

## THE POSSIBILITIES OF BUDGET DEFICIT FINANCING

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### Introduction

There are also some obligations with the integration of Czech Republic to the EU that will be necessary to meet after joining the European Community especially when integrating into the EMU. One of those are the Maastricht criteria to maintain a budget deficit up to 3 percent of GDP and keeping public debt under 60 percent of GDP to reach the fiscal stability. Because of this reason I will try to find out what are or could be the possibilities of budget deficit financing, eventually what are their impacts on macroeconomic stability in the CR.

The fiscal stability (balanced public finance) is useful indicator of the macroeconomic health. Nevertheless there are still many developing countries that experience high budget deficits at these days.

The high budgetary deficits are considered as the cause of macroeconomic problems. Among those problems in many cases are:

- High level of inflation,
- Current account deficits,
- Highly indebted economy,
- Slow economic growth.

### The Macroeconomic Connections of Budget Deficits

First of all it's necessary to say, that there can be more types of budget deficits and that's why I mentioned here some of them. Because of this inconsistency it doesn't have to be always clear which type of deficit the author has in mind.

In the statistics of the Czech ministry of finance we can find following types of budget deficits:

- Balance of government sector including net borrowing,
- Balance of government sector less net borrowing,
- Balance of government sector plus privatisation and grants to TI<sup>2</sup>,
- Balance of government sector minus privatisation and grants to TI.

For my further analyses regarding to the type of budget deficit, I'll use the data from the IFS<sup>3</sup> statistics, issued by IMF.

The recent economic studies showed, that there hadn't been proved any direct connections between budget deficits and macroeconomic instability. The emergence of any macroeconomic instability depends on the way, how budget deficits are financed. There are several options of the budget deficit financing:

1. Government bonds selling,
2. Borrowing from abroad,
3. Monetisation,
4. Selling of state assets.<sup>4</sup>

The bond selling at the home financial market leads to increase in demand for private funds in the economy. The more funds the government deficit demands the less money will remain for the private investments. The excess demand for money will invoke rise in interest rates. Higher interest rates, according to the theory, stimulate private sector and households to increase savings and shift some investments towards the future. In this case we say, that public expenditures (deficits) crowd out private investments.

On the contrary, external borrowing usually causes appreciation of real exchange rate, deepening current account deficit, increase of foreign debt and loss of foreign reserves. Extreme and very serious result of this foreign borrowing can be currency crises, for which this scenario is very common (see Hakkio 1996).

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<sup>2</sup> TI – Transformation Institutions

<sup>3</sup> IFS - International Financial Statistics

<sup>4</sup> Into this group of revenues we especially can include extraordinary revenues from privatisation (selling of state assets) in the CR.

Monetisation causes hyperinflation, and that's why this method of budget deficit financing is forbidden in many industrial and developing countries.<sup>5</sup>

The impact of budget deficit onto macroeconomic stability is also influenced by absorption ability of a particular economy. In general it can be said, that long-term budget deficits are much more easily absorbed by countries with high level of private savings and fully developed financial markets.

Since less developed countries possess less private savings, and not fully developed financial markets, and regulated prices, they should try to reduce budget deficits, and thus avoid possible macroeconomic problems.

### **The Budget Deficits and Economic Performance**

According to last findings about the impacts of budget deficits to the developing economies, we can make following conclusions:

1. The budgeted deficits are unambiguously bad for economic growth,
2. High budget deficits are mostly explained as consequences of planned political decisions, and not as a consequence of external shocks or reactions on current internal economic situation,
3. Although short term budget deficit financing by monetisation doesn't necessarily leads to inflation, in long term horizon monetisation causes inflation growth,
4. There is some evidence that public investments are not always positive for private investments, which denies general opinion to this question. The public investments have negative effects on private investments. Public investments replace rather than complement private investments,
5. Budget deficits cause current account deficit and overvaluation of the exchange rate. This makes another negative impact on economic growth, decrease in exports as stated earlier,
6. Reducing budget deficits is effective policy measure in rising national savings.

Those conclusions made above can differ, and the actual situation in a particular country will be the most decisive. In one country can budget deficits lead to high inflation causing debt crises or low inflation with crowding out effect, and slow economic growth. It seems budget deficits don't cause any macroeconomic instability in some countries.

### **Budget Constraint**

Arising deficit is necessary to cover, either from monetary resources, or from others non-monetary resources. The budget constraint unambiguously expresses the connection between budget deficit and alternative resources of deficit financing. This way we can analyse relations between fiscal and monetary policy and macroeconomic circumstances of budget deficits.

We can define budget deficit and connect it with the change of net governmental debt in following way:

$$D_g - D_{g-1} = (G + I_g - T) + rD_{g-1} \quad (1)$$

Where the expression  $D_g - D_{g-1}$  is the change of net governmental debt between current period and previous period,  $G$  represents governmental consumer expenditures,  $I_g$  is governmental investment, and  $T$  represents taxes; precisely "net taxes" (reduced by transfers),  $r$  is nominal interest rate.

It's necessary to explain the difference between economic theory and governmental financial statistics. The equation (1) is based on the economic theory, and thus deals with the variables in net values, especially the expression in brackets representing the net balance of state budget  $(G + I_g - T)$ . The public expenditures

$G + I_g$  are in net values; i.e. gross expenditures less transfers and  $T$  represents net tax revenues; i.e. gross taxes minus transfers.

There is a difference in comparison with the governmental financial statistics where the values are given in gross terms.

The right hand side of the equation represents the budget deficit and shows that the change in net public debt equals to the sum of budget deficit plus debt service.<sup>6</sup>

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<sup>5</sup> This way of financing is forbidden in CR as well.

<sup>6</sup> Debt service represents the interest payments of governmental debt from state budget.

If there is a negative budget balance (deficit), it's necessary to cover it. The government has several options, how to settle this deficit. Provided that deficit will be covered by issuing bonds there are also several subject to whom these bonds can be sold:

1. Foreign subjects (private and public),
2. Households and firms,
3. Domestic banking system,
4. Central bank.

Especially in developing countries buys the most proportion of governmental bonds central bank, because of insufficient financial capacity of private domestic subjects and usually government doesn't have to pay any interest to central bank, if there are some problems. When the government owes money to central bank it's only a shift of public debt from one public organisation to another, because the central bank usually owns the government.

Foreign subjects are usually not very interested in government bonds of developing countries. Financial markets of these countries are not developed much, and such investment involves high investment risk. There must be sufficient risk premium contained in interest rate to attract foreign investors.

Let's suppose now, that part of governmental deficit is owned by private domestic or foreign investors and the rest possesses domestic central bank. According to given situation the total amount of governmental debt in possession of the central bank can be expressed by following equation:

$$(D_{gc} - D_{gc-1}) = (D_g - D_{g-1}) - (D_{gp} - D_{gp-1}) \quad (2)$$

Where the left hand side of equation ( $D_{gc} - D_{gc-1}$ ) shows the change of public debt in possession of the central bank. The right hand side of the equation (2) represents the total change of public debt<sup>7</sup> ( $D_g - D_{g-1}$ ) reduced by the change of public debt owned by private subjects ( $D_{gp} - D_{gp-1}$ ).

The following relation shows, how the public debt in the central bank's portfolio influences monetary base together with the other components.<sup>8</sup>

This equation expresses the indirect influence of budget deficit to the monetary base:

$$(MB - MB_{-1}) = (D_{gc} - D_{gc-1}) + e(R_c - R_{c-1}) + (L_{cb} - L_{cb-1}) \quad (3)$$

In this equation the variable **R** represents central bank's foreign reserves, **e** is the nominal exchange rate (the amount of domestic currency for one unit of foreign currency), and **L<sub>cb</sub>** indicates total central bank's credits given to other commercial banks. Under the assumption that the last expression is zero, we'll get following equation:

$$(MB - MB_{-1}) = (D_{gc} - D_{gc-1}) + e(R_c - R_{c-1}) \quad (4)$$

Substituting the bracket term ( $D_{gc} - D_{gc-1}$ ) from equation (2) we can get new relationship, which reveals the possibilities of budget deficit financing:

$$(D_g - D_{g-1}) = (MB - MB_{-1}) + (D_{gp} - D_{gp-1}) - e(R_c - R_{c-1}) \quad (5)$$

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<sup>7</sup> In this case we assume, that public debt is equal to governmental debt.

<sup>8</sup> It is necessary to point out, that the monetary base (MB) is used by central to manage the amount of money in the economy, and is the base for other money aggregates  $M_i$  calculations. MB together with the money multiplier significantly influences the rest of money aggregates.

The MB comprises of instruments with the highest liquidity level that can influence a central bank.

MB includes: money in circulation + total bank reserves.

The central bank conducts its monetary policy by managing monetary base.

This equation (5) suggests that there are three main alternatives of budget deficit financing:

1. Increasing monetary base (basically printing new money).
2. Issuing governmental bonds offered to private subjects (leads to financing by private sector – inducing crowding out effect).
3. Decreasing foreign reserves.

Final impacts of budget deficits depend on the means of its financing. Every alternative of financing causes macroeconomic instability when used excessively.

So far I have mentioned three possible alternatives of budget deficit financing. The next part of the paper deals with actual problem of budget deficits in the CR. Precisely I'll try to analyse the macroeconomic effects of budget deficit financing in the Czech economy.

### The Budget Deficit Financing in the Czech Republic

In this part I am going to find out how is covered the public debt in CR. Afterwards I'll try to assess the impacts of deficit financing to the Czech economy.

First of all I can conduct correlation analyses that should reveal which means of financing prevail. This analysis was made on quarterly data for the period 1994-2000 that was available from the IFS and CNB<sup>9</sup> statistics. For results see table 1.

Table 1: Correlation coefficients of variables from equation<sup>10</sup> (5)

	$MB - MB_{-1}$	$D_{gp} - D_{gp-1}$	$R_c - R_{c-1}$	BD
$MB - MB_{-1}$	1	-0,19	-0,19	0,04
$D_{gp} - D_{gp-1}$	-0,19	1	-0,07	0,65
$R_c - R_{c-1}$	-0,19	-0,07	1	-0,07
BD <sup>11</sup>	0,04	0,65	-0,07	1

As we can see from the table 1, there is a tight relationship between the budget deficits and public debt held by the public (0.65). This means that with budget deficit deterioration, there is a significant increase in public debt in possession of private subjects. According to these findings, governmental debt had been mostly covered by governmental bonds sold to private sector.

The other coefficients (0.04 and -0.07) are rather low indicating that the budget deficits, and thus public debt is financed, neither by monetisation nor by reduction in foreign reserves.

Even though the direction of dependence between budget deficits and foreign reserves is correct, i.e. indirect, we can see it is insignificant, because of low value of correlation coefficient. Further more there were recorded budget deficits and increase of foreign reserves at the same time during the period 2001-2002. These facts indicate that both variables developed independently.

I don't mention the monetisation because it isn't significant according to the correlation coefficient (0.04) too and it is also in CR and in many other countries forbidden.

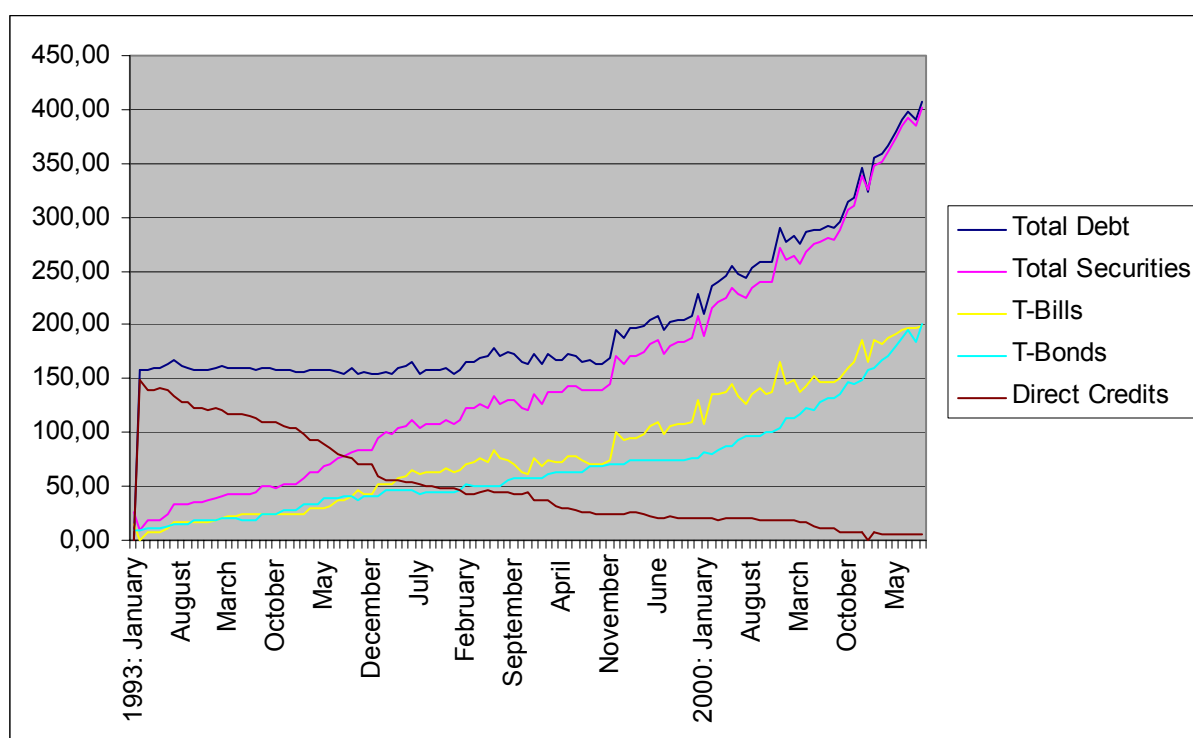
For further evidence let's have a look at the figure 1 depicting the structure of governmental debt by issued financial instruments. As we can see, since 1993 there has been a trend to transform the public debt from the direct credit to T-bills and T-bonds.

<sup>9</sup> CNB – Czech National Bank

<sup>10</sup> For this analysis was used the data for the period 1994 – 2000.

<sup>11</sup> BD – means budget deficit at the central government. The data with negative sign indicate budget surplus and positive sign represents budgetary deficit.

Figure 1: The structure of governmental debt by the financial instruments during January 1993 – September 2002, in bill. of CZK



Source: Ministry of Finance CR

According to these findings so far, my next aim will be to assess the impact of deficit financing by private sector to the interest rates as states the Keynesian theory.

From the correlation analysis we can make a conclusion that:

- 1) The budget deficits in the CR aren't financed by direct credits from the central bank (monetisation),
- 2) Foreign reserves aren't used for budget deficit financing as well,
- 3) Budget deficit has been mostly "sold" to private sector.

We can say (according to the theory) that the budget deficits shouldn't have any influence onto inflation and on exchange rate appreciation. Budget deficits are more likely to influence interest rates causing crowding out effect. The next step is to assess the impact of budget deficits to real interest rates and to private investments.

### The Impact of Budget Deficits to the Interest Rates

The economic theory says about the relation between budget deficits and interest rates that budget deficit deterioration invokes interest rates to increase, because the government will have to increase interest payments for bonds, as it'll want to sell an additional amount of bonds.

It is because financial funds are rare and if a government wants to sell more bonds it'll have to lower the price or offer higher interest rate to stimulate private investors to buy. But the more governmental bonds are sold, the less disposable funds will remain for private investments.<sup>12</sup>

Persistent budget deficits and permanent growth of public debt causes decrease in public confidence about the economy, inducing decrease in demand for governmental bonds and possible increase in interest rates.

Another theories also state an opposite causality between budget deficits and interest rates. The main feature is that with increasing interest rates the government must also pay higher interest for issued government debt. It is usually called the debt service. So higher debt service increases state budget expenditures that can further worsen budgetary balance. I won't further analyse this problem, because this would be beyond the scope of this paper.

<sup>12</sup> This is the example of crowding out effect, where increasing public investment cause decrease in private investments.

Table 2 shows for illustration the debt service to total expenditures and debt service to GDP ratios. As can be seen the debt service to total expenditures ratio amounts about three percent and debt service to GDP ratio constitutes about one percent.

Table 2: The debt service in the CR, CZK (bill.)

	1998	1999	2000	2001	2002 <sup>13</sup>
Debt service	19,328	25,028	18,295	21,329	21,996
Total expenditure of state budget	527,661	597,633	620,621	679,195	709,083
GDP	1839,1	1902,3	1984,8	2157,8*	2270**
Ratio debt service to total expenditure (%)	3,7	4,2	2,9	3,1	3,1
Ration debt service to GDP (%)	1,1	1,3	0,9	1	1

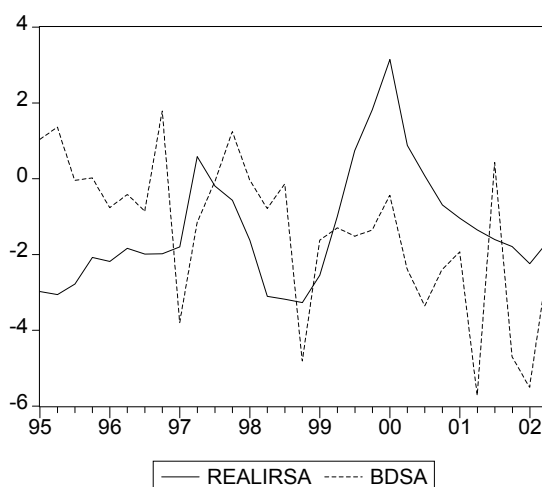
Source: Ministry of Finance CR, own calculations

\* preliminary, \*\* forecast

For investigation of the relation between interest rates and budget deficits I have used available quarterly data from the beginning of 1995 till the second quarter of 2002. These are only 30 observations and it is almost the threshold level for the necessary sample size to provide consistent econometric analyses.

First I made a graph of real interest rate<sup>14</sup> and budget deficits together to estimate possible relations between those two series. See figure 2 where on the x-axis is time and on the y-axis are percentage points of interest rates and budget deficits to GDP. According to development of both lines we can't say anything about the relationship between each other.

Figure 2: The development of real interest rate and budget deficit to GDP<sup>15</sup>



REALIRSA – real interest rate seasonally adjusted

BDSA – budget deficit seasonally adjusted<sup>16</sup>

That's why I'll further continue with econometric analysis. The next step is again correlation analysis to evaluate the proportion of dependence (relation). For results see table 3. As we can see the value of correlation coefficient (-0.01) is nearly zero and thus we can make a conclusion, that there is not any statistically significant relation between interest rates and budget deficits, even though the direction is correct. That means e.g. there is a rise in interest rates with budget deficit deterioration.

<sup>13</sup> From January till November

<sup>14</sup> The real interest rate is calculated from deposit nominal interest rate, where I used its quarterly moving averages to get quarterly data. Then I subtracted from nominal interest rate the inflation rate (according to Fisher's equation) to obtain real interest rates.

<sup>15</sup> Seasonally adjusted data, additive method was used.

<sup>16</sup> In this case values with positive sign represent budget surplus and values with negative sign represent budget deficit.

Table 3: Correlation coefficient of interest rates and budget deficits<sup>17</sup>

	REALIR	BD
REALIR	1	-0,01
BD	-0,01	1

In table 4 I also did the correlation analysis, as in table 3, but with seasonally adjusted data. In this case we can see, that after seasonal adjustment we get better results, though close to zero as in the previous case in table 3.

Table 4: Correlation coefficient of interest rates and budget deficits (seasonally adjusted data)

	REALIRSA	BDSA
REALIRSA	1	-0,04
BDSA	-0,04	1

In the next step I have tried to confirm the results from correlation analyses with conducting a simple regression. See equation (6).

$$REALIR_t = c + BD_t + \varepsilon_t \quad (6)$$

As these time series are quarterly data that follow their development trend according to business cycle there can be problem with spurious regression and series don't have to be stationary. So I used seasonally adjusted data, and conducted unit root test. For the unit root test I used Dickey-Fuller and Phillips-Perron tests. The results of both tests are in the following table 5. Both tests confirmed that the time series are I(1); integrated in first level. It means that for the regression I'll have to use the data in first differences to get stationary series, and to avoid spurious regression.

Table 5: Dickey-Fuller (DF), and Phillips-Perron (PP) tests

Test used	Index level		First differences	
	DF	PP	DF	PP
REALIRSA	-1.87	-1.88	-3.74*	-3.74*
BDSA	-4.36*	-4.39*	-9.70*	-9.70*

\* Values are significant at 5 % level

Table 6 represents the results of regression analysis with data in first differences. I have taken the real interest rates as dependent variable and budget deficits as independent variable.

Table 6: The results of the model (6)

	First differences	
	coefficient	t-statistic
c	0.06	0.32
BD <sub>t</sub>	0.10	1.37
R <sup>2</sup>	0.07	
R <sup>2</sup> adj.	0.03	
DW	1.36	
F-statistic	1.88	

As we can see the regression results are completely insignificant according to t-statistics, F-statistic and R<sup>2</sup>. After this finding we can make a final conclusion that the budget deficits don't significantly influence real interest rates in the Czech economy. The same results have been obtained from the correlation analysis as well. In another words, there is no crowding out effect in the Czech Republic.

<sup>17</sup> Not seasonally adjusted.

For graphic illustration we can have a look at the figures 2 and 3. These both scatter plots with regression lines show the same results as in the estimated equation. Figure 2 represents seasonally adjusted data and figure 3 represents seasonally unadjusted data. According to the slope of both regression lines we can assess the proportion of relation between both variables.

Figures 3 and 4: Scatter plots showing the rate of relation between real interest rates, and budget deficits<sup>18</sup>

Figure 3

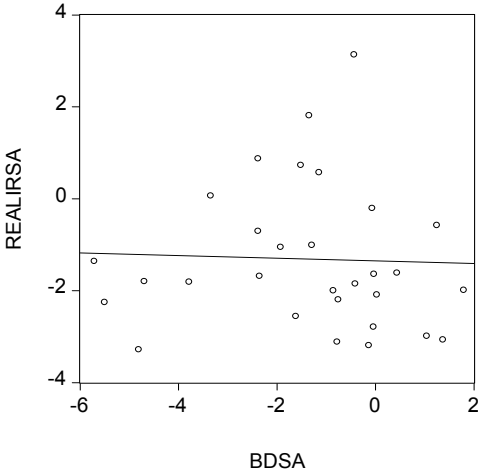
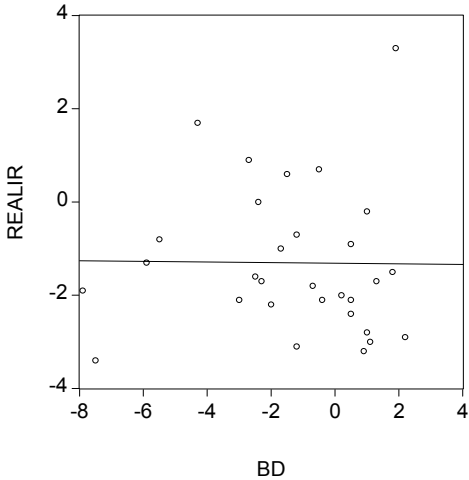


Figure 4



BDSA – budget deficits seasonally adjusted  
 REALIRSA – real interest rates seasonally adjusted

BD – budget deficits  
 REALIR – real interest rates

<sup>18</sup> The used data are from the period of Q:1 1995 – till Q:2 2002



Figures 5 and 6 show the evolution of GDP and budget deficit in the period 1994-2003

Figure 5

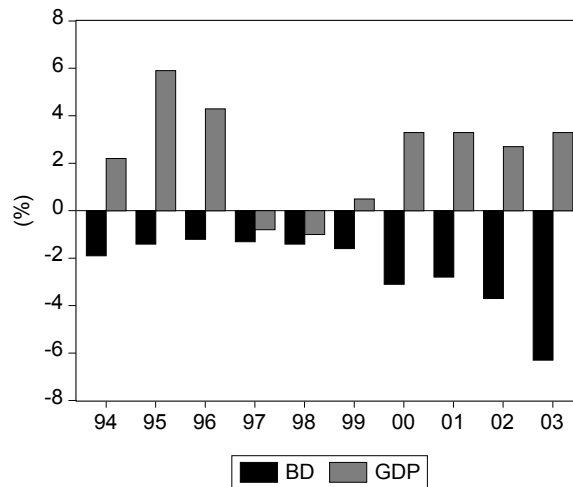
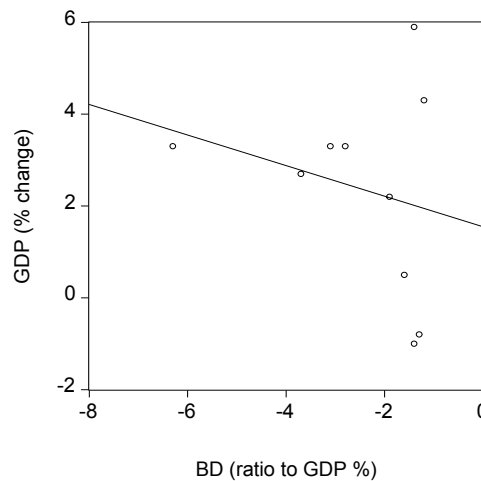


Figure 6



BD – annual budget deficit to GDP ratio  
 GDP – annual gross domestic product

### Conclusions

In this analysis I have found out that budget deficits are largely financed through issued governmental bonds possessed by internal and external private sector. This fact is supported by low interest rates that make this type of financing rather cheap.

Budget deficit is neither monetised nor financed by reducing foreign reserves. On the contrary foreign reserves experienced increasing trend thanks to the inflow of foreign investments into the Czech economy on the ground of privatisation process.

Surprisingly any impact of budget deficits to inflation wasn't found too and the same conclusion can be made in the case of exchange rate.

I suppose that the neutrality of budget deficit financing to the macroeconomic stability in the CR is at this time caused by sufficient amount of funds available for public debt covering. The demand for governmental bonds is high, so the interest rates don't have to be increased. There are also extraordinary revenues from privatisation that help to cover budgetary expenditures.

Recently (2002) a part of public expenditures have been financed from extraordinary revenues. For instance the budget deficit in fiscal period 2002 was lowered by approximately 50 percent by revenues from Transgas privatisation and by repayment of Russian debt.<sup>19</sup>

Especially those extraordinary revenues caused appreciation of the Czech koruna in 2002, deterioration in external competitive advantage, decreasing exports and deteriorating the current account deficit. The problem of these extraordinary revenues is their short-term persistence. So there can be some negative economic effects after spending those resources in couple of years.

In my opinion, the fact there are enough funds in the CR, is caused also by negative experience from the beginning of transformation when commercial banks experienced high losses. Thus Czech banks are more scared to credit risks and prefer to buy governmental bonds with guaranteed revenue at relatively low risk.

In the end I'd say that there is hardly any risk of financial crises in the CR at this time. Budget deficit can be still financed by governmental bonds, because the financial market is able to absorb it without any serious macroeconomic difficulties. But this is not a permanent solution, and some changes will have to be done.

For the future there is a problem with the source of financing the budget deficits, because extraordinary revenues are getting dry. We will have to find any ordinary revenues to finance public expenditure. In this case we will have to increase e.g. tax revenues and reduce public expenditures, and thus a reform of public finance is discussed in CR at these days.

Because Czech budget deficit doesn't match Maastricht criteria (5.5 percent in 2002), it'll be necessary to reduce these deficits under 3 percent of GDP otherwise Czech economy won't be able to implement Euro as the mutual European currency.

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<sup>19</sup> For more details see the expose of the minister of finance P. Sobotka to the proposal of the state budget for year 2003.