

Adjusted GDP: Real, PPP, and Inflation (book page 409)

So far we have dealt with the nominal GDP: the GDP unadjusted for prices. Since we multiply the amount of good produced with the price of the good, we can intuitively see that if prices were too double, the GDP would double too without any increase in output. This leads to the following question: is GDP a good indicator to measure (material) living standards? The teacher's answer is no. If we want to find a better 'version' of GDP to illustrate living standards, we have to start taking several other factors into account.

Inflation

Inflation is simply the phenomenon of rising prices. If over the course of one year prices on average rise by 1%, then inflation is 1%. In order to realistically measure inflation, we create *indexes: the average price level for a basket of goods*. Two indexes are particularly important.

The consumer price index, or *CPI, measures how much a basket of goods and services costs today in comparison to a base year*. Imported goods are included in this. The CPI is given by the following formula:

$$CPI = \frac{(P_{NEW} \times Q_{Base})}{(P_{Base} \times Q_{Base})} \times 100$$

The GDP deflator is the average price for all goods and services included in the GDP compared to a base year. It is the average price level in the economy.

$$GDP\ Deflator = \frac{Nominal\ GDP}{Real\ GDP} \times 100$$

We see that the denominator is called real GDP. This is the *GDP calculated with the prices of a base year*. See the slide 14 in the first powerpoint.

How do we turn this into a number that shows us inflation? We look at how much the GDP deflator or the CPI changes over the course of time. Each will yield a different number. The multiplication by one hundred at the end is there to get an outcome in percentages.

$$Inflation_{CPI} = \frac{CPI_{current\ year} - CPI_{base\ year}}{CPI_{base\ year}} \times 100$$

$$Inflation_{deflator} = \frac{deflator_{current\ year} - deflator_{base\ year}}{deflator_{base\ year}} \times 100$$

We can similarly calculate the growth of the GDP:

$$Growth\ of\ GDP_{nominal} = \frac{GDP_{nominal\ current\ year} - GDP_{nominal\ base\ year}}{GDP_{nominal\ base\ year}} \times 100$$

There is also *structural unemployment: unemployment caused by changes in the economic structure*. This can happen because certain markets undergo a declining demand for their goods (change in demand patterns), because new production methods make employees redundant (technological unemployment), or because a geographically concentrated industry collapsed (geographical unemployment).

Finally, there is *seasonal unemployment: this occurs when the demand for certain types of labor fluctuates with the seasons of the year*. This is especially important in the tourist sector, when extra employees are needed during the holiday seasons.

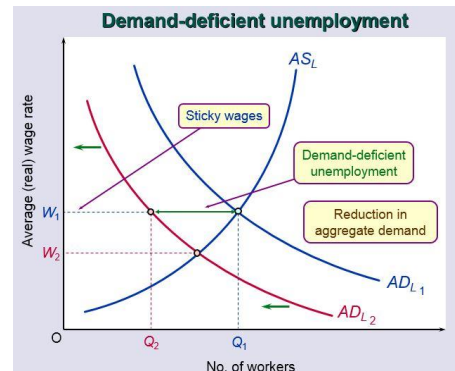
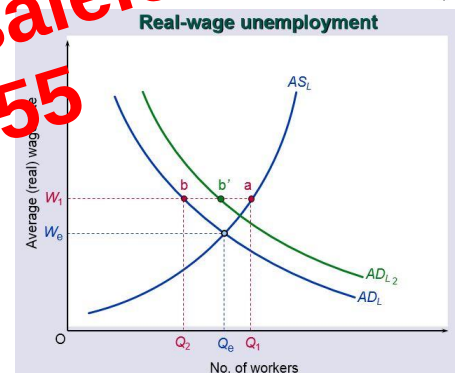
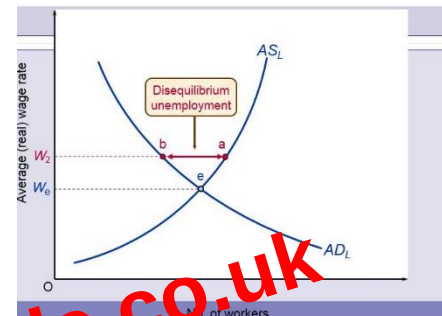
Disequilibrium Unemployment

Disequilibrium unemployment occurs when the wages are above the equilibrium wage.

There are three different types of disequilibrium unemployment. The first is *real wage unemployment* and occurs when unions use their power to drive wages above the market equilibrium or the government setting the minimum wages too high. There is a positive economic effect, however. If the real wages go up, those persons employed will spend more money and the aggregate demand for goods and services will go up. This in turn will shift the demand for labor to the right, since the firms need more employees to meet the additional demand.

The second type of disequilibrium unemployment is the *demand deficient or cyclical unemployment*. This is associated with economic recessions. When the demand for goods and services falls, the firms will after a while decrease output and lay off personnel. Once the economy starts growing again the demand will rise and the output will increase, which will make the cyclical unemployment drop. However, one could argue that if the demand for labor falls, there would be no disequilibrium unemployment because there would be a new equilibrium at a new wage rate. The problem lies in the *stickiness of wages*: if there is a new equilibrium with a lower wage rate, then people won't be willing to accept this new wage and will, at least initially, prefer to be unemployed. Only after a long time will the wages adjust. Thus, *wages are sticky in a downward direction* (not upward, of course, since anyone is immediately willing to accept a higher wage).

The last kind of disequilibrium unemployment is caused by a *growth of the labor supply*. This will cause the wages to fall. Since the supply for labor changes relatively slowly, this too is a serious case of unemployment.



CHAPTER 18: Banking, Money and Interest Rates

The Meaning and Functions of Money (book page 524)

Simply put, *money is a widely accepted means of payment*. However, this is a lot more than notes and coins: these make up only a very small portion of a country's money supply. Most of it is deposits in banks and other financial institutions.

Why the need for money? Because if we relied solely on bartering, then the price of every good would have to be known in terms of other goods: a single good would have many prices expressed in other goods. This is extremely inefficient. A single accepted means of payment and a single price make trading much easier. In the money economy, a single good has only a single price expressed in the locally accepted medium of exchange (the local currency).

Money serves three main purposes:

- It is a *medium of exchange*: because bartering is impractical in the modern economy, a medium of exchange is needed to make trade easier. This medium of exchange must be considered an acceptable means of payments for all parties. Money is such a medium and can come in various forms.
- It is a *means of storing wealth*: the reward for today's labor can be used in the future only if it can be stored. Money is such a mean.
- A *means of evaluation*: money allows the values of various goods and services to be compared. Money is also a unit of account, since countries' GDPs are expressed in it.

We distinguish two types of money (there are more): goods money and fiat money. Goods money is money with an inherent value: a gold coin will have the value of the gold it is made from. Fiat money derives its value from the fact that it is universally accepted as a means of payment (for example, the metal used to make a one dollar coin is worth much less than one dollar, yet the coin itself is worth that).

What counts as money? This depends on which definition we choose. *In the narrow meaning money is just cash: notes and coins. In the broader sense bank accounts and various financial assets count as well.*

Ideally, money should be durable (resistant to wear and tear over time), it should be divisible (which is why we have notes and coins of all sizes), transportable and non-counterfeitable.

The Supply of Money (book page 543)

If we want to measure the money supply in the economy, we should first wonder what to include (what should count as money). We have to distinguish the monetary base and broad money.

The Monetary Base

The monetary base, or 'high-powered money' (denoted as M_0), consists of cash and notes in circulation outside the central bank. This we denote as 'C'.

expectations of the changes in prices and other security assets influences the size of L_2 . Lastly the exchange rates determines the demand for a certain currency.

The total demand for money is thus $L_1 + L_2 = L$.

Equilibrium in the Money Market (book page 557)

In equilibrium, *the supply of money M equals the demand for money $L(i, Y, P)$* . The interest, national income and price level between brackets merely serve to signify that they determine the L . So we can say:

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

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

The second equation represents the *real money balance: the money balance adjusted for the price level*.

In the graph we see that on the vertical axis we have the rate of interest and that on the horizontal axis we find the quantity of money. Why the interest rate on the vertical axis? Because this is the price for holding money: if the interest is high, holding money is 'cheap' and vice versa. In equilibrium, we find the equilibrium rate of interest r_e .

We also use the *Fisher equation*. This shows the relationship between the inflation Π , the real interest rate r and the nominal interest rate i . The equation tells us that the nominal interest rate is the inflation plus the real interest rate.

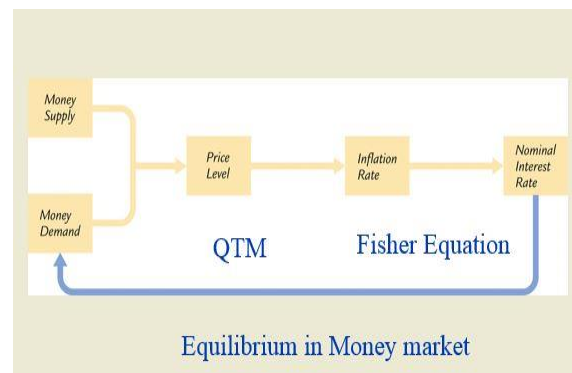
$$i = r + \Pi^e$$

consequently:

$$\frac{M}{P} = L(r + \Pi^e, Y)$$

More simply, this means that the real supply of money is determined by the national income Y and the real interest rate r . This brings us to the *Keynesian money supply curve* (not the monetarist curve: this one is vertical and thus the supply is not affected by the interest rate).

Finally, there is a connection between money, prices and interest rates. The supply and demand of money will of course determine the price of money. Then, via the quantity theory of money QTM we know that a growth of money in the economy will result in inflation. The fisher equation $i = r + \Pi^e$ gives us the connection between inflation and the nominal interest rate (the nominal interest rate is merely the inflation plus the real interest rate), which in itself determines the demand for money.

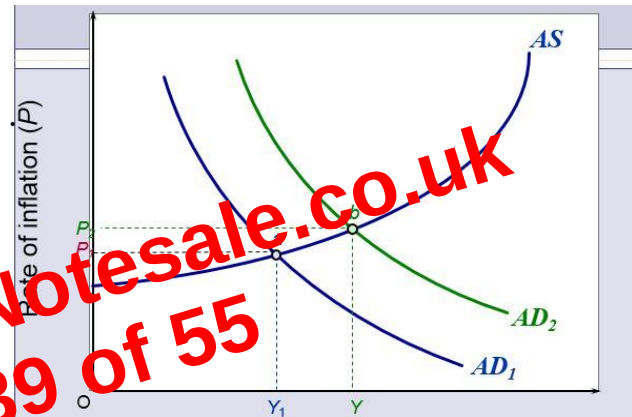
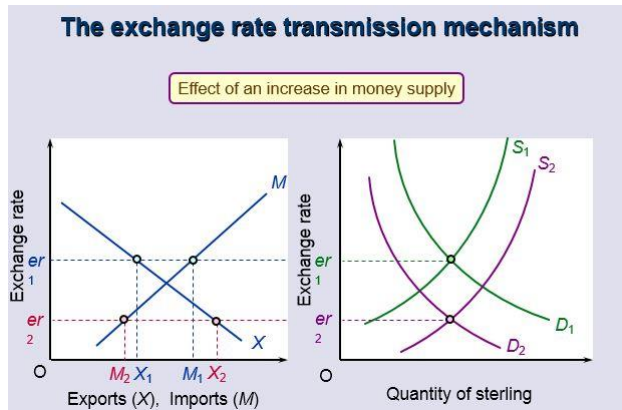


In the first stage a rise in the money supply causes a fall in domestic interest rates. The strength of this stage is largely dependent on the openness of the economy.

In the second stage people demand more foreign assets: the demand for the domestic currency falls while the supply rises. Note that the graph shows the foreign exchange market. The exchange rate falls and the domestic currency is depreciated. This stage can be quite strong, especially since financial markets are extremely open and a small change in the exchange rate can cause large financial flows.

In the third stage, due to the depreciation of the currency, imports will fall while exports will go up. Stage three can be very strong in the long run.

In the fourth stage, the rise in exports (a rise in injections) and the fall in imports (a drop in withdrawals) will cause a rise in aggregate demand: the multiplier effect is again applied and the GDP rises. The precise magnitude of this stage is highly unpredictable.



The Portfolio Balance Effect

Monetarists emphasize a more direct transmission mechanism: *the portfolio balance effect*. *If the money supply in the economy goes up, people will have more money than they require to hold.* They will spend the surplus. Much of this spending will go to goods and services, thereby directly increasing aggregate demand. Monetarists explain this with the theory of portfolio balance. As people get more money through a rise in supply, they may want to diversify their portfolio; i.e. they don't want too many liquid assets. They will spend more on goods and services but also on financial assets. As more of these assets are being bought, they drive up their price and reduce their yield. For example, bonds will grow more expensive but their interest rate will go down. Goods and services will have a higher price/marginal utility ratio. This will go on until people's portfolios are restored. By that time aggregate demand has increased through a rise in consumption.

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Page 39 of 55

CHAPTER 21: Fiscal and Monetary Policy

Fiscal Policy (book page 626)

Fiscal policy seeks to control aggregate demand AD by change the balance between government spending G and taxation T . The purpose of fiscal policy is to prevent a fundamental disequilibrium (a long lasting recession), the smooth out the fluctuations of the business cycle, and to influence aggregate supply.

The public sector net cash requirement is the amount that the public sector must borrow if it is in deficit. Furthermore there is a difference between the national debt and the public sector debt. *The national debt is composed of the accumulated government budget deficits over the years: it is the government's debt. The public-sector (government and public corporations) debt is the debt held by the public.*

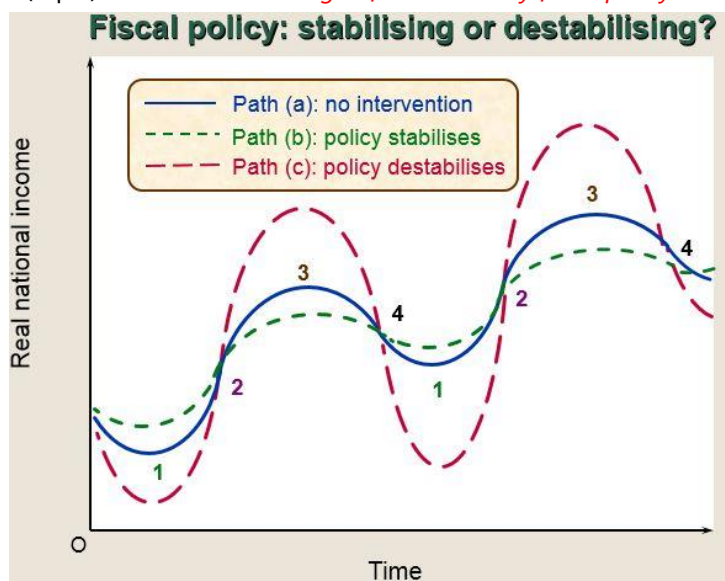
The government takes a fiscal stance: this can be either contractionary or expansionary, depending on the state of the economy. *The structural balance is the public sector deficit that exists if the economy is at the potential output: there is no output gap.*

There are *automatic fiscal stabilizers* that even out the business cycle: if national income rises taxes increase and benefits go down. The same is true for the opposite. The higher the tax rate (MPT = marginal propensity to tax), and the higher the G , the higher the automatic fiscal stabilizer.

The advantages of automatic stabilizers are that they do not need intervention: they work on their own and are most effective if the MPT and benefits are high. The disadvantages is that they do not eliminate fluctuations entirely. To the contrary, the higher tax rates discourage people to work and invest. Also, equilibrium unemployment may be increased if the benefits are too high: people might lose income by getting a job. And, if the economy is in a deep recession, the automatic stabilizers may stabilize at the wrong level of national output.

Discretionary fiscal policy refers to the government's ability to choose its own policy. It can decide to change the levels of government expenditure G and taxes T . If the G is increased, then the Y will go up with a multiplier. Cutting taxes has a smaller effect because this increase disposable incomes: people will not spend all the additional money they receive (mpw). *The main advantage of discretionary fiscal policy is that it can correct severe macroeconomic disequilibria.* One of the main problems

is that it is difficult to forecast the magnitude of the effect of changing the G or the T on injections and withdrawals. Also, the phenomenon of crowding out can occur: money is diverted from the private to the public sector. Then there are also problems related to timing: by the time the government has decided the policy, the business cycle may have progressed to another state. If the timing is wrong, fiscal policy can actually destabilize the economy and worsen the fluctuations in the business cycle.



CHAPTER 22: Long-Term Economic Growth

What are the causes of economic growth in the long run, and why are there poor and rich countries? These two questions we will answer. (*Not the second one ;).*)

Long-run Economic Growth in Industrialized Countries (book page 670)

The main causes of economic growth are *an increase in production factors K and L (capital and labor). The other main contributor, and an extremely important one, is technology.*

The production function is determined by K (real capital stock), L (labor force measured in working hours) and A (the productivity of the production factors K and L). The problem that arises is that K and L have decreasing returns to scale (but not A): the more K and L one uses, the higher the cost to create additional output.

The Solow Model: A New Classical Model of Economic Growth (book page 673)

Without Technological Progress

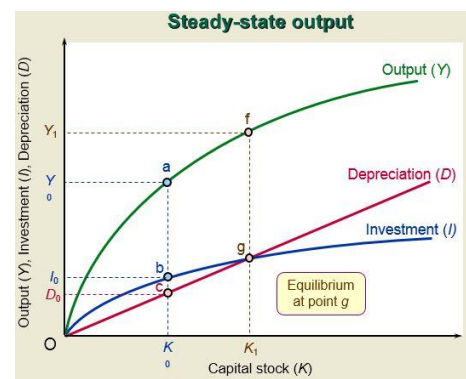
We can use more capital compared to labor, which will generally increase the productivity per worker. However, increasing capital requires investing in investment that would otherwise have gone to producing more goods. This means that there is an opportunity cost attached to investment.

The 'y' is the productivity per capita. This is increased by increasing the K per L. Increasing capital will increase productivity per worker (per capita).

So where does the K come from? There is of course starting capital. Then the K can be increased by investment I. Therefore, if investment I goes up, capital K goes up and y (productivity per worker) goes up. Logically, economic growth is determined by 'y'.

We can see on the first graph that we can increase investment until it reaches equilibrium: the point where *depreciation and investment are equal*. *Depreciation refers to worn out capital, like machines that needs to be replaced.* This requires investment spending, but this investment will keep output at a steady rate, it will not increase it.

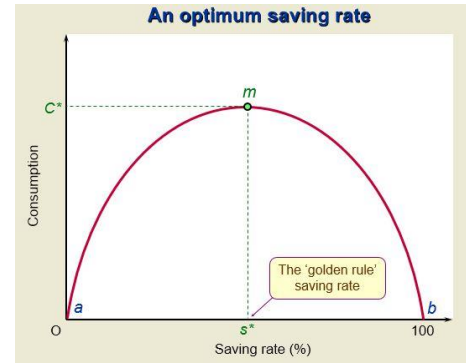
We assume that in our model, an increase in savings will increase investment (just assume this). By lifting the investment curve upward we generate a new equilibrium. Note that this equilibrium is



only in the short run, because when the new capital starts wearing out the depreciation curve will move upward too!

I comes from savings. We assume this in this simple model. *This means that if savings go up, investments go up.* However, if savings S goes up too much, then consumption will fall. So saving increases output (through investment) but directly decreases demand.

However, if saving is zero, then capital stock is zero and output is zero. *Logically, there must be a rate of saving where consumption is highest. This point is called the golden rule saving rate.*



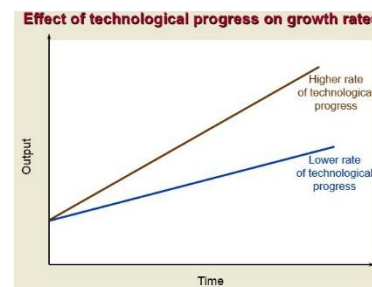
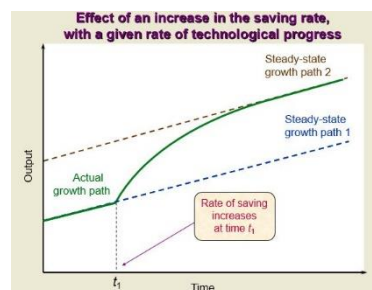
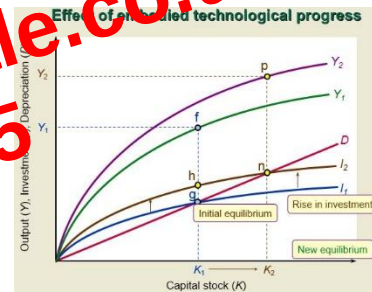
So we know what happens if we increase capital. But what happens if we increase the labor force? There will be diminishing returns to L if the K does not increase with it (if the K is constant). *This means that there can be no long term economic growth if only the labor force increases.*

If the total amount of hours worked increases because of an increase in the participation ratio, then GDP per capita will increase even if working hours per person decreases. However, if the GDP increases because of a rise in population, then the GDP per capita will go down.

With Technological Progress

Technological progress has the effect of increasing the output from a given amount of investment. Technological progress actually has two effects. The first one is that, given investment and savings constant and technology improves once, national income will experience a jump. It will go up by a certain amount but the rate of growth will remain the same. *The second effect is that the rate of technological progress determines the slope of the output curve over time: the faster the progress, the steeper the curve, the greater the rate of growth.*

The main advantage of obtaining a new equilibrium through technological progress is that the depreciation curve does not shift, meaning that the higher output can be permanent (as opposed to growth without technological progress).



Endogenous Growth Theory (book page 679)

What do we have to do to increase innovation, renewal and invention? After all, technological progress does not come from nothing. First of all, *we have to create new knowledge*: devote more resources to research, protect patents to encourage inventions, et cetera... Secondly, *we have to spread the knowledge we have*: we must invest in education.

Institutional Growth Theory (book page?)

Institutional growth theory assumes that even while new technologies are available to all countries, not all countries have the same abilities to incorporate new technology in order to create production. The different social structures (like government type) have a big hand in this.

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Page 53 of 55