Fiscal Policy, Government Budget, Public Debt

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5.1 Fiscal policy – stabilization role

Fiscal policy is a macroeconomic stabilization policy, which attempts to stabilize the economy (or eliminate output gaps). Fiscal policy is the use of government expenditure and revenue collection (taxation) to influence the economy. The two main instruments of fiscal policy are, thus, government expenditure and revenue (taxation). Changes in the level and composition of taxation and government spending can impact the following variables in the economy:

➢ aggregate demand (AD = C + I + G + NX) and the level of economic activity;
➢ the pattern of resource allocation;
➢ the distribution of income.

Fiscal policy refers to the use of the government budget to influence the first of these: economic activity.

In the text below, we focus on the use of fiscal policy to affect planned expenditure. However, fiscal policy may affect potential output as well as planned aggregate expenditure. On the spending side, for example, investments in public capital, such as roads, and school, can play a major role in the growth of potential output. On the other side, taxes and transfers may well affect the incentives and economic behavior of firms and households.

The government budget balance can be expressed by following equation:

$$TA = G + TR, \tag{5.1}$$

where *TA* is the total taxes (total governments' revenues), *TR* are transfers (examples of certain transfer payments include welfare (financial aid), social security, and government subsidies for certain businesses; transfers generally increase income of households and firms), and *G* are government expenditure. The government budget may be balanced: *TA = G + TR* or in deficit: *TA < G + TR*, or in surplus when *TA > G + TR*. If the government intends to decrease a budget deficit, it must increase budget revenues (by higher taxes or selling government assets) and/or

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reduce budget expenditure (e.g. social benefits, government investment or consumption).

J.M. Keynes's theory suggested that active government policy could be effective in managing the economy. Rather than seeing unbalanced government budgets as wrong, Keynes advocated what has been called **countercyclical fiscal policies**, that is policies which acted against the tide of the business cycle: deficit spending when a nation's economy suffers from recession or when recovery is long-delayed and unemployment is persistently high - and the suppression of inflation in boom times by either increasing taxes or cutting back government outlays. He argued that governments should solve problems in the short run rather than waiting for market forces to do it in the long run, because 'in the long run, we are all dead'. This contrasted with the classical and neoclassical economic analysis of fiscal policy. Fiscal stimulus (deficit spending) could actuate production. But to these schools, there was no reason to believe that this stimulation would outrun the side-effects that 'crowd out' private investment: first, it would increase the demand for labor and raise wages, hurting profitability; second, a government deficit increases the stock of government bonds, reducing their market price and encouraging high interest rates, making it more expensive for business to finance fixed investment. Thus, efforts to stimulate the economy would be self-defeating.

The Keynesian response is that such fiscal policy is only appropriate when unemployment is persistently high (above the non-accelerating inflation rate of unemployment (NAIRU)[1]). In that case, crowding out is minimal. Further, private investment can be 'crowded in': fiscal stimulus raises the market for business output, raising cash flow and profitability, spurring business optimism. To Keynes, this *accelerator effect* means that government and business could be complements rather than substitutes in this situation. Second, as the stimulus occurs, gross domestic product rises, raising the amount of saving, helping to finance the increase in fixed investment. Finally, government outlays need not always be wasteful: government investment in public goods that will not be provided by profit-seekers will encourage the private sector's growth. That is, government spending on such things

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[1] For more details see Ch 7.

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as basic research, public health, education, and infrastructure could help the long-term growth of potential output. The conservative and some neoliberal economists view the problem of higher unemployment from different perspective: they state that unless labor unions or the government 'meddle' in the free market, persistently higher unemployment is created. Their solution is to increase labor-market flexibility, e.g., by cutting wages, busting unions, and deregulating business.

Contrary to some critical characterizations of it, Keynesianism does not consist solely of deficit spending. Keynesianism recommends counter-cyclical policies to smooth out fluctuations in the business cycle. An example of a counter-cyclical policy is raising taxes to cool the economy and to prevent inflation when there is abundant demand-side growth, and engaging in deficit spending on labor-intensive infrastructure projects to stimulate employment and stabilize wages during economic downturns. Classical economics, on the other hand, argues that one should cut taxes when there are budget surpluses, and cut spending - or, less likely, increase taxes - during economic downturns. Keynesian economists believe that adding to profits and incomes during boom cycles through tax cuts, and removing income and profits from the economy through cuts in spending and/or increased taxes during downturns, tends to exacerbate the negative effects of the business cycle. This effect is especially pronounced when the government controls a large fraction of the economy, and is therefore one reason fiscal conservatives advocate a much smaller government.

According J.M. Keynes, excessive saving, i.e. saving beyond planned investment, is a serious problem, encouraging recession or even depression. Excessive saving results if investment falls, perhaps due to falling consumer demand, over-investment in earlier years, or pessimistic business expectations, and if saving does not immediately fall in step, the economy would decline. Contrary, the classicals wanted to balance the government budget. To Keynes, this would exacerbate the underlying problem: following either policy would raise saving (broadly defined) and thus lower the demand for both products and labour.

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## 5.2 Short-run equilibrium output – Keynesian Cross

Self-study: Franke (2007): Ch 26

5.3 Fiscal policy versus aggregate demand

We know already that the fiscal policy aims to affect the economy through aggregate demand. Please notice that not all changes in spending have the same impact on aggregate demand! First of all, changes in government spending G affect planned aggregate expenditure directly by and equal amount and shift the AD curve. Transfers and autonomous taxes affect the planned expenditure indirectly, by changing disposable income in private sector. So, they change the aggregate expenditure by an amount equal to the marginal propensity to consume c times increase in TR or the reduction in T_A (cTR or $-cT_A$) and shift the AD line north-east if G and TR go up, and T_A decrease. Adjustment in marginal tax rate t changes, however, the slope of the AD (lower t, flatter AD).

The ultimate effect of a fiscal policy change on short-run equilibrium output equals the changes in autonomous expenditure times multiplier.

Graph 1: AD curve – increase in government expenditure and adjustment of marginal taxation rate

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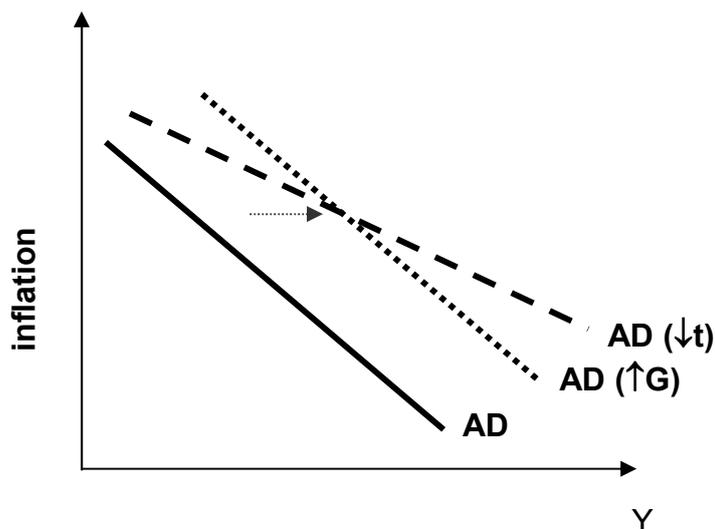
If the economy falls into a recession ($Y<Y^*$; see point *A* in Graph 2), the government may decide to support the economy in order to shorten the period of recession and low employment by reducing the marginal tax rate ($\downarrow t$). Instead of relaying on self-correction of the economy that would shift the economy back to the long-term equilibrium at point E, the economy is shifted to point B. The lower effective tax rate increased disposable income of households. A part of disposable income was spent on consumption, which in turn increased the AD. The point B is the point of the short term and therefore unstable equilibrium. The higher demand forces prices up and the SRAS line moves up. Finally, the economy moves to the long-term equilibrium level at point F. Output reaches potential at higher inflation rate. In this case, we assumed that fiscal policy responds to the economic imbalance alone (in isolation) without coordination with monetary policy or countercyclical monetary policy measures.

Graph 2 Recession gap
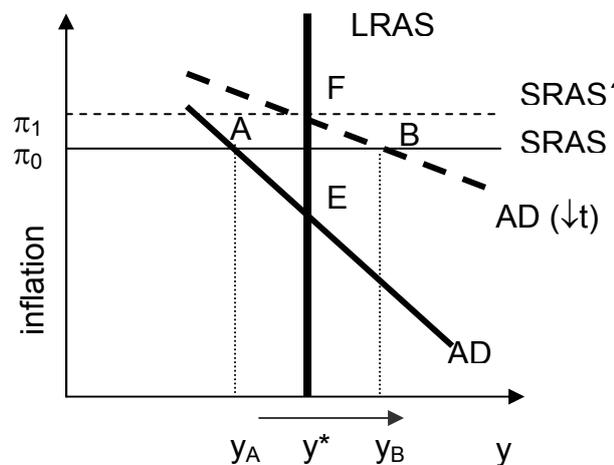
In contrary, if the economy moves above the potential, in expansionary gap ($Y>Y^*$, point M in Graph 3), than the government may raising taxes in order to reduce government deficit (again we do not assume any response of monetary policy). The AD curve turns southwest. Higher taxes reduce demand, producers produce less. Inflation decelerates to π'. Finally, the economy stabilizes in the long run equilibrium point N. The expansionary gap is eliminated, output reaches potential and inflation decelerates.

Graph 3 Expansionary gap
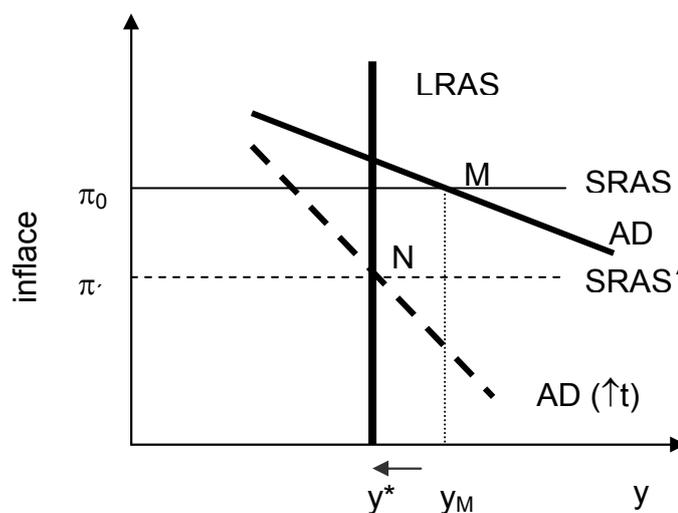
Economists debate the effectiveness of fiscal stimulus. The argument mostly centers on **crowding out**, a phenomenon where government borrowing leads to higher interest rates that offset the stimulative impact of government spending. The complete crowding out effect is illustrated in the following graph. In this example, we assume that the government decides, even though the economy was on the potential - at the long run equilibrium point, boosting aggregate demand by higher government expenditure. The result is, as you can see, pure and simple increase in inflation rate. During the adjustment process, the economy pass through the point O, where output is above potential and inflation remains (temporarily) stable. Producers register higher aggregate demand boosted by higher government spending and begin gathering the relative prices. Inflation expectations gradually rise and consequently the rate of inflation itself. Thus, the economy shifts to the point L – to the long-term

equilibrium at higher rate of inflation. However, higher inflation and higher inflation expectations cause the real interest rates to grow, since the central bank aims to save price stability. Thus, the central bank raises interest rates and pushes the MP line up, Lenders require higher nominal interest rates from borrowers including the 'inflation premium' that reflects higher inflation expectations. Higher real interest rates reduce interest rate-sensitive private consumption and private investment. Fiscal stimulus in the form of higher government spending crowds out private spending – or it changes the structure of expenditure in favor of public expenditure. The total expenditure (ie aggregate demand) remain unchanged. Ideally, if inflation expectations are fully rational and the central bank's tightening monetary policy successfully prevents inflation advances, the economy comes back from point *O* to point *K*. Inflation does not change, output is back on potential. The AD line is also back at its initial position. But if inflation expectations are irrational and economic agents underestimate an increase in inflation, the SRAS line will not move to the point *L*, but somewhere between *O* and *L* and there will be a longer process of economic adoption. The equilibrium would be achieved once the economic agents fully adopted the final impact of initial fiscal expansion, so the economy moves to the point *L*. In partial stages of economic adoption occurs so-called partial crowding-out effect. Economic agents that do not fully adopt the final increase in inflation require a smaller increase in interest rates and central bank (because of only moderate increase in inflation expectations0 has to increase its key rate by less extent. As result, the economy may stay for a while about potential but once the inflation expectations fully reflect the true effect of fiscal expansion on inflation, the central bank has to rise interest rate by full extent in line with its monetary policy reaction function; the AD shifts south-west, back to the potential output at point *K*.

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Graph 4 Complete crowding-out effect
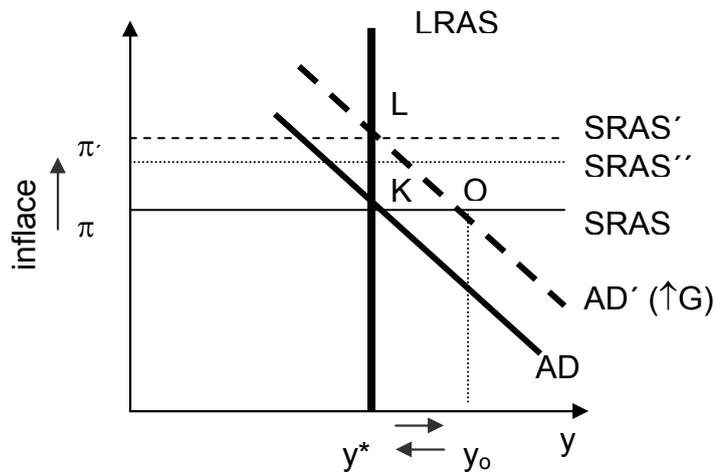
Summarization of the fiscal policy effects:

A) Expansive fiscal policy in the short and medium term leads to the growth of aggregate spending and production, if we assume that expectations of economic agents are not fully rational. If expectations are fully rational, the point B) is correct.

B) in a sufficiently long period when economic agents fully incorporate into their expectations the true impacts of expansionary fiscal policy, the fiscal stimulus leads only to higher inflation and real interest rates. Higher real interest rates have negative impact on investment and interest-rate sensitive consumption; the output return back to potential and the structure of aggregate demand changes in favor of government's consumption. So, crowding out completely negates any fiscal stimulus.

In other words, when the government runs a budget deficit, funds will need to come from public borrowing (the issue of government bonds), overseas borrowing, or monetizing the debt. When government finances a deficit by an issue of government bonds, interest rates can increase across the market, because government borrowing creates higher demand for credit in the financial markets. This causes a lower aggregate demand for goods and services, contrary to the objective of a fiscal stimulus.

C) In a very long-run period, an increase in real interest rates may have a negative impact on investment, capital formation and hence the potential, which we have not considered in the AS-AD model. However, there are two

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channels to do so. First, expansionary fiscal policy increases the real interest rate, reduces the growth of private investment, capital formation and ultimately the growth of potential output. Second, government deficits lower national savings in the economy, since government savings are negative. Funding sources are decreasing and capital formation and investment decline. The decline in capital formation may result in slower growth of potential output.

Neoclassical economists generally emphasize crowding out while Keynesians argue that fiscal policy can still be effective especially in a liquidity trap where, they argue, crowding out is minimal.

Shortcomings of fiscal policy

Fiscal policy is not always flexible enough to be useful for economic stabilization. In reality, changes in government spending or taxes must usually go through a lengthy legislative process, which reduces the ability of fiscal policy to respond in a timely way to economic conditions. Another factor that limits the flexibility of fiscal policy is that fiscal policymakers have many other objectives besides stabilizing aggregate demand, from ensuring and adequate national defense to providing income support to the poor.

Other possible problems with fiscal stimulus include the time lag between the implementation of the policy and detectable effects in the economy, and inflationary effects driven by increased demand. In theory, fiscal stimulus does not cause inflation when it uses resources that would have otherwise been idle. For instance, if a fiscal stimulus employs a worker who otherwise would have been unemployed, there is no inflationary effect; however, if the stimulus employs a worker who otherwise would have had a job, the stimulus is increasing labor demand while labor supply remains fixed, leading to wage inflation and therefore price inflation.

Generally, the fiscal policy has contrary to the monetary policy one disadvantage: the longer time lag. While the central bank's decision - to change interest rates - is applicable mostly the very next day after the decision, a new tax law, preparing the state budget, all takes much longer time. Implementation lag of fiscal policy is longer

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than in the case of monetary policy. In the case of a prolonged recession or inflation, the limited flexibility of fiscal policy recedes into the background.

Fiscal policy is implemented not only through active government interventions into the economy that are known in the economics literature as **a discretionary government policy**, but also through so-called **automatic stabilizers**. The automatic stabilizers are the statutory provisions that imply automatic increases in government spending or decrease in taxes when real output declines. When output declines, income tax collections fall (because households' taxable incomes fall and subsequently consumption); contrary, the unemployment rise thus unemployment insurance payments and welfare benefits go up – all without any explicit action by the government or parliament. These automatic changes in government spending and tax collections help to increase (or at least decelerate the fall in) planned spending during recessions. During expansions, they help to reduce or slow-down the expenditure growth, without the delays in the legislative process. The example of the automatic stabilizer is the progressive taxation or all kinds of social benefits and transfers.

Fiscal policy is also important stabilizing force for the cases of prolonged episodes of recessions. However, because of the relative lack of flexibility of fiscal policy, monetary policy is more usually applied to stabilize the economy.

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5.4 Government finance statistics

Government finance statistics (GFS) show the economic activities of government. The GFS presentation is similar to that of business accounting where the profit and loss accounts and the balance sheet are presented together, in a linked manner. The emphasis is on the economic substance over the legal form of the event. Hence GFS differ noticeably from the budget or public accounting presentations that are nationally specific as far as scope of units and recording of transactions are concerned. European GFS are produced in accordance with the European System of Accounts 1995 (ESA 95), the EU manual for national accounts, supplemented by further interpretation and guidance from Eurostat. GFS form the basis for fiscal monitoring in Europe, most notably for the statistics related to the Excessive Deficit Procedure (EDP).

The general government sector is divided into **four sub-sectors**:

a) central government (all administrative departments of the State and other central agencies except for the administration of social security funds)

b) state government

c) local government

d) social security funds.

Total general government revenue comprises the following categories of the European System of Accounts 1995 (ESA 95):

- market output
- output for own final use
- payments for the other non-market output
- taxes on production and imports
- other subsidies on production receivable
- property income
- current taxes on income, wealth, etc.
- social contributions
- other current transfers
- capital transfers

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Graph 5 General Government Revenue
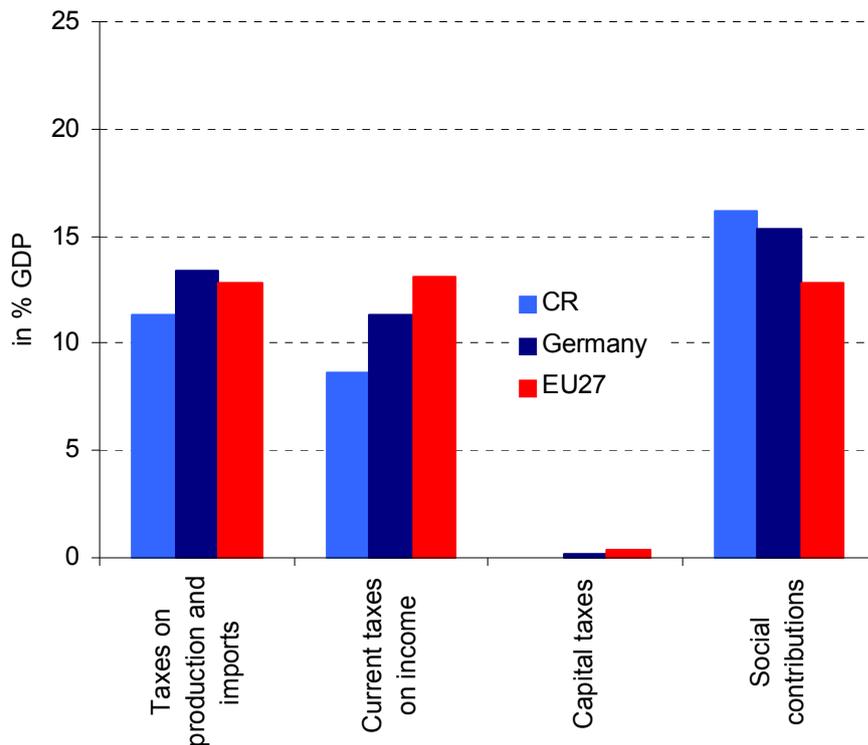
Source: Eurostat, 2010.

Note: Data from 2008.

Self study: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-10-023/EN/KS-SF-10-023-EN.PDF

Total general government expenditure (economic types):

- o intermediate consumption
- o gross capital formation
- o compensation of employees
- o other taxes on production
- o subsidies payable
- o property income
- o current taxes on income, wealth, etc.
- o social benefits other than social transfers in kind
- o social transfers in kind related to expenditure on products supplied to households via market producers
- o other current transfers
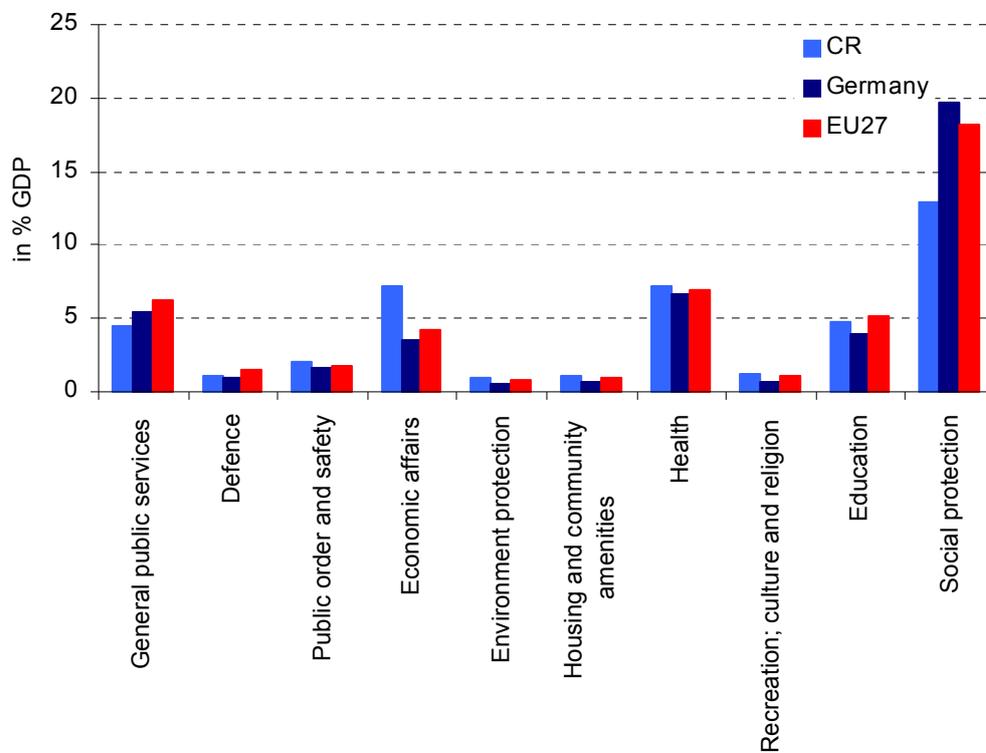
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- o adjustment for the change in net equity of households in pension fund reserves
- o capital transfers payable
- o acquisitions less disposals of non-financial non-produced assets

Total general government expenditure according to function (COFOG)

- ➤ Defence
- ➤ Public order and safety
- ➤ Economic affairs
- ➤ Environment protection
- ➤ Housing and community amenities
- ➤ Health
- ➤ Recreation; culture and religion
- ➤ Education
- ➤ Social protection

**Graph 6 General Government Expenditure – function**

Source: Eurostat, 2010.

Note: Data from 2008.

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Self-study: Eurostat (2011). EU27 and euro area government expenditure-to-GDP ratios falling after 10 quarters of growth - Issue number 13/2011. http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-SF-11-013/EN/KS-SF-11-013-EN.PDF

Graph 7 Government Budget Balance EU-25
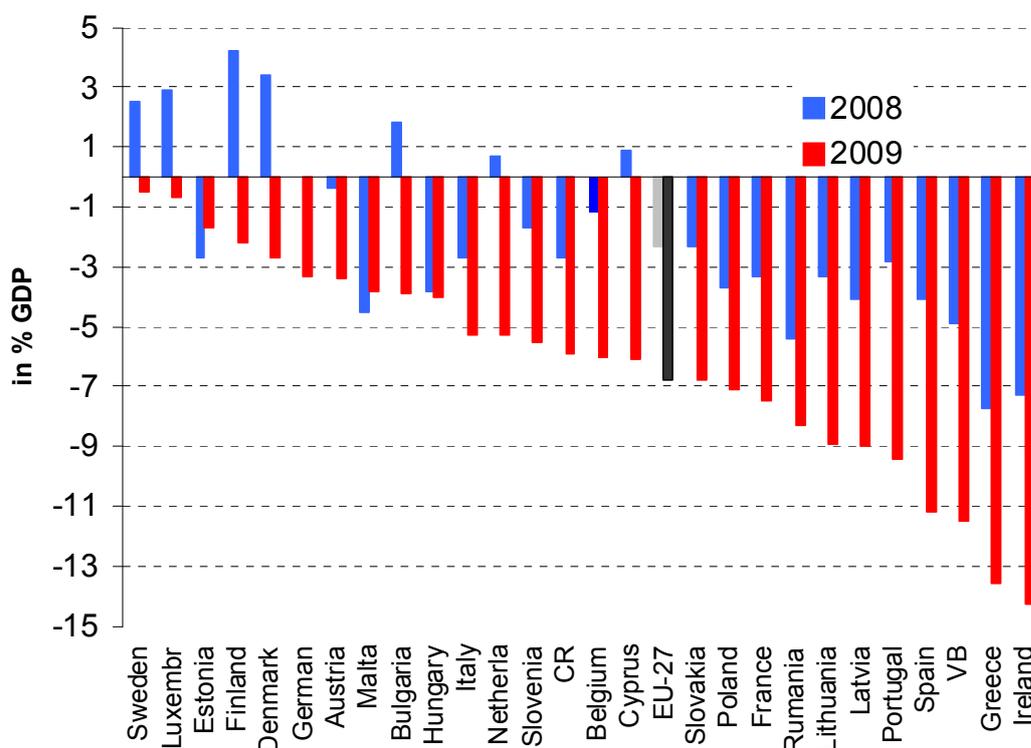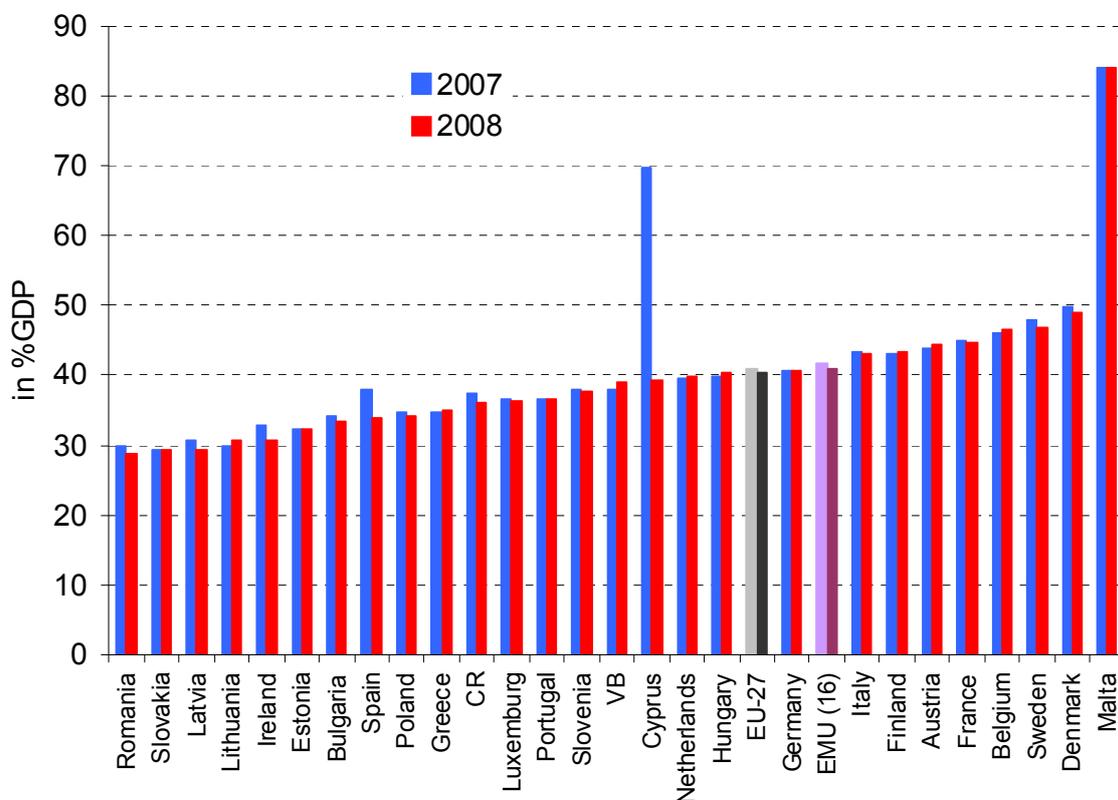

Source: Eurostat, 2010.

5.4.2 Tax burden

For international comparison of tax burden we may use a so-called **tax quota**. This is a macroeconomic indicator that is calculated as "proportion of tax and duty revenue to GDP" in current prices (tax quota in % = tax revenues / GDP * 100). It represents a proportion of gross domestic product that is redistributed by means of public budgets. As it uses data of really collected tax revenues to GDP, it provides information about

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value of total effective taxation in the given country. Depending on the 'extent' of numerator (i.e. "extent" of public revenues considered), there is a simple and **a compound (sometimes called overall) tax quota**. Simple tax quota includes only those incomes of public budgets that are really labelled as taxes. With regard to the fact that tax revenue (quasi taxes) are in fact also incomes from the obligatory payments to social welfare, contributions to state unemployment policy and obligatory payments to health insurance system, the relevant indicator for international comparison is the compound tax quota that also includes these incomes. Compound tax quota (CTQ) is calculated as proportion of revenue from tax, duty and payments to health insurance and social welfare systems to GDP in current prices (Compound tax quota in % = tax revenues + quasi taxes / GDP * 100). As it results from the formula, basic factors affecting value of tax quota is the amount of gross domestic product and volume of taxes collected. Total effective burden is regularly monitored by Eurostat and published in the form of tax quota.

Graph 8 Compound tax quota in Europe

Source: Eurostat (2002). *Main national accounts tax aggregates*.

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The Laffer curve is a theoretical representation of the relationship between government revenue raised by taxation and all possible rates of taxation. It is used to illustrate the concept of taxable income elasticity (that taxable income will change in response to changes in the rate of taxation). The curve is constructed by thought experiment. First, the amount of tax revenue raised at the extreme tax rates of 0% and 100% is considered. It is clear that a 0% tax rate raises no revenue, but the Laffer curve hypothesis is that a 100% tax rate will also generate no revenue because at such a rate there is no longer any incentive for a rational taxpayer to earn any income, thus the revenue raised will be 100% of nothing. If both a 0% rate and 100% rate of taxation generate no revenue, it follows that there must exist at least one rate in between where tax revenue would be at a maximum. However, there are infinitely many curves satisfying these boundary conditions. Little can be said without further assumptions or empirical data.

One potential result of the Laffer curve is that increasing tax rates beyond a certain point will become counterproductive for raising further tax revenue because of diminishing returns. A hypothetical Laffer curve for any given economy can only be estimated and such estimates are sometimes controversial. Estimates of revenue-maximizing tax rates have varied widely with some studies suggesting midpoint ranges around 70%.

A. Laffer explains the model in terms of two interacting effects of taxation: an 'arithmetic effect' and an 'economic effect'. The 'arithmetic effect' assumes that tax revenue raised is the tax rate multiplied by the revenue available for taxation (or tax base). At a 0% tax rate, the model assumes that no tax revenue is raised. The 'economic effect' assumes that the tax rate will have an impact on the tax base itself. At the extreme of a 100% tax rate, the government theoretically collects zero revenue because taxpayers change their behavior in response to the tax rate: either they have no incentive to work or they find a way to avoid paying taxes. Thus, the 'economic effect' of a 100% tax rate is to decrease the tax base to zero. If this is the case, then somewhere between 0% and 100% lies a tax rate that will maximize revenue.

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The relationship between tax rate and tax revenue is likely to vary from one economy to another and depends on the elasticity of supply for labor and various other factors. Even in the same economy, the characteristics of the curve could vary over time. Complexities such as possible differences in the incentive to work for different income groups and progressive taxation complicate the task of estimation. The structure of the curve may also be changed by policy decisions. For example, if tax loopholes and off-shore tax shelters are made more readily available by legislation, the point at which revenue begins to decrease with increased taxation is likely to become lower.

A. Laffer presented the curve as a pedagogical device to show that, in some circumstances, a reduction in tax rates will actually increase government revenue and not need to be offset by decreased government spending or increased borrowing. For a reduction in tax rates to increase revenue, the current tax rate would need to be higher than the revenue maximizing rate. In 2007, Laffer said that the curve should not be the sole basis for raising or lowering taxes.

Graph 9 Laffer curve

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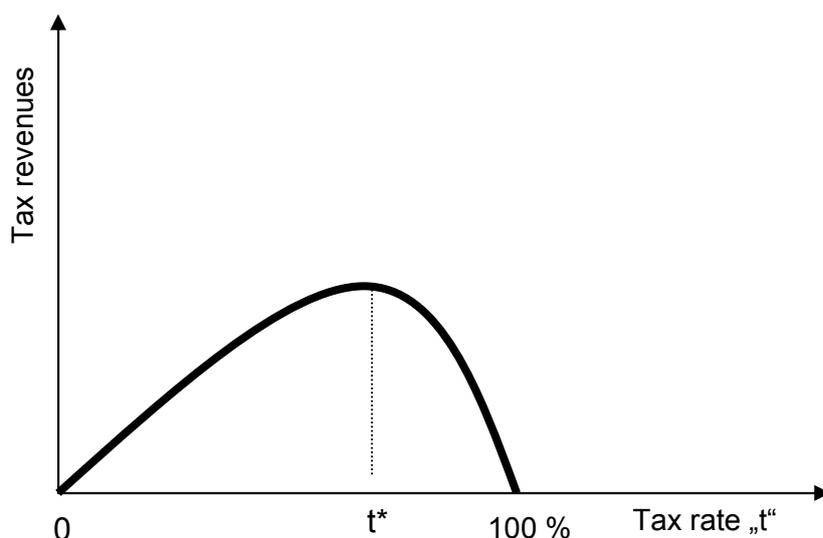
5.4.3 General government budget

Primary balance

Primary balance is the general government balance which is derived after deducting the interest payments component from the total balance of general government budget. In other words, the total of primary deficit and interest payments makes the general government deficit.

A government deficit can be measured with or without including the interest it pays on its debt. The **primary deficit** is defined as the difference between current government spending and total current revenue from all types of taxes. The **total deficit** (which is often just called the 'deficit') is spending, plus interest payments on the debt, minus tax revenues.
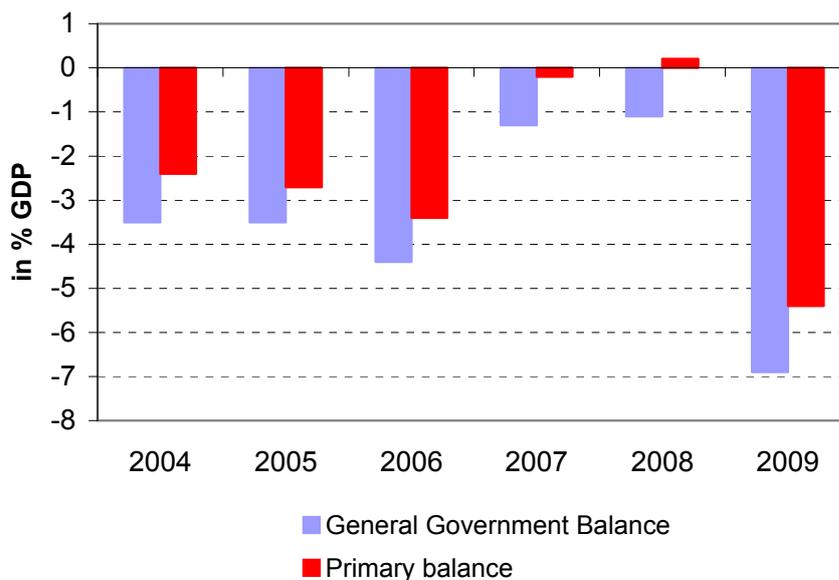
Therefore, if G_t is government spending and T_t is tax revenue for the respective timeframe, then the primary deficit is

$$G_t - T_t.$$

If B_{t-1} is last year's debt, and i is the interest rate, then the total deficit is

$$D_t = G_t + iB_{t-1} - T_t. \tag{5.2}$$

Graph 10 General Government Balance in the Czech Republic

Source: Ministry of Finance of the Czech Republic (2001). *Macroeconomic Forecast.* July 2010, GFS 2001 Statistics.

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Structural deficit

A government deficit can be thought of as consisting of two elements, structural and cyclical. At the lowest point in the business cycle, there is a high level of unemployment. This means that tax revenue are low and expenditure (e.g. on social security) high. Conversely, at the peak of the cycle, unemployment is low, increasing tax revenue and decreasing social security spending. The additional borrowing required at the low point of the cycle is **the cyclical deficit**. By definition, the cyclical deficit will be entirely repaid by a cyclical surplus at the peak of the cycle.

The **structural deficit** is the deficit that remains across the business cycle, because the general level of government spending is too high for prevailing tax levels. The observed total budget deficit is equal to the sum of the structural deficit with the cyclical deficit or surplus.

Structural deficit differs from cyclical deficit in that it exists even when the economy is at its potential. Structural deficit issues can only be addressed by explicit and direct government policies: reducing spending (including social benefits), increasing the tax base, and/or increasing tax rates.

The **fiscal gap**, a measure proposed by economists Alan Auerbach and Laurence Kotlikoff, measures the difference between government spending and revenues over the very long term, typically as a percentage of Gross Domestic Product. The fiscal gap can be interpreted as the percentage increase in revenues or reduction of expenditures necessary to balance spending and revenues in the long run. For example, a fiscal gap of 5% could be eliminated by an immediate and permanent 5% increase in taxes or cut in spending or some combination of both. It includes not only the structural deficit at a given point in time, but also the difference between promised future government commitments, such as health and retirement spending, and planned future tax revenues. Since the elderly population is growing much faster than the young population in many countries, many economists argue that these countries have important fiscal gaps, beyond what can be seen from their deficits alone.

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Stances of fiscal policy

There are three possible stances of fiscal policy: neutral, expansionary and contractionary. The simplest definitions of these stances are as follows:

- A neutral stance of fiscal policy implies a balanced economy. Government spending is fully funded by tax revenue and overall the budget outcome has a neutral effect on the level of economic activity.
- An expansionary stance of fiscal policy involves government spending exceeding tax revenue; the budget outcome supports the economic activity.
- A contractionary fiscal policy occurs when government spending is lower than tax revenue; the budget outcome has a negative impact on the economic activity.

However, these definitions can be misleading because, even with no changes in spending or tax laws at all, cyclical fluctuations of the economy cause cyclical fluctuations of tax revenue and of some types of government spending, altering the deficit situation; these are not considered to be policy changes. Therefore, for purposes of the above definitions, 'government spending' and 'tax revenue' are normally replaced by 'cyclically adjusted government spending' and 'cyclically adjusted tax revenue'. Thus, for example, a government budget that is balanced over the course of the business cycle is considered to represent a neutral fiscal policy stance. So, to evaluate the fiscal policy stance is better to use the structural balance. If the structural deficit increases or structural surplus is reduced, the fiscal stance is expansionary; if the structural deficit decreases or the structural surplus raises, the fiscal policy is contractionary. Changes in the structural government balance are sometimes defined as **the fiscal position**. And the fiscal position measures whether the government sector adds funds into the economy or removes them.

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5.5 Public Debt

5.5.1 Methods of funding government deficit

Governments spend money on a wide variety of things, from the military and police to services like education and healthcare, as well as transfer payments such as welfare benefits. This expenditure can be funded in a number of different ways:

- Taxation
- Seigniorage (the benefit from printing money)
- Borrowing money from the population or from abroad
- Consumption of fiscal reserves
- Sale of fixed assets (e.g. land; state-own companies)

All of these except taxation, seigniorage and a reduction of government expenditures are forms of debt financing.

Seigniorage is the main profit of the central bank and as public institution, the central bank is required to pass most of their profits to their government. So, it is profit of the government. Formally, seigniorage is the real value of the monetary base created. Or it is the difference between interest earned on securities acquired in exchange for bank notes and the costs of producing and distributing those notes. To put more simple, the seigniorage is a profit from 'printing' money.

Some economists regarded seigniorage as a form of **inflation tax**, redistributing real resources to the currency issuer. Issuing new currency, rather than collecting taxes paid out of the existing money stock, is then considered in effect a tax that falls on those who hold the existing currency. The expansion of the money supply may cause inflation in the long run.

Monetization of the public debt describes the situation when the government borrows from commercial banks by issuing Treasury bills which are then acquired by the central bank on the open market. The direct lending to the government through the credit or direct purchase of Treasury bill by the central bank is in the most of the

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developed economies forbidden. Most of the episodes of high inflation are associated with direct financing of budget deficits and/or monetization of the debt.

Borrowing

A fiscal deficit is often funded by issuing bonds, like Treasury bills. These pay interest, either for a fixed period or indefinitely. If the interest and capital repayments are too large, a nation may default on its debts, usually to foreign creditors.

A fiscal surplus is often saved for future use, and may be invested in local (same currency) financial instruments, until needed. When income from taxation or other sources falls, as during an economic slump, reserves allow spending to continue at the same rate, without incurring additional debt.

Government debt can be categorized as **internal debt**, owed to lenders within the country (residents), and **external debt**, owed to foreign lenders. Bonds issued by national governments in foreign currencies are normally referred to as sovereign bonds.

And what is the impact of debt financing of the deficit in the economy? To answer the equation, we can use the identity of savings and investment in a closed economy:

$$S = I \tag{5.3}$$

National savings S and planned investment can be divided into private and government:

$$S^G + S^P = I^G + I^P.$$

If the government runs budget deficits, the government savings are negative. This means that the government has to draw private funds - private savings. The possible short-fall of private savings in the economy causes interest rate to rise. And private investment is to decline (see crowding-out) and so the potential in long run.

In the case of an open economy, the goverment deficit could be financed by foreign economic agents. The possible lack of savings in the domestic economy would be

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reflected in the current account deficit (correspondingly in a surplus in financial account within balance of payment):

$$S - I = BU. \tag{5.4}$$

Government deficit might be covered partially or entirely from foreign sources. And if capital mobility is perfect over the globe, domestic real interest rate should be equal to foreign interest rates. In this case, no crowding out of the private investment will occur.

5.5.2 The Arithmetic of Deficits and Debt

Public debt is incurred by the accumulation of government deficits. So, the actual level of public debt can be calculated as the sum of the debt in year t-1 (B_{t-1}) and the actual government deficit in year t D_t:

$$B_t = B_{t-1} + D_t. \tag{5.5}$$

The government budget constraint states that the change in government debt during year t is equal to the deficit during year t

$$B_t - B_{t-1} = D_t. \tag{5.6}$$

Further, we assume that the government deficit is equal to sum of interest rate payments on the government debt (iB_{t-1}), government expenditures (G_t) and transfers (TR_t) reduced by government tax revenue (TA_t).

$$D_t = iB_{t-1} + G_t + TR_t - TA_t. \tag{5.7}$$

From last two equation is clear that if the government runs a deficit, than the government debt increases. If the government runs a surplus, government debt decreases.

Using the above definition of the deficit, we can rewrite the government budget constraint as

$$B_t - B_{t-1} = iB_{t-1} + G_t + TR_t - TA_t, \tag{5.8}$$

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where iB_{t-1} are (nominal) interest payments on the debt, $(G_t + TR_t - TA_t)$ is the primary deficit (equivalently, primary surplus would be $TA_t - G_t - TR_t$).

Reorganizing the government budget constraint by shifting B_{t-1} on the right side of the equation, we get:

$$B_t = (1+i)B_{t-1} + G_t + TR_t - TA_t. \tag{5.9}$$

Now we look at the implications.

A) Eliminating primary deficit and making primary balance balanced

Suppose that the government decides to eliminate primary deficit. The cumulated debt would increase further, at the rate equal to $(1+i)$:

$$B_t = (1+i)B_{t-1} + 0.$$

So the debt would keep increasing over time. The reason is clear: while the primary deficit is equal to zero, debt was and still is positive, and so are interest payments on the debt. Each year the government must issue more debt to pay the interest on existing debt.

B) Debt stabilization

Suppose that the government decides to stabilize the debt on the level of B_{t-1}. So, the actual debt B_t must equal to previous one B_{t-1}:

$$0 = B_t - B_{t-1} = iB_{t-1} + G_t + TR_t - TA_t.$$

Reorganizing, we get:

$$iB_{t-1} = TA_t - G_t - TR_t.$$

To avoid a further increase in debt, the government must run a primary surplus equal to interest rate payments on the existing debt. And it must do so in following years as well: each year, the primary surplus must be sufficient to cover interest payments, keeping the debt level unchanged.

C) Full repayment

Suppose the government decides to fully repay the debt. So $B_t = 0$:

$$0 = (1+i)B_{t-1} + G_t + TR_t - TA_t.$$

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Even with the balanced primary deficit, the government debt is increasing at the rate equal to the interest rate:

$$B_t=(1+i)^{t-1} \text{ and } B_{t+1}=(1+i)^{t,} \text{ and } B_{t+2}=(1+i)^{t+1}, \ldots$$

or to go back to the past:

$$B_t=(1+i)^{t-1} \text{ and } B_{t-1}=(1+i)^{t-2,} \text{ and } B_{t-2}=(1+i)^{t-3}, \ldots$$

Now, back to the government budget constraint, where we substitute B_{t-1} by $(1+i)^{t-2}$:

$$0 = (1+i)(1+i)^{t-2}+ G_t + TR_t - TA_t.$$
$$0 = (1+i)^{t-1}+ G_t + TR_t - TA_t.$$

Reorganizing the above equation we get:

$$(1+i)^{t-1} = TA_t - G_t - TR_t .$$

This expression states that the government must run primary surplus equal to $(1+i)^{t-1}$ (*interest payment in t-1 year*) to full repay the debt.

These examples yields the below set of conclusions:

- o The legacy of past deficits is higher government debt.
- o To stabilize the debt, the government must eliminate the deficit
- o To eliminate the deficit, the government must run a primary surplus equal to the interest payments on the existing debt.
- o If the government runs into a deeper deficit, higher government spending must eventually be off-set by an increase in taxes in the future
- o The longer government waits to eliminate the deficit, the higher eventual increase in taxes or/and decrease in spending.

The Evolution of the Debt-to-GDP ratio and the Arithmetic of the Debt Ratio

So far we have focused on the evolution of debt level. But in an economy in which output grows over time, it makes more sense to focus instead of the ratio of debt to output.

First, we divide both sides of the government budget constraint by actual nominal output:

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$$\frac{B_t}{Y_t} = (1+i)\frac{B_{t-1}}{Y_t} + \frac{G_t + TR_t - TA_t}{Y_t}.$$

Next we multiply B_{t-1} / Y_t (both the numerator and denominator) by Y_{t-1}:

$$\frac{B_t}{Y_t} = (1+i)\frac{Y_{t-1}}{Y_t}\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t + TR_t - TA_t}{Y_t},$$

The ratio Y_{t-1}/Y_t is only the reverse ratio of Y_t /Y_{t-1}, that express the increase in output. The annual increase in output is, however, precisely calculated as $(Y_t - Y_{t-1})/Y_{t-1}$. And if we denote the annual rate of output by g, than $Y_t /Y_{t-1} = 1+g$ or $Y_{t-1}/Y_t = 1/(1+g)$. And we substitute Y_{t-1}/Y_t by $1/(1+g)$.

$$\frac{B_t}{Y_t} = (1+i)\frac{1}{1+g}\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t + TR_t - TA_t}{Y_t}.$$

And using the approximation $(1+i)/(1+g) = 1+i-g$, we rewrite the preceding equation as

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} = (i-g)\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t + TR_t - TA_t}{Y_t}. \tag{5.10}$$

The final relation has a simple interpretation. The change in the debt ratio over time (the left side of the equation) is equal to the sum of the gap between nominal interest rate and nominal GDP growth rate time the initial debt ratio, and the ratio of the primary deficit to GDP. If the primary deficit is zero, debt will then increase at a rate equal to nominal interest rate minus the growth rate of nominal output (i-g). So, if the rate of nominal GDP exceeds the nominal interest rates and the government runs deficit, the debt will expanded by slower pace. But if the nominal interest rates are higher than the rate of nominal GDP growth, the debt will accelerate. The excessive debt-to-GDP ratio or its out-off-control growth might cause the **debt crisis**. Once the economic agents lose their believe that the government will fully repay the debt, these fears can easily become self-fulfilling. The lenders will ask higher interest rate

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on government debt and it might happen that the government will be unable to repay the debt, validating initial fears.

So, there is the caution rule that says that **if interest rates in an economy exceed the growth rate of the nominal GDP and the government budget revenue, the primary balance should turn into surplus in order not to jeopardize the long-term stability of public budgets**.

Table 1 Government debt and Primary balance

	Govern. debt in % GDP		Primary balance in % GDP
	2008	2009e	2009e
EMU	69,4	78,7	-3,5
Germany	66	73,2	-0,7
CR	30	35,4	-4,6
Greece	95,7	99,2	-8,5

Source: Eurostat (2010). *European Economic Forecast*. Spring 2010.

Graph 11 Government debt to GDP
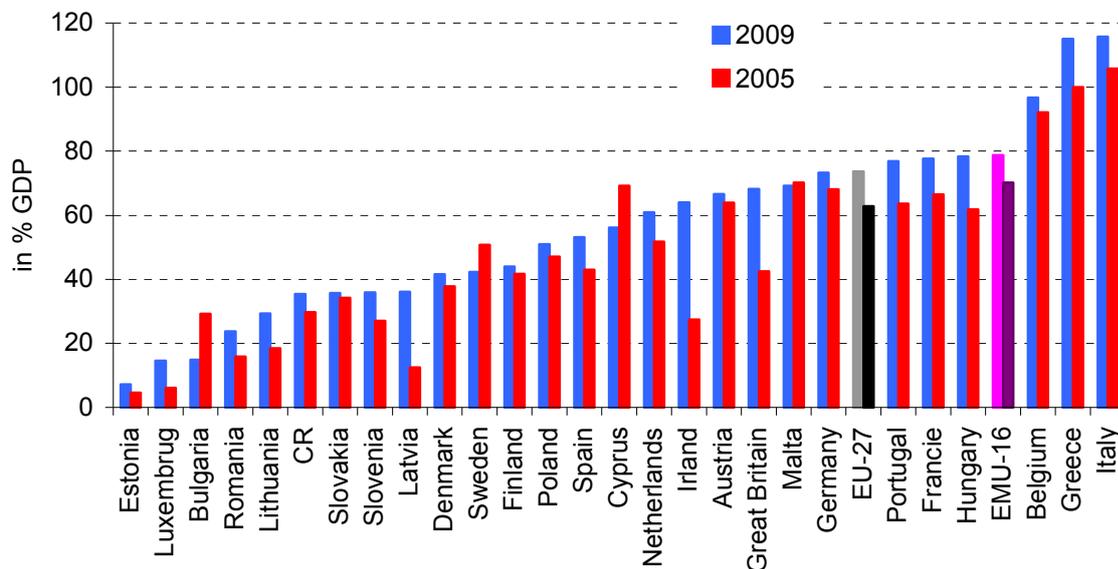
Source: Eurostat, Aug 2010.

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> **Box 1 European sovereign debt crisis (2010–present)**
>
> In early 2010, fears of a sovereign debt crisis, the 2010 Euro Crisis, developed concerning some European states, including European Union members Portugal, Ireland, Italy, Greece, Spain, and Belgium. This led to a crisis of confidence as well as the widening of bond yield spreads and risk insurance on credit default swaps between these countries and other EU members, most importantly Germany.
>
> Concern about rising government deficits and debt levels across the globe together with a wave of downgrading of European government debt created alarm in financial markets. In 2010 the debt crisis was mostly centred on events in Greece, where there was concern about the rising cost of financing government debt. On 2 May 2010, the Eurozone countries and the International Monetary Fund agreed to a €110 billion loan for Greece, conditional on the implementation of harsh Greek austerity measures. On 9 May 2010, Europe's Finance Ministers approved a comprehensive rescue package worth almost a trillion dollars aimed at ensuring financial stability across Europe by creating the European Financial Stability Facility.

5.6 Ricardian equivalence

The Ricardian equivalence hypothesis, named after the English political economist and Member of Parliament David Ricardo, states that because households anticipate that current public deficit will be paid through future taxes, those households will accumulate savings now to offset those future taxes. If households acted in this way, a government would not be able to use tax cuts to stimulate the economy. The Ricardian equivalence result requires several assumptions. These include households acting as if they were infinite-lived dynasties as well as assumptions of no uncertainty and no liquidity constraints. Also, for Ricardian equivalence to apply, the deficit spending would have to be permanent. In contrast, a one-time stimulus through deficit spending would suggest a lesser tax burden annually than the one-time deficit expenditure. Thus temporary deficit spending is still expansionary. Empirical evidence on Ricardian equivalence effects has been mixed. Insofar as future tax increases appear more distant and their timing more uncertain, consumers

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are in fact more likely to ignore them. This may be the case because they expect to die before taxes go up, more likely, because they just do not think that far into the future. In either case, Ricardian equivalence is likely to fail.

So, we can conclude that budget deficits have an important effect on activity – although perhaps a smaller effect than we though going through the Ricardian equivalence argument. In the short-run, larger deficits are likely to lead to higher demand and to higher output. In the long run, higher government debt lowers capital accumulation and, as a result, lowers output, and possibly potential.

5.7 Fiscal reforms

Self-study: GUICHARD, S. at el. (2007). *What promotes fiscal consolidation OECD Country experiences*. Economic Department OECD, ECO/WKP(2007)13. May 28, 2007.

5.7.2 Fiscal Straitjacket - fiscal rules

The concept of a fiscal straitjacket is a general economic principle that suggests strict constraints on government spending and public sector borrowing, to limit or regulate the budget deficit over a time period. The term probably originated from the definition of straitjacket: anything that severely confines, constricts, or hinders. Various states in the United States have various forms of self-imposed fiscal straitjackets.

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Box 2 Fiscal Rules in Europe: The Stability and Growth Pact

The Stability and Growth Pact (SGP) is an agreement among the 17 members of the European Union (EU) that take part in the Eurozone, to facilitate and maintain the stability of the Economic and Monetary Union. It consists of fiscal monitoring of members by the European Commission and the Council of Ministers and, after multiple warnings, sanctions against offending members. The pact was adopted in 1997, so that fiscal discipline would be maintained and enforced in the EMU. Member states adopting the euro have to meet the Maastricht convergence criteria, and the SGP ensures that they continue to observe them. The actual criteria that member states must respect:

   * an annual budget deficit no higher than 3% of GDP (this includes the sum of all public budgets, including municipalities, regions, etc)

   * a national debt lower than 60% of GDP or approaching that value.

The SGP was initially proposed by German finance minister Theo Waigel in the mid 1990s. Germany had long maintained a low-inflation policy, which had been an important part of the German strong economy's performance since the 1950s; the German government hoped to ensure the continuation of that policy through the SGP which would limit the ability of governments to exert inflationary pressures on the European economy.

Unfortunately, the pact has proved not to be enforceable against big countries such as France and Germany, which were the biggest promoters of it when it was created. These countries have run 'excessive' deficits under the pact definition for some years. The reasons that larger countries have not been punished include their influence and large number of votes on the Council of Ministers, which must approve sanctions; their greater resistance to 'naming and shaming' tactics, since their electorates tend to be less concerned by their perceptions in the European Union; their comparatively weak commitment to the euro as compared to smaller states; the relatively greater role of government spending in their larger and more enclosed economies.

In March 2005, the EU Council, under the pressure of France and Germany, relaxed the rules; the EC said it was to respond to criticisms of insufficient flexibility and to make the pact more enforceable. The Ecofin agreed on a reform of the SGP. The ceilings of 3% for budget deficit and 60% for public debt were maintained, but the decision to declare a country in excessive deficit can now rely on certain parameters: the behaviour of the cyclically adjusted budget, the level of debt, the duration of the slow growth period and the possibility that the deficit is related to productivity-enhancing procedures.

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5.8 Exercises

1. Describe and depict in the AS-AD model the stabilization process of an economy in the case of (a) recession, and (b) the high inflation rate, if the government decides to withdraw (or to introduce) a poll-tax in order to support the self-correction process of the economy.

2. Using AD-AS model, describe the way how the automatic stabilizers work, namely the unemployment benefits, if (a) the economy is hit by recession or (b) it ends up in expansionary gaps.

3. The government decided to reduce the marginal income tax rate from 40% to 30%. To prevent a worsening of the government budget balance, it reduces, at the same time, the welfare benefits by 100 to 200 units. How and how much the aggregate demand is going to be effected, if the propensity to consume c is equal to 0.8? Assume the initial level of product 2000.

4. The government runs deficits for many years. Its debt has climbed to 500 and debt-to-GDP ratio reached 60%. Nominal interest rates are 5% on average and the nominal GDP is growing at 8% per annum. How high primary surplus must be in order to stabilize the government debt (in other words, to eliminate an increase in debt at time t to zero).

5. Use the data from Example 4 and calculate how high primary surplus of the government must be in order to fully repay the actual debt.

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Assigned reading

- FRANK, R.H. – BERNANKE, B.S. (2009) *Principles of Economics*. Chapter 23 p. 651-671, Appendix A&B p. 667-673. and Chapter 26 p.760-767. Fourth Edition. USA: McGraw-Hill, 2009. 836 s. ISBN 978-0-07-128542-1.

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- Ministry of Finance of the Czech Republic. *Fiscal outlook of the Czech Republic*. Different issues.

- Ministry of Finance of the Czech Republic. *Macroeconomic forecast of the Czech Republic*. Different issues.

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