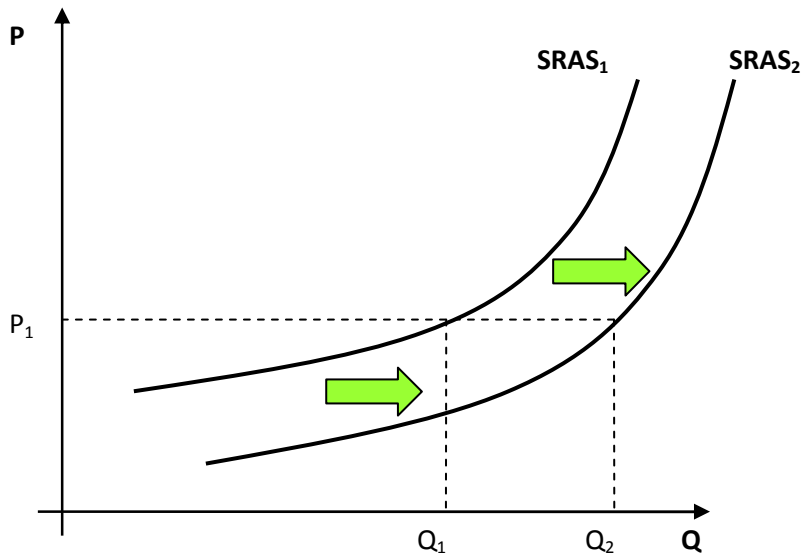


Fig. 3.3 illustrates positive supply shock, when at a constant price level P_1 companies are able to produce higher production volumes. We can see an increase in production volume from Q_1 to Q_2 . The supply curve shifts to the right. However, the equilibrium volume of production depends on aggregate demand (AD).

Fig. 3.4 Negative supply shock of SRAS curve

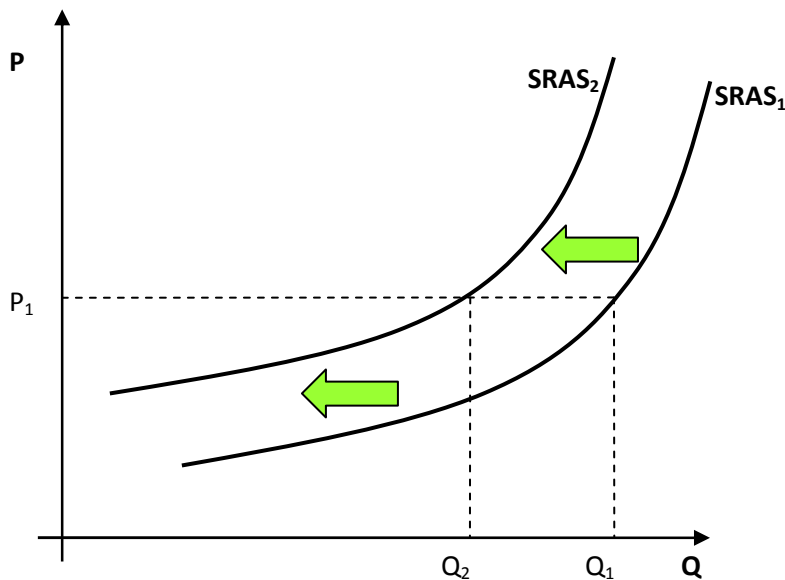


Fig. 3.4 demonstrates a negative supply shock, when at a constant price level P_1 firms decided to reduce their output from Q_1 to Q_2 , the SRAS shifts to the left, the new equilibrium output will be created in the intersection point of SRAS and AD curve.

Aggregate supply in the long run

Aggregate supply in the long term is referred to LRAS (LR - Long Run). Economists agree there is the process of adapting the new pricing conditions in the long run. Firms are not able to take advantage of fixed costs and **aggregate supply curve in the long run becomes vertical**.

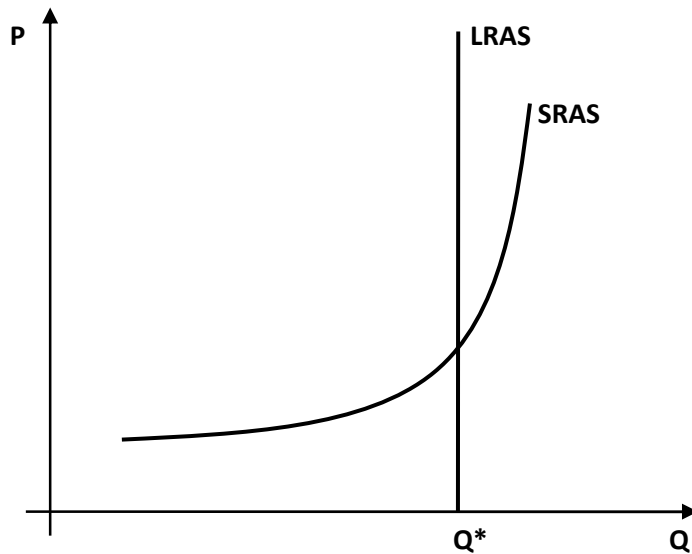
In the long term the output of the economy is determined by a straight line. There is an output that is sustainable and unbreakable in the long (under the given conditions – that is quantity of factors of production, quality of inputs and the level of technology) This output is called **potential output**.

Potential output is the maximum sustainable long-term performance and it cannot be exceeded (under the given conditions in the economy).

The potential product is a product in terms of fully used inputs. The maximum effective use of inputs can be demonstrated by using the **production possibilities frontier** (PPF). If the frontier moves to the right, it means that the economy has the new higher capacity to produce more goods and services - potential output increases.

The **actual product** is something else. The actual product is the economy actually achieves at a given time. The actual product may indeed be higher than the potential, but not in the long run. This means that the potential product is not a product of the maximum, but the maximum sustainable product under given conditions. The following Figure 3.5 demonstrates the short and long-run aggregate supply. Long-term aggregate supply curve LRAS determines the potential product denoted by Q^* or Y^* .

Fig. 3.5 Short-term and long-run aggregate supply



In case of the potential GDP growth LRAS curve moves to the right and determines an higher level of potential output Q^* . SRAS curve moves together with long-term aggregate supply. Production possibilities frontier shifts to the right in case of economic growth.

Only **real supply shocks** can affect the position of long-run aggregate supply. That is, the vertical line LRAS moves leftward or rightward.

3.2 Aggregate demand

Aggregate demand (AD) includes the relationship between the quantity demanded Q_D and the general price level. When increasing price level, quantity demanded decreases. The relationship $Q_D = f(P)$ is negative in case of aggregate demand. Aggregate demand is the sum of all market demands and has the typical shape of a decreasing function. It expresses what all economic operators would buy at various price levels and it means effective demand. Aggregate demand consists of planned expenditures of all economic operators. The structure of aggregate demand can be expressed as the following:

$$AD = C + I + G + NX$$

Aggregate demand consists of planned household consumption expenditure (C), planned investments companies (I) of government expenditure on purchase of goods and services (G) and net exports (NX). Individual market operators may be households, firms, government and foreign entities.

The **C, I and NX**, are dependent on the price level. Government spending should be considered rather constant. The relationship between the price level and the size of

aggregate demand is inversely proportional. In case of decline in the price level planned aggregate expenditures grow.

If the price level falls, then an immediate impact on household spending (C) is such that their disposable income remains the same nominally, but its real value increases. This means households are able to buy more goods and services. Consumer behavior is described by **the Pigou effect** or **the effect of wealth**. Households are willing to increase their total expenditure on the purchase of goods and services.

The fall in the price level results in also means increased purchasing power of money. Therefore households will want to hold less money and demand for other financial assets will increase. Assets prices will rise and nominal interest rates will fall. The decline in interest rates will boost investment spending. Subsequently it will cause increase in aggregate demand. This phenomenon is known as **Keynes effect of interest rates**.

Declining domestic price level can stimulate **demand foreign economic entities** for goods in the domestic economy.

Change of any component of aggregate demand (C, I, G, NX) affects the position of aggregate demand curve.

Fig. 3.6 Aggregate demand curve and its shifts

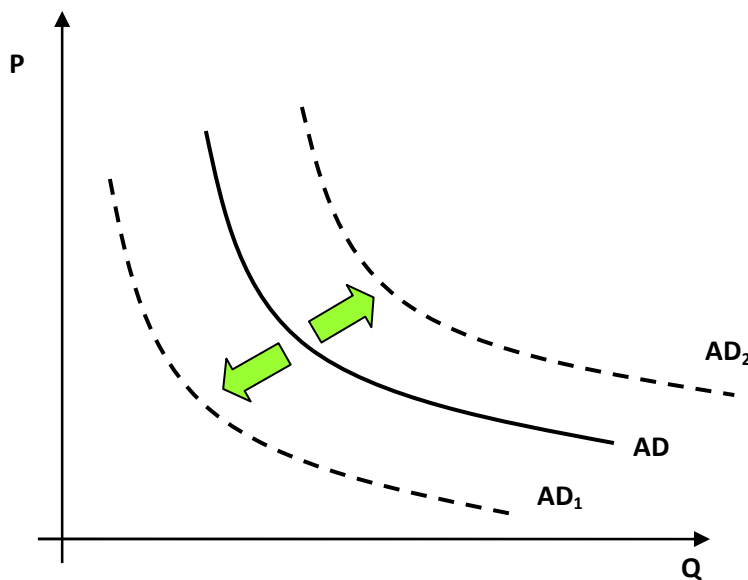


Fig. 3.6 illustrates the shifts of AD curve. When any components of AD decreases, there is a shift to the left (AD falls to AD_1). When any component of AD increases, there is a shift to the right (AD rises to AD_2).

The shift to the position AD_1 indicates a **negative demand shock** and the shift to the position AD_2 represents **positive demand shock**. There are examples of **positive (negative) demand shocks**:

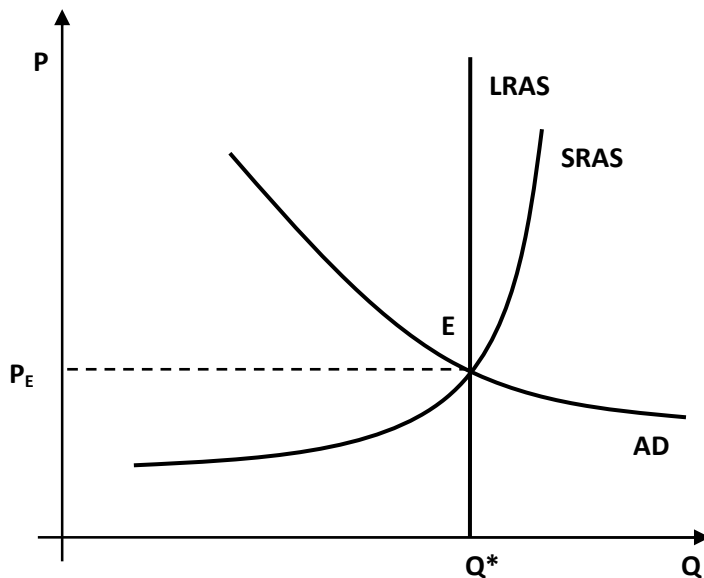
- **increase (decrease) in household wealth** and the related increase (decrease) in consumer spending,
- **decrease (decline) in rates of income taxes**, stimulating (weakening) growth in consumption and investment spending,
- **decrease (increase) in interest rates** stimulating (weakening) growth in capital expenditures, or consumer and government purchases,
- **increase (decrease) in money supply**, reflected in the increasing (decreasing) demand for goods and services,
- **optimistic (pessimistic) expectations** regarding future economic development, e.g. the optimistic expectations of consumers and investors will stimulate investment and consumer spending,
- **increase (decrease) in number of population**, leading to an increase (decrease) in consumer spending or investment (i.e. construction of houses),
- **increase (decrease) in government spending or transfer payments** – it is the government decision,
- **increase (decrease) in exports**, e.g. an increase in net exports can be stimulated by the growth in foreign income, the growth of foreign price level, depreciation of the domestic currency, export measures or foreign trade liberalization,
- **decrease (increase) in imports**, e.g. a reduction in imports due to devaluation of the domestic currency, when domestic operators redirect their spending to buy relatively cheaper domestic goods; or due to the tariffs implementing or increasing and due to other protectionist measures,
- **expected inflation**. The planned expenditure will increase when expected increase in the price level,
- **other circumstances**, i.e. the macroeconomic policy or changing consumer preferences etc.

Household spending (C) and private domestic investment (I) are the main changing components of aggregate demand. Their change is reflected in the change of the total aggregate expenditures, then in product and price level.

3.3 Conception of macroeconomic equilibrium

The macroeconomic equilibrium means such a state in the economy that does not cause a change of economic operators' behavior. Macroeconomic equilibrium represents equality of aggregate demand to aggregate supply. Macroeconomic equilibrium is shown in Fig 3.8 – by the point E and in this picture the real product is located at the level of potential output Q^* (actual product equals the potential product).

Fig. 3.8 Macroeconomic equilibrium - AS/AD model



Macroeconomic equilibrium is usually illustrated by **the AS/AD model**. This model depicts the economy as a whole, the x-axis represents real output (Q or Y , respectively real GDP) and the y-axis indicates the aggregate price level, respectively price index (P). Point E determines the equilibrium output Q^* (here it is also potential output of the economy) and the equilibrium price level P_E .

Equilibrium in AS/AD model contains equilibriums on the aggregate:

- **production market (or market of goods and services)**
- **labor and land markets,**
- **financial markets (i.e. capital market and money market).**

Conception of macroeconomic equilibrium represents an important position to deal with macroeconomic issues, in particular to define the role of government in the economy. In macroeconomics, there is a distinction between the classical conception and the Keynesian macroeconomic approach. Based on different underlying assumptions, different conclusions and recommendations for macroeconomic policy were formulated.

A. The classical concept of macroeconomic equilibrium

The classical concept of equilibrium is historically older than the Keynesian concept, occurs currently in theoretical concepts of contemporary conservative streams of economics. This concept is built on the assumptions of (neo)classical economics, on the tradition of liberal economic thinking.

The classical model assumes flexible prices at the production market and flexible prices at factor markets. Markets tend towards equilibrium when changing prices.

Savings and investment meet at the capital market. Household savings are dependent on the size of the interest rate (rising interest rate stimulates the formation of household savings). Conversely, investments are indirectly dependent. Rising interest rate reduces incentives to invest. Changing interest rate ensures the equilibrium at the capital market.

Fig. 3.9 The capital market in the classical concept of macroeconomic equilibrium

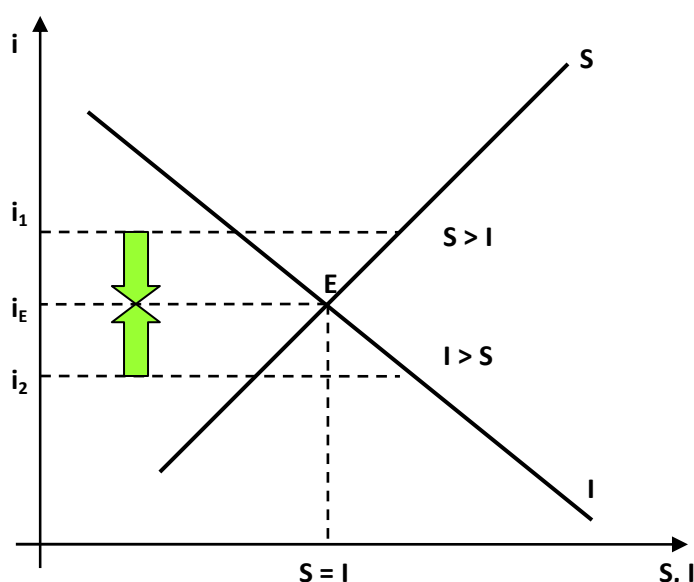
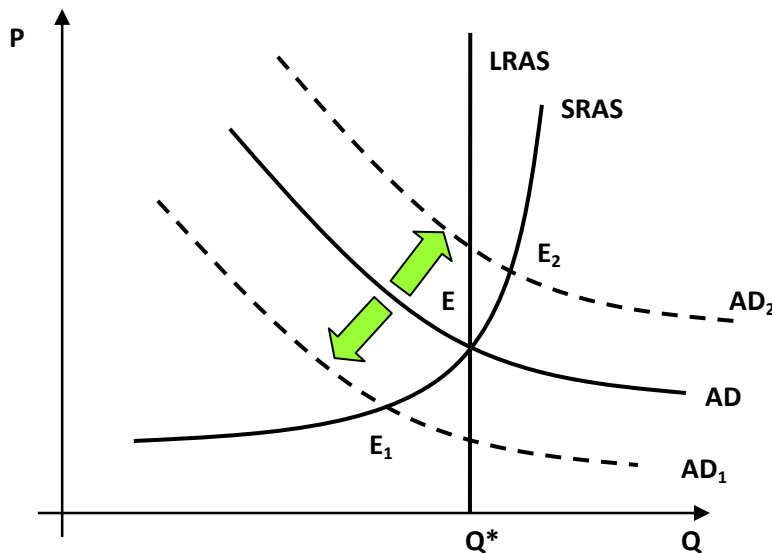


Fig. 3.9 illustrates the capital market. The vertical axis represents the rate of interest (i), and the horizontal axis represents savings (S) and investments (I). The savings are directly dependent on the interest rate, and therefore showed as increasing function. Investment is indirectly dependent on the interest rate and declining. Point E represents equilibrium. It determines the equilibrium interest rate i_E and the equality of savings and investments ($S = I$). Flexible interest rates ensure transition of savings to investment. When the interest rate i_1 is greater than the equilibrium interest rate, savings is greater planned investments ($S > I$), and there is a surplus of available funds and the interest rate will tend to decline to the level of i_E . In case of interest rate i_2 , there is situation ($I > S$), the interest rates will rise to the level i_E . If the capital market is able to achieve equilibrium (point E), and savings are transformed into

investments, the economy is able to operate at the level of potential product – as illustrated in Fig. 3.10.

Fig. 3.10 Market equilibrium of final production in the classical conception



The macroeconomic equilibrium corresponds to the level of potential output (full employment). If there is a reduction of planned aggregate expenditures (AD shifts to the left down to the level of AD_1), new macroeconomic equilibrium will be created at point E_1 , at the intersection of SRAS and AD_1 . The new equilibrium point E_1 determines the lower performance of the economy and a lower level of average price level.

The decline in output is accompanied by non-use of all inputs, the rate of unemployment rises. This will tend to reduce inputs prices. It will allow decreasing prices of final production. According to the law of demand households are willing to buy higher amounts of production. The new macroeconomic balance will be created at the intersection of AD_1 and LRAS curves. The economy's output is again at the level of potential output, but at a lower price level. Nominal variables have fallen, but real variables have remained stable.

When AD curve shifts to AD_2 , new macroeconomic equilibrium is formed at point E_2 . The new equilibrium point E_2 determines greater real output compared to the potential product and a higher level of price level. Increased aggregate demand motivates firms to produce more. Inputs demands increase and it will cause increase prices of inputs. In the long run higher costs will be reflected in the rise in prices and the macroeconomic equilibrium will be created at the intersection of LRAS and AD_2 curve. Again, the output equals the potential output, but it is accompanied by higher level of prices. Nominal variables have increased, but real variables have remained stable.

The classical model describes how the economy is an inherently stable system. Price mechanism responds to stimuli from the equilibrium aggregate demand and returns the actual output of the economy to the level of potential output. This finding allows questioning the effectiveness of the expansionary fiscal and monetary policies.

B. Keynesian macroeconomic equilibrium approach

The Keynesian model of macroeconomic equilibrium concept is historically younger. It is based on different assumptions in comparison with the traditional classical model. It assumes limited flexibility or inflexibility of prices as a cause of imperfectly competitive environment. Some prices may be regulated. The inflexibility of prices includes wage rigidity at the labor market (due to labor unions and macroeconomic policy).

At the capital market savings is not dependent on the interest rate, but on the amount of disposable income. Savings are made up when disposable income exceeds consumption ($YD > C$). Investment depends not only on the interest rate, but also on the marginal efficiency of capital (capital returns) and on expectations of future development. Interest rates lose the ability to create equilibrium. If there is a distortion at the market of capital, savings is not transformed to investment and the economy is to operate below the potential product.

Fig. 3.11 The capital market in Keynesian macroeconomic equilibrium approach

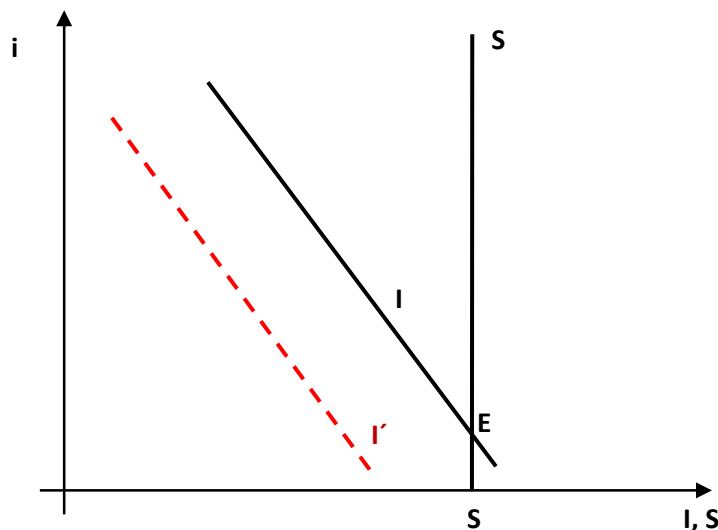
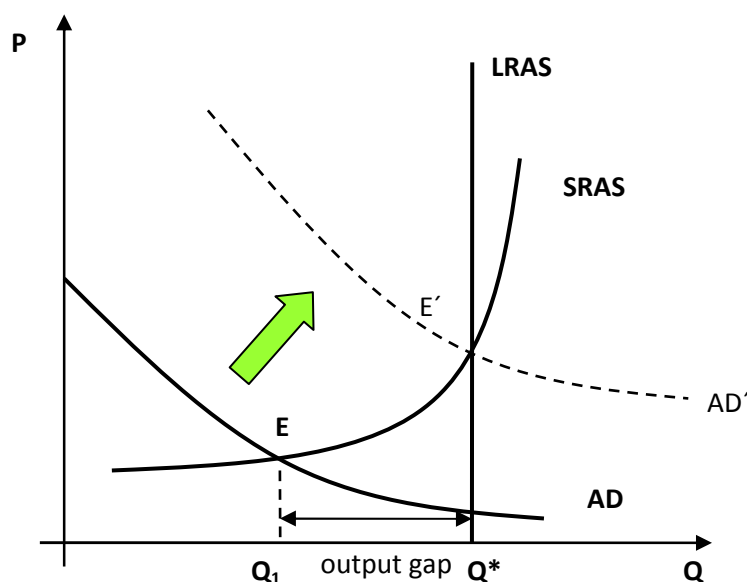


Fig. 3.11 illustrates the capital market in the Keynesian concept of equilibrium. Because savings is dependent on the disposable income of households, it is shown as a vertical line. Planned investment is partly dependent on the interest rate. Equilibrium - point E is formed as a meeting-point of the planned investments and saving. Savings may be transformed into investments at the point E. Under the conditions of reduced sensitivity of investment to interest rate there could be a

situation when even a very low rate of interest does not ensure the equilibrium at the capital market and not to convert savings into investment (see I').

Thus the real output lags behind the level of potential output. This situation is called **output gap** due to non-use of production capacity and output gap causes higher unemployment rate. Fig. 3.12 demonstrates the output gap.

Fig. 3.12 Market equilibrium of final production in Keynesian concept

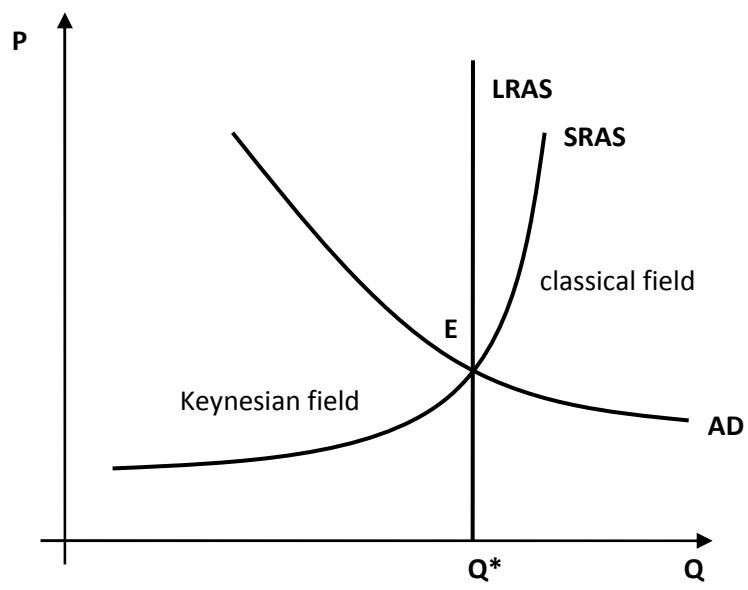


Point E determines the output of Q_1 , that is lower than potential output Q^* , and the equilibrium price level. The output gap is defined by the difference between potential and actual output ($Q^* - Q_1$). Notice that SRAS curve is very flexible. This fact leads to the finding that increasing aggregate demand causes greater rise in real output than in price level. Therefore, Keynesian economics is oriented on demand-side of the economy.

The economy is perceived as an unstable system. This conclusion led to emphasize the active role of the state in the economy and promotion of expansionary economic policy measures that would increase aggregate demand (in Fig. 3.12 to AD' level) and subsequently the product and employment.

Today we distinguish Keynesian and classical field along the SRAS curve. We talk about **nokeynesian compromise**. Keynesian field is located along the short run aggregate supply curve SRAS left from potential output. Short run aggregate supply curve is flexible. Classical field is defined along the short run aggregate supply curve SRAS right from potential output. Short run aggregate supply curve here is very inflexible. It implies what happens when increasing aggregate demand. Keynesian and classical field are shown in the following figure 3.13.

Fig. 3.13 Neokeynesian compromise



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