

## **BUDGET DEFICIT AND INFLATION**

**Zoran Anušić**

One of the macroeconomic categories which causes polemics among economists is budget deficit and its impact on inflation and economic activity in general. Public is acquainted with the fact that from the beginning of the liberation war, the Croatian state has been creating significant budget deficit. However, the contradictory estimates of the size of deficit could often be heard. Furthermore, the appearance of budget deficit has often been identified as the main cause of high inflation in the Republic of Croatia in 1991 and 1992. This paper is an attempt to quantify the budget deficit impact on inflation in Croatia during 1991 and 1992. It also gives a review of some macroeconomic problems of budget deficit in the Republic of Croatia.

National budget deficit is the amount by which total government expenditures exceed total revenues in the observed period of time. Government expenditures comprise material consumption of the state sector, salaries of government employees, depreciation of national fixed capital, as well as all kinds of transfers to population. On the other hand, national budget revenues include all kinds of taxes and other levies. Interaction between the budget and the rest of national economy can be observed through the definition of budgetary deficit. The revenue side of the budget is highly dependent upon the overall share of the economy. If the economic activity in the country is on the upswing, the budget revenues will grow without increase of the fiscal burden. Although the expenditure side of budget has often been labeled in the economic literature as the instrument of economic policy (exogenous variable), even in stable economies the budget expenditures appear to be much more inert. If the country is in the period of economic stagnation, substantive changes occur in the budget sphere. Budget revenues decrease due to erosion of the tax base, while expenditures rise mostly due to increase in transfers to

population (unemployment benefits, social welfare etc.). If a country is in war, the budget expenditures increase dramatically, primarily the military expenditures and expenditures on accommodation of displaced persons if the war takes place on its own territory. Since a defensive war also brings paralysis of economy on the affected territory, deterioration of tax base and consequently of budgetary revenue appears. In most cases, drastic levels of taxation in war conditions are insufficient for covering the war budget expenditures. Therefore, large budget deficits were accompanying most of the wars in the past.

During last two years of World War II, for example, the government expenditures of the USA amounted to almost 50% of the gross national product (GNP) with budget deficit of about 25% of gross national product. This means that just one half of material expenditures was covered by revenues regardless of the real growth rates of over 10% per annum! War budget deficit in Croatia in 1991 and 1992 was formed under significantly unfavorable circumstances. Physical destruction of national capital, paralysis of the service sector, as well as transitional crisis in general, caused complete tax base erosion. On the other hand, defence necessities, hundreds thousands of displaced persons and refugees, social expenditures and the losses of state and other enterprises, were a multiple burden for national economy which has been stagnating for more than a decade. According to official estimates, in 1992 the share of government expenditures in gross national product was about 26%, and the share of consolidated budget deficit (state, funds and public enterprises) in GNP stood at 4.8%.

There is a common belief among economists, that budget deficit is a priori harmful for the total functioning of economy. The most frequent arguments are intertemporal effects of budget deficit, crowding-out effect on gross investments and its impact on inflation. According to the first argument, budget deficit today relentlessly implies the necessity of running a surplus in the future budget, what simultaneously means heavier fiscal burden for future generations. It is, however, often forgotten that interest on government bonds will also be the income of future generations. As long as the deficit is financed

through internal debt, interest payment is simply financial transfer from one group of population to another. Although these transfers needn't be desirable, it can't be said that they represent a burden for national economy.

According to Keynesian economic theory, the increase in budget deficit will cause *ceteris paribus*, the increase in real interest rate. The reason lies in a fact that due to budget deficit occurrence (i.e. increased real budget expenditures which are by taxation not withdrawn from other components of aggregate demand), the aggregate national demand increases as well. If the aggregate supply curve is not situated in its perfectly elastic/inelastic regions, a shift in aggregate demand will also cause the increase of production and prices. The relationship between price and quantity effect depends upon price elasticity of aggregate supply. However, the increased nominal income will cause the increase in transactional demand for money, what must be compensated by a decrease in speculative demand for money, i.e. by rising real interest rate. Consequently, the budget deficit, along with its potential expansion impact on economy can cause a drop in real gross investment, what is in literature called the crowding-out effect. The intensity of crowding-out effect depends upon the level of capacity utilization in the economy and whether is in full employment, in other words upon the slope of the aggregate supply curve. As long as the aggregate supply is price elastic, the increased demand will cause larger quantity effect than the price effect on the supply side, which due to impact of accelerator can positively influence investment. In literature, this effect is known as the crowding-in effect. Furthermore, the intensity of the crowding-out effect largely depends upon monetary policy executed under the influence of budget deficit. If the budget deficit is accompanied by expansive monetary policy (deficit monetization), the movement of real interest rate fully depends upon the degree of monetization. In that case budget deficit overturns to all financial means in the economy which don't pay the real interest.

Inflationary impact of budget deficit depends upon the sources of its financing, as well as upon the overall share of the economy. If taxation

is comprehended as the financial base of goods and services reallocation from one group of national product's users to another, the appearance of budget deficit implies creation of excess demand. For that amount a government has to issue debt to population, commercial banks or enterprises in the country, foreigners, or it may ask for credit from the central bank, namely monetize the deficit. While with the first two sources of financing the creditors and real sources of financing could be clearly and precisely identified, by monetization a deficit is inflationary imposed primarily on holders of financial means. Consequently, this model of financing is often called the inflationary taxation.

An illustrative description of inflationary taxation, as well as possibilities for its collection, even in countries with unstable economic and political situation is found in Keynes (1923):

**"A government can live for a long time, even the German government or the Russian government, by printing paper money. That is to say, it can by this means secure the command over real resources, resources just as real as those obtained by taxation. The method is condemned, but its efficacy, up to a point, must be admitted.**

**.... so long as the public use money at all, the government can continue to raise resources by inflation... What is raised by printing notes is just as much taken from the public as is a beer duty or an income tax. What a government spends the public pays for. There is no such thing as an uncovered deficit."**

Monetary deficit financing implies that excess money supply in the economy, for which demand doesn't exist must be imposed on public by means of inflation. It is already mentioned that a budget deficit may have a positive influence on production, and money demand due to growth of real transactions. Apart from an increase in real transactions, the nominal money demand increases to the extent to which inflation devaluates the existing purchasing power of money in circulation. In order to partially restore the purchasing power of financial means, the

population increases the nominal amounts of money holdings. In this manner, the inflationary deficit financing automatically creates the additional demand for money.

However, in the periods of high inflation a stock of money which population desires to hold in a form which doesn't pay interest, diminishes. Instead, the nominal money is transformed into forms which are more resistant to inflation, such as foreign currency, commodities, and sometimes interest bearing deposits . High inflation consequently induces the acceleration of money velocity. Just like high interest rates cause tax base erosion, high inflation causes a decrease in real money demand, which increases the inflation rate required to finance the budget deficit.

The budget deficit can be financed from three sources: by issuing debt in the country and abroad, as well as by deficit monetization:<sup>1</sup>

$$\mathbf{BD= dMi + dDD + dFD * EXCG} \quad (1)$$

where BD denotes the nominal budget deficit, dM1 absolute change in nominal money stocks M1, dDD change in the stock of public debt, dFD change in the foreign debt outstanding, and EXCG average exchange rate in the observed period.

It is quite obvious that a government may entirely finance a deficit by issuing debt in the country and/or abroad ( $dM1 = 0$ ), and in this way avoid the increase in money supply at least for some time. However, we are interested in a case when deficit is entirely financed by the central bank. What is the inflation rate caused by such deficit

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<sup>1</sup> *Along with these three sources of deficit financing which have been most frequently quoted in the literature, a government may finance deficit on its own capital expense. This source of deficit financing is significant for the Republic of Croatia, since the major share of capital which traditionally doesn't belong to state sector is owned by government.*

financing? What was the inflation rate caused by deficit monetization in the Republic of Croatia in the war years 1991 and 1992? A simple model of interdependence of full deficit monetization and inflation (Dornbusch, 1991) will serve as the analytical tool for providing answers to these questions. In the notation of budget constraint (1), we are interested in a case when  $dDD = dFD = 0$ :

$$\mathbf{BD = dM1} \quad (2)$$

If we use the share in gross national product as the relative measure of deficit burden, (2) may be expressed as:

$$\mathbf{Yg = dM1} \quad (3)$$

where  $Y$  represents the nominal gross national product, and  $g$  the share of nominal budget deficit in nominal gross national product, i.e.  $g = BD/Y$ . It may be observed here that a share of budget deficit in gross national product can be expressed as the ratio of change in money supply and nominal gross national product,  $g = dM1/Y$ . Since data on budget deficit are rarely readily available, a size of budget deficit can be indirectly calculated through money supply increase, which will be elaborated in the following text.

In real terms, (3) translates to:

$$\mathbf{YRg = dM1 / P} \quad (4)$$

where  $YR$  denotes the real gross national product,  $YR = Y/P$ , and  $P$  stands for the implicit price deflator for the gross national product. If the right side of (4) is multiplied by  $M1/M1$  we obtain:

$$\mathbf{YRg = m (M1 / P)} \quad (5)$$

where  $m$  denotes a rate of change of  $M1$ ,  $m = dM1/M1$ .

Dornbusch then introduces the assumptions of monetary balance (money supply,  $M1$ , is equal to money demand,  $Md$ ):

$$M1 = Md = (P YR) / V \quad (6)$$

and of linear equation of velocity of money which is a function of the inflation rate  $p$ :

$$V = a + bp \quad (7)$$

where parameter  $a$  denotes the non-inflationary velocity of money, and parameter  $b$  the sensitivity of velocity of money to unit change in the inflation rate (the expense of keeping cash). Since higher inflation causes higher level of dollarization and flight of cash money into means which are more resistant to inflation, the value of both parameters is positive. The expressions (6) and (7) together give  $YR = (a + bp) M1/P$ , which after insertion into (5) gives:

$$m = g (a + bp) \quad (8)$$

The connection between inflation and growth rate of money supply is established on the basis of well known monetary constant growth rates rule:

$$P = m - y \quad (9)$$

where  $y$  is the growth rate of real gross national product. Inserting (8) into (9) gives the equation for inflation which is generated by full monetization of budget deficit:

$$p = (a g - y) / (1 - b g) \quad (10)$$

under condition that  $b g < 1$ . Equation 10 shows that inflationary effect caused by full deficit monetization depends upon the financial structure of system, namely upon the parameters of velocity of money equation, as well as upon growth rate of real national product. It means that the

same level of budgetary deficit doesn't always induce the same inflationary impact. The characteristics of equation (10) are the following:

- 1) Inflation rate decreases when the real income grows. Hence,  $dp/dy = -(1 - by)^{-1} < 0$ . The reason lies in a fact that output growth causes the increase in money supply, which allows the increase in money supply without inflationary impact.
- 2) The inflation rate is higher with the heavier budgetary burden. This link, however, depends upon the output growth rate:

$$dp/dg = (a - by)/(1 - by)^2$$

The condition  $dp/dg > 0$  is fulfilled if  $y < a/b$ .

Table 1 presents all data necessary for calculation of inflation rate caused by budget deficit monetization in 1991 and 1992. Real monthly gross national product (GNP) is obtained as the ratio of nominal GNP with implicit GNP deflator which has been calculated as the arithmetic mean of retail and producer price index.<sup>2</sup> A share of budget deficit (money supply change) in GNP,  $g$ , significantly varied from month to month, which can be explained by time structure of budget expenditures and revenues, as well as by irregular coordination between fiscal and monetary spheres. At the annual level, however, the calculated share of budget deficit in GNP is more than twice larger than the share declared in the official statistics. In 1991 the average monthly  $g$  stood at 8.9%, and in 1992 even 11.06%, which is almost 2.5 times larger than the mentioned 4.8%.

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<sup>2</sup> For control; GNP in 1992 was calculated in December 1992 prices (monthly nominal figures are inflated to the level of December prices) and expressed in USD on the basis of exchange rate in that month of 798.12 HRD for 1 USD. This procedure resulted in GNP value of 8134 mil. USD, what corresponds to official data.



**Table 1.**

**CALCULATION OF INFLATION RATE DUE TO FULL MONETIZATION  
OF BUDGET DEFICIT 1991:1 - 1991:12**

month and year	M1 billion HRD	YR 1990=100	P 1990=100	Y billion HRD	V	p	g	y	p*
1991-1	34.27	79.90	128.51	20.72	0.60	0.05	0.1458	-0.1921	0.4942
2	34.88	79.30	140.32	22.46	0.64	0.09	0.0272	-0.0075	0.0208
3	35.91	88.30	145.97	26.01	0.72	0.04	0.0396	0.1135	-0.1116
4	38.45	85.50	154.16	26.60	0.69	0.06	0.0955	-0.0317	0.1057
5	39.98	85.80	178.27	30.87	0.77	0.16	0.0496	0.0035	0.0208
6	43.46	84.90	191.90	32.88	0.76	0.08	0.1058	-0.0105	0.0852
7	47.06	74.60	204.36	30.77	0.65	0.06	0.1170	-0.1213	0.2802
8	50.53	68.40	227.63	31.42	0.62	0.11	0.1104	-0.0831	0.2055
9	50.48	59.90	252.27	30.49	0.60	0.11	-0.0016	-0.1243	0.1229
10	59.82	58.30	312.00	36.71	0.61	0.24	0.2545	-0.0267	0.8936
11	63.09	53.40	387.74	41.78	0.66	0.24	0.0783	-0.0840	0.1585
1991-12	65.26	53.90	458.70	49.89	0.76	0.18	0.0435	0.0094	0.0105
1992-1	66.69	49.60	550.62	55.11	0.83	0.20	0.0259	-0.0798	0.0993
2	70.01	51.80	618.35	64.64	0.92	0.12	0.0514	0.0444	-0.0274
3	79.25	54.70	722.39	79.74	1.01	0.17	0.1159	0.0560	-0.0117
4	90.55	53.70	810.56	87.84	0.97	0.12	0.1286	-0.0183	0.1271
5	99.06	51.30	1058.89	109.62	1.11	0.31	0.0776	-0.0447	0.1045
6	111.10	53.50	1267.76	136.87	1.23	0.20	0.0880	0.0429	-0.0082
7	143.34	57.00	1596.26	183.61	1.28	0.26	0.1756	0.0654	0.0207
8	174.76	55.20	1925.88	214.53	1.23	0.21	0.1465	-0.0316	0.1827
9	201.97	53.80	2409.18	261.56	1.30	0.25	0.1040	-0.0254	0.1061
10	248.85	55.30	3091.22	344.97	1.39	0.28	0.1359	0.0279	0.0538
11	275.41	51.80	4004.63	418.61	1.52	0.30	0.0634	-0.0633	0.1142
1992-12	390.32	52.80	5023.28	535.23	1.37	0.25	0.2147	0.0193	0.2517

Source: PK and EP, 17; Priopćenja DZS, various issues; GKH, DZMAP, various issues

Monthly velocity of money (the ratio of nominal GNP and money supply) was increasing in the entire observed period. In March 1992, monthly velocity of money exceeded the level of 1, and from May of the same year it was regularly above that figure. The velocity at the annual level increased from 7.2 in January 1991 to around 16 in December 1992. At the first glance one can observe positive connection between the velocity of money,  $V$ , and the inflation rate,  $p$ . Econometric estimation of equation (7) on data from table 1 gave the following results:<sup>3</sup>

$$V = 0.4214 + 3.3410 p, \quad DW = 1.23, \quad RKOR^2 = 0.79$$

(6.19)      (8.64)

Therefore, the non-inflationary level of monthly velocity of money in the Republic of Croatia stands at 0.4214 (5.06 on annual basis), and for every percentage point of the inflation rate increase, monthly velocity increases for 0.0334. Consequently, formula for the inflation rate under deficit monetization in Croatia in the period 1991:1 - 1992:12 is:

$$p_t = (0.4214 g_t - y_t) / (1 - 3.341 g_t) \quad (11)$$

Insertion of monthly observations for  $g_t$  and  $y_t$  from table 1 into expression (11) gives a series of monthly inflation rates due to full deficit monetization ( $p^*_t$ ) which is shown in the last column of table 1. Comparison of actual monthly inflation rates and inflation rates caused by deficit monetization reveals several interesting features. In seven of twelve months in 1991 inflation rate caused by monetization was higher than the actual inflation rate, while in 1992 that was a case only in April. In all other months of 1992 the inflation rate caused by

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<sup>3</sup> *The sample excludes the observations for October and November 1991 and May 1992 in which the high inflation rate was a consequence of administrative increase of prices of some products. The estimation over the whole sample gives  $a = 0.52$  and  $b = 2.4$ , and significantly worse regression statistics. In both cases, however, the final conclusion about budgetary deficit impact on inflation does not significantly differ. Corresponding  $t$  values are quoted in parenthesis below coefficient.*

monetization was significantly lower (except in August and December) than the actual inflation rate, what suggests that in that year other components of inflation were also present (cost generated inflation and inflationary expectations).<sup>4</sup>

On the other hand, many studies show that the links between inflation, budget deficit and money supply are not tight within one month but polynomially distributed in time. Furthermore, they show that these links are realized with certain time lags. Since the objective of this paper is not full identification of all interdependencies and their time pattern, the monthly oscillations are partially remoted by insertion of monthly averages for  $g$ , and  $yt$  into expression (11), for all four quarters as well as for the whole year. The results, shown in table 2, confirm the movements which are already suggested from monthly differences between  $p$  and  $p^*$ .

The average monthly rate of inflation due to deficit monetization in 1991 was very close to actual inflation rate (11.9% vs. 11.8%). Larger deviation between these two rates appeared in the third quarter of 1991 when, although relatively lower, budget deficit could have been monetized only with the average monthly inflation rate of 18.87%, primarily due to huge decline in real GNP in that quarter. Instead, the prices were administratively kept at lower level (monthly rate of 9.3%), which most probably caused a large deficit in the fourth quarter of 1991.

Strong monetary expansion, which due to lower rates of GNP fall could have monetized deficit with somewhat lower inflation rates, evidently

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<sup>4</sup> *If the autonomous increase in wages causes the proportional increase in prices, the nominal GNP will increase proportionally, and money demand under-proportionally, due to increase in the velocity of money. That means that a share of budget deficit in GNP would remain at the same or at somewhat lower level, which depends upon parameters in the velocity equation. If the real rate of change of GNP remains constant, the "required" inflation rate for budgetary deficit monetization will not substantially change.*

also had the opposite effects in encouraging other inflationary mechanisms, such as indexation and incorporation of inflationary expectations. In the first quarter of 1992 the conditions for removing the hyperinflationary elements were the most convenient primarily due to slight increase in real GNP, and smaller share of budget deficit in GNP. In that quarter the budget deficit could have been monetized with the monthly inflation rate of only 2.58% , while the actual monthly rate of inflation (although lower than in the previous quarter), stood at high 16.3%.

**Table 2.**

**INFLATION CAUSED BY MONETIZATION  
AND ACTUAL INFLATION RATE:  
COMPARISON OF QUARTERLY AND ANNUAL AVERAGES**

quarter year	average monthly g	average monthly y	average monthly p <sup>*</sup>	average monthly p
I 1991	0.0709	-0.0287	0.0768	0.060
II 1991	0.0836	-0.0129	0.0668	0.100
III 1991	0.0752	-0.1096	0.1887	0.093
IV 1991	0.1254	-0.0338	0.1491	0.220
I-IV 1991	0.0889	-0.0462	0.1190	0.118
I 1992	0.0644	0.0069	0.0258	0.163
II 1992	0.0981	-0.0067	0.0715	0.210
III 1992	0.1420	0.0028	0.1085	0.240
IV 1992	0.1380	-0.0054	0.1179	0.277
I-IV 1992	0.1106	-0.0080	0.0866	0.223

In the remaining three quarters of 1992, the share of budget deficit in GNP increased, and along with it the rate of inflation due to monetization. It is significant that lower rates of GNP decline in 1993 compared to 1991 enabled the monetization of relatively larger budget deficit in 1992 with smaller inflation rates than in 1991. Instead, the other inflationary mechanisms remained strong till the end of 1992, although during the year their performance didn't strengthen in direction of hyperinflation. Namely, the change of average actual inflation rate in 1992 ( $p_t - p_{t-1}$ ) closely matches the change of inflation rate caused by monetization ( $p_t^* - p_{t-1}^*$ ), which suggests that in 1992 the growing budget deficit may be identified as a principal cause for the increase in inflation rate.

In 1991 and 1992 we discover another regularity that is significant from the stand point of conducting the economic policy. In both years, the rising share of budget deficit (change in money supply) in GNP, can be observed. It seems that this movement can be connected with a time lag in identifying the actual budget revenues and expenditures. When a true size of deficit is established at the end of the year the intervention from the monetary sphere follows. If this behavior can be confirmed as a regularity, the second half of the year would represent a more unfavorable period for reducing inflation than the first half of the year.

What are the implications of this analysis for conducting the economic policy? First of all, this analysis shows that the actual inflation in the Republic of Croatia is parallelly generated from several simultaneous sources and that it has all tendencies to overgrow into open hyperinflation. Elimination of one of the generators would lead to decline in inflation, but the other sources would remain intact. In other words, the gradual elimination of budget deficit would surely decrease the inflation rate, and consequently diminish the inflationary expectations and cost component of inflation. These two components, however became dominant in the last quarters, which suggests that elimination of budget deficit should be supported by some version of shock-therapy. On the other hand, no shock-therapy can provide

results without full elimination of budget deficit monetization. In the Croatian case, it means, due to lack of real sources of financing, removing the chronic sources of budgetary deficit creation. A policy of public debt reduction should also be in function of inflation rate reduction. According to some reports, a size of public debt has already reached the level of one-year GNP of Croatia, and the expense of its servicing (which represents the budget expenditure) already stands between 2 and 3 percent of GNP. Therefore, the measures for elimination of budget deficit monetization (the removing of chronic sources, bond issuing and foreign borrowing) should be supported by measures for reduction of public debt, and first of all by its conversion for national capital which is still owned by the state - enterprises shares and residential units.

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