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The impact of the budget deficit on the currency and inflation in the transition economies

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Abstract: This article investigates the causal linkage between budget deficit, monetary mass and inflation in the transition economies. It is focused on the impact of public expenditures growth on money supply growth, and it does not take in account the amount of budget deficit. We test the new hypothesis that inflation is primarily attributable to public finances imbalances. In our model, the money supply growth is function of budget deficit and GDP growth rate; and inflation is a function of money supply growth and budget deficits. We find a positive relationship between monetary financing of government deficits and money base growth in the case of Albania, Bulgaria, and Romania; public finance imbalances are the main cause of money creation and inflation in these countries.

Key words: Public finance, Budget deficit, Exchange rate, Inflation, Transition economies.

JEL Classification: E5, E61, E62, H5, H6

Introduction

The objective of this chapter is to examine the causality of the link budget deficit – monetary mass – inflation in the transition economies. The analysis is quite different from that of the first part for many reasons. The big comparative difference with the socialist economies lies in the factors that determine the supply of monetary mass and the transmission mechanism of inflation in function of the different ways of financing the budget deficits. Likewise, contrary to the first

part where the rigidity of the administered prices doesn't allow to directly test the causality between budget deficit and inflationary pressures, it is possible to proceed with this test in the case of the transition economies. Lastly, it appears relevant to show the relations between budget deficit, monetary mass and inflation that are highlighted by the authors of the monetarist trends.

The relation between budget deficit, monetary mass and inflation has been the object of multiple studies. According to Bruno (1995), a high inflation rate is always accompanied by serious imbalances in public finances. According to him a detailed analysis shows that, in all cases of inflationary crisis, the country showed significant budget deficits before the crisis, more pronounced still during the crisis and clearly below the average during the recovery after the crisis. The empirical observation confirms the monetarist proposition that budget deficits contribute to the increase of monetary supply, and excessive money creation is responsible for inflation. According to Montiel (1989), the supporters of the budgetary approach, and in particular Milton Friedman, support the idea that inflation is always and everywhere a monetary phenomenon. The theoretical contributions of Sargent and Wallace (1981), of Dornbusch (1985 and 1992), of Buiter (1984), of van Wijnberge et Anand (1987 and 1989), of Dornbusch and Fischer (1989), have shown that "permanent expansion of the high-powered monetary mass essentially arises from budgetary imbalances"¹.

Nevertheless, the empirical works doesn't always lead to this conclusion. For Barro (1978)² it's rather the growth of public expenses that impacts the growth of monetary mass, and not the amount of budget deficit. Nevertheless, the American experience offers ambivalent results.³ The ambiguity of a relation between the growth of the monetary mass and the imbalances of the public finances persists also in the works dedicated to the other developed economies.

¹ Montiel P.J., *Ibid.* p. 528.

² The basis model of Barro, consists in testing the growth of monetary mass as a function of the increase of budgetary expense and of budgetary deficit.

³ The papers of Hamburger and Zwick (1981) strengthen the conclusion of Barro. On the contrary, Niskanen (1978), Hamburger and Zwick (1982), and Grier and Neiman (1987), find a strong correlation between budgetary deficits and growth of monetary mass. McMillin and Beard (1982), examining the same sample, find a different result. It should be specified that before, McMillin and Beard (1980) and McMillin (1981) have used quarterly data, and they find a strong relation between budgetary policy and various monetary aggregates. More or less, to the same conclusion lead the papers of Levy (1982), of Hoffman, Low and Reineberg (1983), of Laney and Willet (1983), in Giannaros and Kolluri (1985), *Art. cit.* p. 402. Miller and Ahking (1985) show a significant causality between budgetary deficits, growth of monetary mass and inflation rates. in Miller S.M., Ahking F.W., "The Relationship Between Government Deficits, Money Growth, and Inflation", *Journal of Macroeconomics*, Vol. 7, No 4, Fall 1985, pp. 447-467.

Thus, Kolluri and Giannaros (1985), Protopapadakis and Siegel (1986), have tested a model similar to that of Barro for the ten industrialized countries⁴. They don't find a significant relationship between budget deficit and growth of monetary mass. On the contrary, for the same sample of countries, Blundell and Chouraqui (1981) find that the acceleration of the growth of monetary mass coincides in a certain number of countries with the implementation of expansionary budget policies. Contradictory results are also obtained from the researchers for the developing countries⁵. For the economists the main cause that doesn't bring out significant positive relation between the amount of the public finance imbalances, the growth of monetary mass and the inflation rate is the way of financing of budget deficits. As a rule, the sale of public debt securities to the non-bank private sector or the external financing (in the case of floating exchange rate) secure a non-monetary financing of the budget deficit. According to Modigliani (1987) the link between the amounts of budget deficits and the growth of monetary mass is clearly false at least for the economies with a reasonably developed financial system. The relation depends also upon the expectations of the economic agents regarding the future policy of the government.

Contrary to a well-spread idea according to which the bond financing is not inflationary as it's financed through stable saving, Sterdyniak (1983) emphasizes that, by diverting the saving away from productive investment, the financing of budget deficits causes the increase of interest rates. For McCallum (1983) also, the theoretical validity according to which the budget deficit doesn't create inflationary pressures if it's financed through bonds, is not concluding. Sargent and Wallace (1985) have highlighted the inflationary character of the bond financing of budget deficits⁶.

However, it is certainly accepted that monetary financing is inflationary because it causes an increase in money supply. Thus, in many developing and/or tran-

⁴ United States, Japan, Germany, France, United Kingdom, Italy, Canada, Australia, Belgium and Denmark.

⁵ The conclusion of the papers of De Haan and Zelhorst (1990) is that the budget deficit contribution to the expansion of the monetary mass, as well as to inflation remains not very significant. On the contrary, Edwards and Tabellini (1991) have shown that the increase of the monetary mass and of inflation is caused by the budget deficits. Nevertheless, Carras (1994) for a larger sample of countries arrives at the same conclusion as De Haan et de Zelhorst. in Carras G., "Macroeconomics effects of budget deficits: further international evidence", *Journal of International Money and Finance*, 1994, Vol. 13 (2), p.190-191.

⁶ The obligatory financing could be inflationary in the case when the growth rate of interest rates of Treasury bills is higher than the growth rate of gross domestic product. In Sargent Th.J., Wallace N., "Some Unpleasant Monetarist Arithmetic", *Federal Reserve of Minneapolis Quarterly Review*, Vol. 9, No 1, Winter 1985, pp. 15-31.

sition countries, the inflationary pressure differs from the one observed in the industrialized countries and/or in the countries in rapid expansion, because of the more important role played by budget deficits, the limited development of internal financial markets, as well as restrictions on the use of external financing. Because of the narrowness of internal financial markets, financing through money creation remains a privileged way or even the ultimate, through which the Treasury can obtain the necessary funds.

Hyperinflationary pressures and chronic inflation are pronounced in many countries that have monetized significant budget deficits. The hyperinflationary experience of Central Europe countries in the 1920s, that of Greece and Hungary at the end of the Second World War have shown that significant budget deficits have been financed mostly through the monetary means⁷. According to Sachs and Larrain (1993) the origin of extreme inflation rates in many countries of Latin America lies mainly in persistent and very high budget deficits, so that their financing has also been assured through the monetary means⁸. A recent analysis of twenty-one transition countries shows that monetary expansion has played a determinant role regarding the inflation rate (Coorey, Mecagni & Offerdal, 1998). The excessive growth of money partly attributable to the financing of budget deficits explains on average from one-third to half of quarterly inflation in the transition countries.

We strive to show the link between the financing of budget deficit and the monetary creation through the consolidated balance sheet of the banking system that combines the accounts of the monetary authority and of the second level banks. The different accounting context of the monetary analysis determines the factors that influence the supply of the monetary base and of the monetary mass. We also question ourselves on the monetary impact of other financing ways, relevant for the transition economies, i.e. financing through public securities and the external financing associated with the exchange rates. We'll then search for the main channels of inflation transmission according to the way of financing of the

⁷ The cases in question are those of Austria (1921-1922), of Germany (1922-1923), of Hungary (1923-1924), of Poland (1923-1924). See Dornbusch R., Ficher S., "Stopping Hyperinflations Past and Present", *Weltwirtschaftliches Archiv*, Vol. 122, No 1, April 1986, p. 1-47. Hyperinflationary crisis have equally occurred in other countries and in other periods like for example in Greece (1943-1945), in Hungary (1945-1946).

⁸ Sachs J D. et Larrain B.F., *Macroeconomics In The Global Economy*, Prentice Hall, Englewood Cliffs, New Jersey, 1993, p. 329. The countries in question are Argentina (1981-1990), Bolivia (1982-1986), Peru (1983-1990), Brazil (1981-1990), Mexico (1983-1988), see Dornbusch R., "Lessons from Experiences with High Inflation", *The World Bank Economic Review*, Vol. 6, No 1, 1992, pp. 13-31.

budget deficit. The monetary financing in a hypothesis of a flexible exchange rate regime, the case of the countries in our sample, allows to examine the evolution of prices in function of the evolution of the exchange rate. On the other hand, the bond financing lead to examine the price evolution in function of the interest rate evolution.

Lastly, in order to test the hypothesis according to which inflation is primarily attributable to public finances imbalances, we define a model that explains the growth of the monetary mass supply in function of the budget deficit and of the growth rate of Gross Domestic Product. Thereafter, in the model, the evolution of inflation depends essentially upon the extension of the monetary mass attributable to the monetization of budget deficits and the amount of deficit itself.

1. Financing of budget deficits and the money supply in the transition economies

This section has two objectives, on one hand to highlight the new framework of analysis for the impact of budget deficit financing on the monetary base and on the monetary mass in the transition economies. And on the other hand to examine the relation between budget deficit financing and the evolution of monetary aggregates in the case of Albania, of Bulgaria and of Romania. We introduce in our analysis the concept of monetary base, the debt financing of the budget deficit.

1.1 The new accounting framework of monetary analysis for the transition economies

The link between the budget deficit financing and the money creation is analyzed through the balance sheet of monetary authority, the balance sheet of second level banks and the consolidated balance sheet of banking system. Each one of these balance sheets allows to accentuate the factors that influence the growth of monetary aggregates. For analysis reason we have presented the simplified balance sheets of three agents, i.e. the balance sheet of the Central Bank, the balance sheet of banks that create the money, the balance sheet of the State Treasury, as well as the consolidated balance sheet of the banking system. The analysis of the impact the budget deficit financing on the monetary base and on the monetary

mass is carried out through the fluxes of balance sheet items that we have presented below (see Figure 1)⁹.

There are three channels of monetary creation from the Central Bank, money issued in exchange for currencies, the financing of new Treasury debt, and the refinancing of the second level banks. Thus, among the assets of the Central Bank, there is the change of foreign assets, ΔFa , the change of financing to Treasury, in the form of loans ΔCc , or in the form of public securities, ΔdTc , and the change of loans to second level banks, ΔLs .

Figure 1: The accounting framework of the monetary analysis

Authorities		Second level banks	
Foreign Assets (Fa)	Monetary base (Mb)	Obligatory reserves (Or)	Demand deposits
Loans to Treasury	Fiduciary money (Fm)	Loans to Treasury	Term deposits, savings
Public sec	Obligatory reserves (Or)	Public securities (Ps)	Central administration
Direct loans	Deposits of	Direct loans	deposits
Claims on banks	administration (Dg)	Loans to the economy (Le)	Central bank loans
creating money	Other items (net)		Other items (net)

Situation		Treasury	
Net foreign assets (Na)	Currency in the broad	Accumulated budget	Loans of the Central Bank
Loans to Treasury (Lt)	Bank money (Bm)	balance	Public securities
Loans to the economy	Quasi-money (Qm)		Direct loans
	Other items (net)		Loans of the banks
			Public securities
			Direct loans
			Not financial agents (Nfa)
			Foreign liabilities

Among the liabilities, there are in compensation the change of fiduciary money, ΔMf , the change in obligatory reserves that banks creating in money have at the monetary authority, ΔRb , as well as the change in the deposits of public admin-

⁹ In the case of Bulgaria, the balance sheet of the monetary authority that we have presented is effectively relevant until June 1997. Thereafter, Bulgaria has adopted a new regime of exchange rate, that of "currency board", that implies different instruments of monetary regulation. The Central Bank doesn't perform anymore neither open market operations, nor direct loans to Treasury or refinancing operations of second level banks.

istrations at the Central Bank, ΔDg . The equilibrium of the balance sheet of the Central Bank is written as follows:

$$\Delta Fa + \Delta Cc + \Delta Tc + \Delta Lc = \Delta Mf + \Delta Rb + \Delta Dg \quad (1)$$

Given that the change of the high-powered monetary mass or of the monetary base, ΔH , is equal to the change of the fiduciary money, ΔMf , and the change of the obligatory reserves, ΔRb , equation 1 is written as follows:

$$\Delta Fa + \Delta Cc + \Delta Tc + \Delta Lc = \Delta H \quad (2)$$

$$\Delta H = \Delta Mf + \Delta Rb \quad (3)$$

In the equation 2, the change of deposits of central administration at the Central Bank doesn't appear, because the account of the government is always supposed exhausted at the end of the year.

To this change of the supply of central money it would be appropriate to add the autonomous change of money performed by the second level banks. Among the assets of the balance sheet of second level banks there are the changes of the three following items: the change of obligatory reserves, ΔRb , the change of financing to the Treasury in the form of loans, ΔCg , or public securities, ΔTs , and the change of financing to the economy, ΔCs . We have ignored the foreign assets of second level banks. Four items cause the change of liabilities of second level banks, the change of public deposits, in the form of demand deposits, ΔDv , and the change of term deposits, ΔDt , the change of Treasury deposits at the banks, ΔDc , and the change of Central Banks credit, ΔLc . The equilibrium of the balance sheet of second level banks is written as:

$$\Delta Rb + \Delta Cg + \Delta Ts + \Delta Cs = \Delta Mf + \Delta Dv + \Delta Dt + \Delta Dc + \Delta Lc \quad (4)$$

Obviously, every change of the items at the assets of the balance sheet of second level banks, causes a change of the quantity of money. Lastly, the global monetary situation allows to determine the factors that influence the change of the monetary mass in the broad sense.

$$\Delta An + \Delta Ct + \Delta Ce = \Delta Mf + \Delta Dv + \Delta Dt + \Delta Dc \quad (5)$$

$$\Delta Ms = \Delta Mf + \Delta Dv \quad (6)$$

$$\Delta Qm = \Delta Dt + \Delta Dc \quad (7)$$

$$\Delta M = \Delta Ms + \Delta Qm \quad (7)$$

$$\Delta A_n + \Delta C_t + \Delta C_e = \Delta M \quad (8)$$

Where, C_t represents the credit to the central administration, C_e represents the credit to the economy, A_n represents net external assets. M_s represents bank money, Q_m represents quasi-money, and M represents monetary mass in the broad sense. A change in the supply of money in the broad sense is caused: changes in the assets in foreign currencies, credit to the Treasury and credit to the economy.

Lastly, the analysis of the Treasury balance sheet highlights the compensation of the change of cumulated budgetary balance or of the need for net financing from the public sector. Here, the terms need for net financing from the public sector and budget deficit are used alternatively. The budget deficit must be equal to the change of liabilities of Treasury balance sheet. Among the liabilities of Treasury, we keep the change of the following items:

$$\Delta SBC = Db = \Delta C_c + \Delta T_c + \Delta C_g + \Delta T_s + \Delta T_a + \Delta E_e \quad (9)$$

$$\Delta C_t = \Delta C_c + \Delta T_c + \Delta C_g + \Delta T_s \quad (10)$$

$$\Delta SBC = Db = \Delta C_t + \Delta T_a + \Delta E_e \quad (11)$$

where, Db represents the budget deficit or the need of net loans from the government, T_a represents the Treasury liabilities towards non financial agents, households, businesses, financial institutions outside banking sector, and, E_e represents Treasury liabilities towards foreigners. The balance sheet analysis above allows to examine the change of money supply depending on the ways of financing used by public authorities.

1.2 The impact of budget deficit financing on the monetary base and on the monetary mass in the transition economies

We analyze the impact of various ways used by public authorities to finance the budget deficit, on the monetary base and on the monetary mass in the transition economies. We'll examine effectively the impact of financing from the monetary authority, of financing from second level banks, of financing from non-financial agents and lastly of external financing.

1.2.1 Central bank financing and change of monetary mass

Differently from the first part, the government can finance the budget deficit using directly the advances of Central Bank or through the sale of public securities. The purchase of public securities from the Central Bank or granting of a direct loan to the State increases the monetary base and mass by the amount of the loan acquired by the monetary authority. The government account increases in an initial phase when it's financed by the Central Bank. But, as these resources are expended, the amount of debt is partly transferred to the second level banks. Then, depending on the behaviour of the second level banks regarding their portfolio composition, a "secondary" expansion of the monetary mass can occur through the credit multiplier.

1.2.2 Financing through the second level banks and change of monetary mass

The monetary impact of budget deficit financing through the second level banks will depend whether direct loans to the Treasury or the purchase of public securities will swell banks portfolio or whether they'll substitute other assets in this portfolio. If the assets of second level banks other than loans to the central administration remain unchanged, there is a global increase of the balance sheet of second level banks. Consequently the purchase of public securities or granting of a loan to the State increases the monetary mass in the broad sense by the amount of loans acquired by the Treasury. Nevertheless, differently from what happens in the case of a financing from the Central Bank, there is no increase of the monetary base at the beginning.

If, on the contrary, the banks keep their balance sheet unchanged or if they don't have excess liquid reserves, the other assets, particularly granting of loans to the economy tends to diminish in proportion to their supplementary assets in public securities. Then, in the portfolio of second level banks, it occurs a substitution of public securities to the loans to the economy. If the refinancing conditions are very strict in the public securities, all increase of their public securities portfolio will happen to the detriment of loans to the economy. In this case, the monetary mass doesn't increase and the monetary base doesn't change. If, on the contrary, there is an utilization of Central Bank refinancing from second level banks by the amount of public securities purchased or the granting of loans to the State, an increase of the monetary base and of the monetary mass in the broad sense occurs.

1.2.3 Financing through non financial agents and monetary mass

The bond financing of budget deficits assures relatively a non monetary financing of the public finances imbalances. The purchase of securities from non financial agents, households, businesses and financial institutions outside the banking sector, doesn't impact neither the monetary base, nor the monetary mass. That implies effectively a simple property transfer of private sector assets to the public administrations and inversely when the funds have been expensed by the latter. Public securities purchase from the resident non financial agents diminishes the amount of deposits and of bank reserves, as well as that of bills in favour of the increase of the account of the Treasury at the Central Bank. But when the resources have been expensed by the Treasury, there is equally an increase of bank deposits and reserves, as well as of bills in favour of non financial agents.

Nevertheless, the sale of public securities to the private non banking sector can cause upward pressures for interest rates. Actually, in order to attract the funds, the Treasury can offer higher interest rates. The rise of interest rates diverts the funds of private sector toward the public sector, and will cause a decrease of private expenses and, in particular of private investments. Consequently, private borrowers risk to have to use even more the banks in order to cover their need for financing. Should that be the case, there would be no difference among budget deficit financing by the banks and the one assured through the non banking sector. The impact on the monetary mass depends from the attitude of the Central Bank regarding interest rates and granting of liquidity to the second level banks. In both cases, the monetary authority intervention will be accomplished through an increase of the monetary base and of the monetary mass in the broad sense.

1.2.4 External financing and monetary mass

The loans contracted by the public sector abroad, doesn't influence on the monetary mass, but in the measure that there results an increase in the assets in money kept by the non banking private sector. That supposes that the monetary authority intervenes in the exchange market by issuing national currency against the the product in foreign currencies of external debts, in the case of fixed or administrated exchange regime. On the contrary, in the case of a flexible exchange regime, there is no impact neither on the monetary base, nor on the monetary mass in the broad sense, as the authorities doesn't intervene in the exchange market.

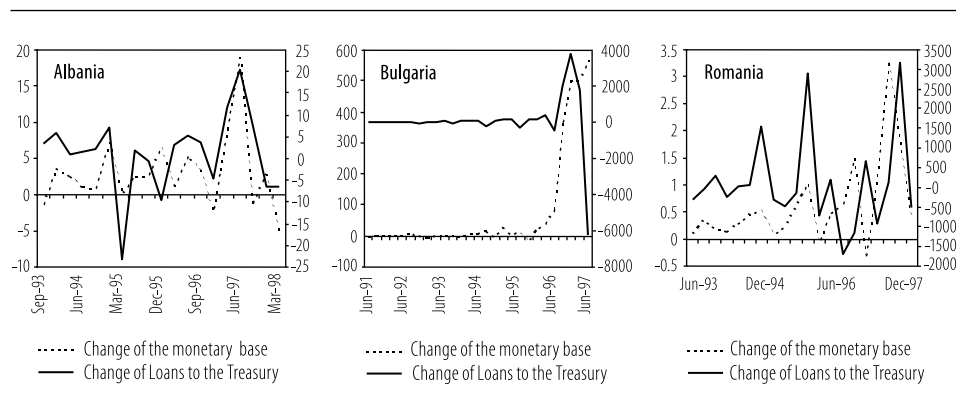
1.3 The financing of budget deficits and the evolution of the monetary mass in the case of Albania, Bulgaria and Romania

If the budget deficit financing determines the change of monetary mass, we should expect a positive and significant relation between the change of monetary aggregates and the change of net financing needs from the government. We'll firstly try to show the impact of budget deficit financing and the change of monetary base. In order to test if there exists a positive relation, we observe for each country the evolution of the quarterly change of the monetary base and the evolution of the quarterly change of the loans to Treasury. We have then calculated the change quarter on quarter of the monetary base stock and of the loans to Treasury stock, based on data from the Central Banks balance sheets. The observation period is June 1993-March 1998 for Albania, June 1991-December 1997 for Bulgaria and June 1993-March 1997 for Romania. Chart 1 allows us to observe the relation between the change of loans to the Treasury and the change of the monetary base.

As it results from the study on Bulgaria, it appears that a positive relation between the change of loans to Treasury and the change of the monetary base exists between June 1991 and March 1997. The correlation coefficient of 0,9 order for this period is very significant. Later as we can notice, there can be no relation between the change of the monetary base and the budget deficit financing, as the monetary authority doesn't finance the public deficit anymore. We note a positive relation between the change of loans to Treasury and the change of the monetary base in the case of Albania also. The correlation coefficient between these indicators is of 0,6 order. The experience of Albania and of Bulgaria show probably that public securities purchase by the monetary authority or direct loans to the State determine mostly the evolution of the monetary base.

On the contrary, the relation between the change of the monetary base and the change of loans to the Treasury is less pronounced in the case of Romania. The correlation coefficient of little significance of 0,2 order allows us to conclude that loans to the Treasury aren't a determinant factor of the change of monetary base. In this last case, the Treasury turns more to ways of financing for public finances imbalances different from a direct financing from the monetary authority.

Chart 1: Change of the monetary base and change of Central Banks loans to the Treasury (In percentage)



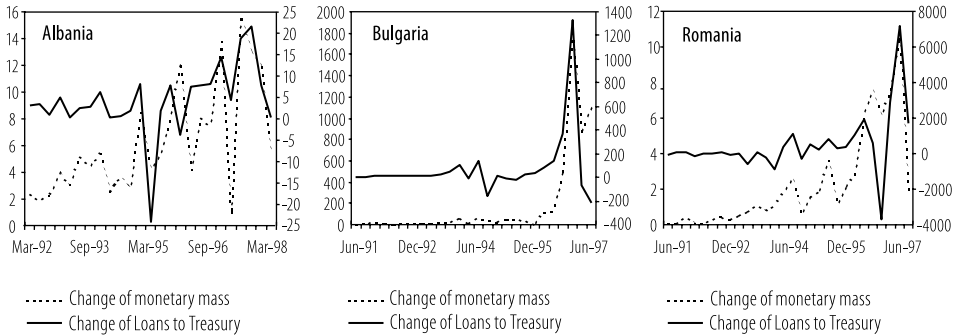
Source: Charts have been constructed based on Central Banks data.

Note: The left scale represents the change of monetary base. The right scale represents the change of loans to Treasury.

The above analysis limited to the monetary base doesn't allow to examine the impact of budget deficit financing on the monetary mass in the broad sense. In order to examine the evolution of the change of the monetary mass attributable to budget deficit financings, we have kept from the monetary situation the quarterly data of the stock of monetary mass in the broad sense and of the stock of loans to the government.

In the same manner, we calculate the quarterly change of the monetary mass in the broad sense and the quarterly change of loans to the government. The observation period is March 1992 – March 1998 for Albania, June 1991-December 1997 for Bulgaria and June 1991-March 1998 for Romania. The observation of the evolution of the change of loans to Treasury and the change of monetary mass in the broad sense show an unexpected trend. The correlation coefficients between these indicators of 0,9 order for Bulgaria and of 0,6 order for Albania and Romania show that there exists a positive relation between the change of loans to the Treasury and the change of the monetary mass in the broad sense. Nevertheless the positive relation remains more pronounced in the case of Bulgaria until June 1997. In the study about each country, we generally notice that the evolution of the monetary mass in the broad sense is strongly determined by the evolution of loans to the government (see Chart 2). The increase of loans to Treasury is reflected in the pace of growth monetary mass.

Chart 2: Change of monetary mass in the broad sense and change of loans to Treasury (In percentage)



Source: Charts have been constructed based on Central Banks data.

Note: The left scale represents the variation of the monetary mass in the broad sense. The right scale represents the variation of the loans to Treasury.

2. Ways of financing of budget deficit and their inflationary effects in the transition economies

The analysis of ways of financing of budget deficits in the first chapter has allowed us to distinguish, in the cases of Albania, Bulgaria and Romania, two main ways of financing, the financing through monetary means and the financing through bonds. Our aim is not to examine which way of financing has more of an inflationary character. We try to analyze the transmission mechanism of inflation, based upon these two ways of financing.

2.1 Monetary financing of budget deficit and inflationary pressures in the transition economies

We try to show that in the case where the transition countries have adopted a flexible exchange regime, the financing through the monetary means of budget deficits tends to depreciate the nominal exchange rate. The depreciation of the nominal exchange rate determines then the evolution of domestic prices and of costs. The risk of a vicious circle can come about, because the inflationary process attributable to the depreciation of the exchange rate leads to a new depreciation of the exchange rate, as well as to a new imbalance of public finances. Thereafter,

our approach will be to observe in the case of Albania, of Bulgaria and of Romania, if the monthly change of nominal exchange rates has influenced the monthly change of final consumer prices.

2.1.1 Monetary financing of budget deficits and the vicious circle.

We start from the hypothesis that the financing through the monetary means of budget deficit represents the main way. We suppose the exchange rate is flexible and capital mobility is imperfect. Economic agents form their behaviour based on rational expectations. The economy is opened and it's constituted by a tradable sector and a non tradable sector. The price of non tradable goods is exogeneous.

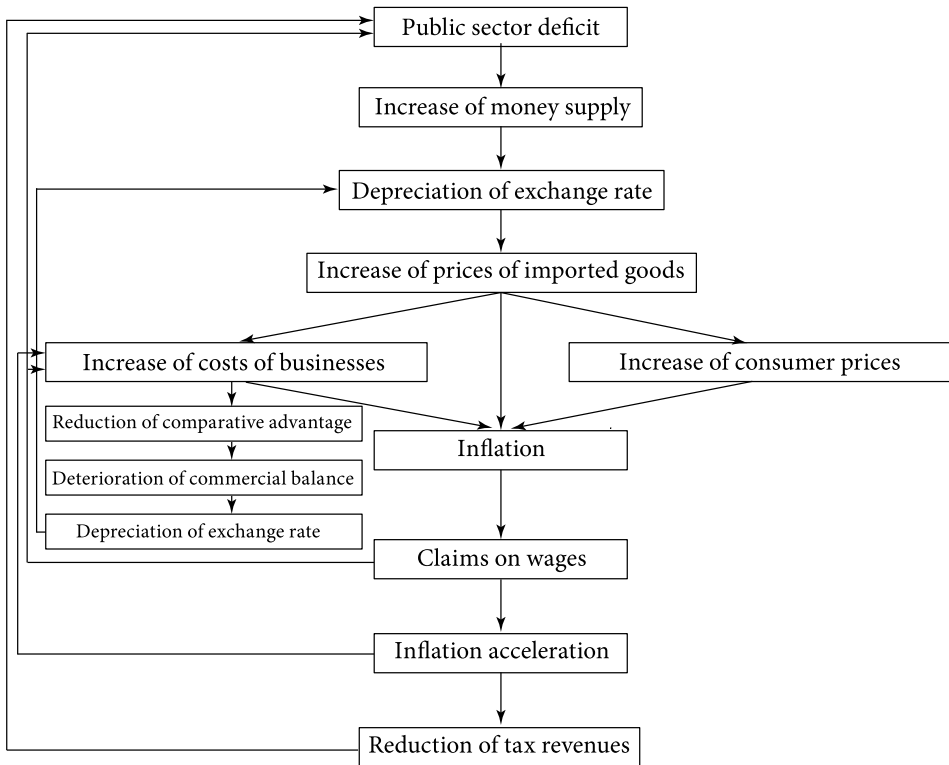
In the case of monetary financing, the amount of budget deficit determines the change of the monetary mass, under the hypothesis of a null change of external assets and of loans to the second level banks. The combination of equations 11 and 8 equalizes then the amount of deficit with the change of the monetary base.

$$Db = \Delta Ct = \Delta M \quad (12)$$

The monetary financing of budget deficit increases the monetary base and the monetary mass in the broad sense. The monetary expansion will be achieved through the involvement of expectations of depreciation of exchange rate. When economic agents form their behavior based on rational expectations, they forecast that monetary financing of public deficit will confirm an inflationary process. So, they sell local currency, which causes a depreciation of the exchange rate.

The initial shock that gives rise to the depreciation of exchange rate can create a cumulative process: the depreciation of the exchange rate leads to an increase of domestic prices and costs, which leads to a new depreciation of exchange rates. And the cycle reproduces itself. The scheme below allows to explain the transmission mechanism of inflation, and the mechanism of vicious circle of inflation and of depreciation of exchange rate.

Figure 2: The transmission mechanism of inflation



Source: Constructed by the author

The above mechanism, theoretically allows to determine the change of final consumer prices as a function of the change of nominal exchange rate¹⁰. If, P_D , represents the price of locally produced goods, P_M , represents the price of imported goods, the final price of goods consumed, P_C , is equal to the sum of prices weighted with their weighting parameters:

$$P_C = \delta P_D + (1 - \delta) P_M \tag{13}$$

$$P_M = EP_m^* \tag{14}$$

¹⁰ See for more details Sachs and Larrain, *Macroeconomics.....*, Cit.op., Chapter 15 "Inflation and Unemployment", p. 468-469.

where, E represents the nominal exchange rate, P_m^* represents the prices of foreign goods, while the parameter δ , whose value varies between 0 and 1, represents the weight of the price index of goods produced locally in the total price index.

The price of locally produced goods will depend upon the price of tradable and non tradable goods. The price of tradable goods produced locally in local currency will equal the product of nominal exchange rate, E , and their foreign price, P_t^* . The price of locally produced goods is equal to the sum of prices of non tradable goods, P_N and the price of tradable goods, P_T weighted with their weighting parameters.

$$P = \phi P_T + (1 - \phi)P_N \quad (15)$$

$$P_T = EP_t^* \quad (16)$$

Where, the parameter ϕ , whose value varies between 0 and 1, represents the weight of the index of tradable goods produced locally in the total index of domestic prices.

In a simplified manner, we suppose that the price of non tradable goods locally produced depends upon the price of intermediary goods and upon the wage level. We also suppose the intermediary products are imported. The price of locally produced goods, P_N , is equal to the sum of prices of intermediary goods, P_n , and the wage, W , that is:

$$P_N = \alpha W + \beta P_n \quad (17)$$

$$P_n = EP_n^* \quad (18)$$

The combination of the above equations allows to determine the final consumer price, P_C .

$$P_C = [\alpha \delta (1 - \phi)] W + [\beta \delta (1 - \phi)P_n^* + \delta \phi P_t^* + (1 - \phi)P_m^*] E \quad (19)$$

Equation 19 shows that the exchange rate impacts the level of prices through three channels: the prices of imported products, the prices of tradable goods locally produced and the prices of intermediary products imported. The rise of prices of the latter rises the production costs. As the prices of foreign goods are given for the country, the change of final consumer price, P_C is determined from the change of the nominal exchange rate, E , and the change of wage, W .

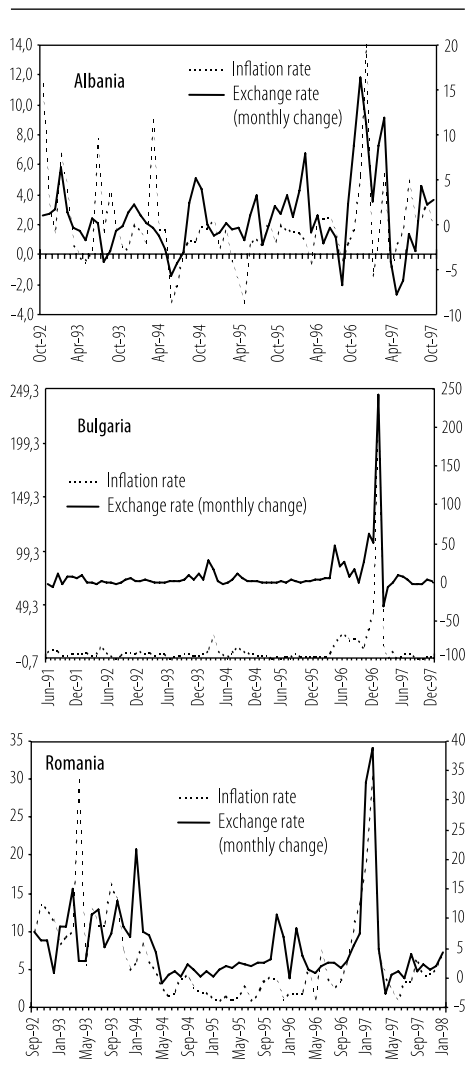
But, as results from the above way of transmission the change of the exchange rate also partly determines the change of wage. Consequently, the evolution of prices largely depends upon the evolution of the exchange rate. The depreciation of the exchange rate leads to an increase of prices of imported products that provokes an adjustment process of wages and of prices. The inflation rate accelerates because of the increase of prices of imported consumer goods and of intermediate products.

The wage inflation rate accelerates also because, in the country, we observe an increase of consumer prices of local products, attributable to the increase of production costs. The increase of prices of imported products increases the prices and lowers the level of real wage. The claims on wages play then an important role in the inflationary process, as the wage indexation results in an increase of costs of wages. The increase of domestic prices and costs reduces the comparative advantage previous to the country's exportations abroad. Everything is accompanied with a degradation of trade balance and with a depreciation of exchange rate. Besides, monetary financing can lead to a reduction of tax revenues. It's probable that inflation exercises a disfavorable effect on the real value of conventional tax revenues, because of the delays in the collection of taxes. Then the causal relation is overturned: it's the inflation that generates budget deficits.

2.1.2 Nominal exchange rate and change of consumer prices in the case of albania, of bulgaria and of romania

The above analysis allows to explain theoretically the change of prices starting from the change of the nominal exchange rate. We also try to identify a similar relation in the case of Albania, of Bulgaria and of Romania. The observation period starts at the moment of liberalization of exchange regime and data availability. For Albania, the observation period is October 1992 – December 1997. For Bulgaria, June 1991 – February 1998 and lastly for Romania, September 1992 – January 1988. For that, we consider the average monthly change of nominal exchange rate and the monthly change of the consumer price index.

Chart 3: Change of consumer price index and change of nominal exchange rate, in Albania, in Bulgaria and in Romania (In percentage)



Source: Charts have been constructed based on Central Banks data.

Note: The left scale represents the monthly inflation rate measured as the monthly change of consumer price index. The right scale represents the monthly change of the nominal exchange rate.

The Chart 3 represents the evolution of these two variables for each country. The observation of the evolution of the change of nominal exchange rates and the evolution of the change of price index shows that there exists a positive correlation among the two variables. The correlation coefficients are of the order 0,5 for Albania and 0,7 for Romania. Nevertheless, the relation between these two variables is more pronounced starting from 1993 for Romania and starting from 1995 for Albania.

Bulgarian experience shows that there exists a more significant positive relationship between exchange rate variation and price change compared to two other countries. Correlation coefficient between the two variables of 0.95 is very high. Between June 1991 and June 1997 there is a flexible exchange rate regime. It is observed that nominal exchange rate change is in line with consumer prices change. The deep depreciation of nominal exchange rate between April 1996 and March 1997 was followed by inflation acceleration. Since July 1997, there was the implementation of new exchange rate regime, which was accompanied by a relative stabilization of consumer prices.

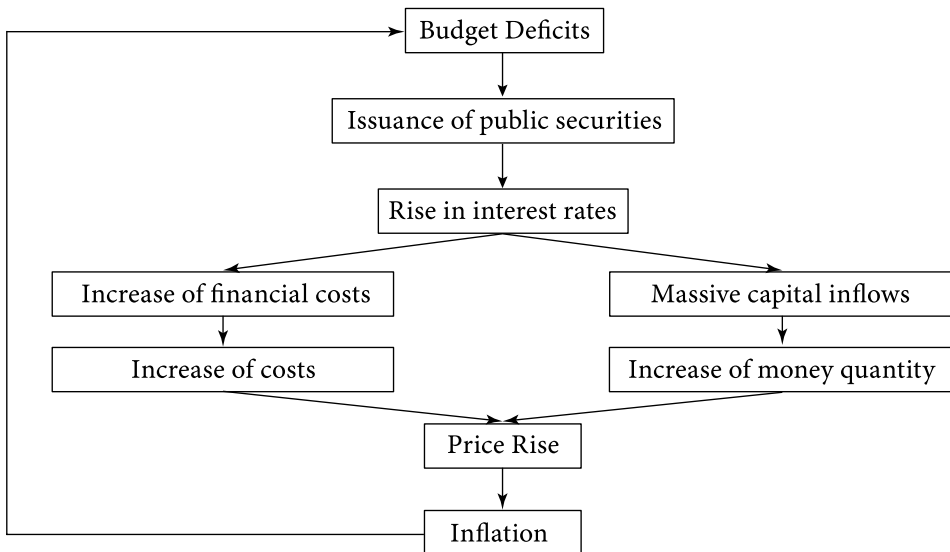
However, the relationship between budget deficits, money supply growth and inflation that we have treated in these sections is still inconclusive. We were unable to verify empirically our hypothesis that budget deficits levels

are the main factor of money supply growth, and that the excessive creation of money is responsible for inflation.

2.2 Bond financing and price rise

The figure below allows us to explain transmission mechanism of inflation in the case of a bond financing (see Figure 3). In the case of bond financing inflationary pressures pass through the rise of interest rates. Bond financing tends to rise interest rate, which leads to higher financial costs and may encourage businesses to pass higher costs on sales prices.

Figure 3: The transmission mechanism of inflation



Source: Constructed by the author.

But the increase of business costs is not the only one explication of an inflationary process due to higher interest rates. Higher interest rates can cause a capital inflow, and consequently an increase in money supply may occur. Increasing money supply leads to inflationary pressures.

The above analysis of inflation impact through bond financing might not be relevant in the case of Albania, Bulgaria and Romania. It seems difficult to establish

a positive correlation between interest rates and budget deficits evolution in economies “financially repressed”. According to Tanzi (1993) in transition economies it is possible that governments in order to reduce debt service try to repress the nominal interest rates.¹¹ However, artificial reduction of interest rates could lead to inflation pressures. In the case of Bulgaria the authorities decided in 1993 and 1995 to reduce interest rate in order to reduce domestic debt service expenditure. The reduction of interest rates has led to financial crises following years. Financial crises of 1994 and 1996 are followed by a deep depreciation of the nominal exchange rate and high inflation (see Chart 3).¹²

Low interest rates tend to encourage credit demand. Therefore, banks are rationing their supply of credit in profit of a number of enterprises. Credit shortcuts in the case of exporting firms tend to favor imbalances in the trade balance. The deteriorating trade balance leads to depreciation of local currency, could aggravate inflation.

3. The empirical analysis of inflation at origins of public finances disequilibrium in the case of Albania, Bulgaria and Romania

As we try to estimate the effects of budget deficits on money supply, as on inflation rate we propose the specification of a theoretical model that links the amount of a budget deficit with money growth rate and price variance. Then we conduct an econometric analysis of the reduced form of this applied model to the case of Albania, Bulgaria and Romania.

3.1 Theoretical specification of the model

The model tries to highlight the impact of budget deficit on money supply growth rate and inflation. It is inspired by the work of Niskanen (1978), Hamburger and Zwick (1981) and of Giannaros and Kolluri (1985), and of Protopapadakis and Siegel (1986, 1987), also Karras (1994). The model begins with two basic equations: money supply growth equation and inflation equation. Money supply growth rate equation in this paper presents a form based on Barro formulation (1977). The reduced form of money supply growth rate that we have used is specified as follows:

¹¹ Tanzi V., "The Budget Deficit in Transition", *IMF Staff Papers*, Vol. 40, No 3, September 1993, pp. 697-707.

¹² See in, *Etudes Economiques de l'OCDE*, Bulgarie 1997, p. 32-33.

$$m_t = a_0 + \sum_{k=1}^n a_{1k} m_{t-k} + \sum_{k=1}^n a_{2k} d_{t-k} + \sum_{k=1}^n a_{3k} y_{t-k} \quad \text{where } k = 1, 2, \dots, n. \quad (20)$$

where:

m_t = nominal money supply growth rate

d_t = budget deficit to gross domestic product at current prices ratio

y_t = real gross domestic product growth rate

In Equation 20, lagged money supply growth rate m_t , depends on budget deficit to gross domestic product ratio, d_{t-k} , lagged real gross domestic product growth rate, y_{t-k} , and lagged money supply growth rate m_{t-k} .

Another specification, slightly different of represented equation is proposed by Protopapadakis and Siegel (1987), and Barnhart and Darrat (1988), according them, only current budget deficit ratio affects money supply and not the lagged values. In Equation 1, the coefficients a_{1k} allow to capture the persistent of money supply growth, and the coefficients a_{2k} show the extension of monetization of budget deficits. Finally, the coefficients, a_{3k} allow capturing the possible reaction of Central Bank on past gross domestic product growth rate.

The analysis of budget deficit impact on inflation is at first to specify a basic equation of price changes, which will explain inflation starting from money growth supply. According to quantity theory of money, nominal money supply changes higher than real growth rate of gross domestic product result in equivalent changes in the price level. In our analysis, we have used a monetarist equation of price changes as follows (Giannaros and Kolluri, 1985):

$$\pi_t = b_0 + \sum_{k=1}^n b_{1k} m_{t-k} \quad \text{where } k = 0, 1, 2, \dots, n. \quad (21)$$

where:

π_t = inflation rate or prices variance

In Equation 21, the current inflation rate t , depends on current and past money growth rates supply. Equation 2 allows us to measure the effect of monetary expansion on inflation rate. In other words, it measures the impact of excessive money creation due to budget deficit financing. But it does not allows to identify the effect of other factors on inflation rate, in other words the contribution of the same amount of budget deficit and the contribution of inertial inflation.

The amount of the budget deficit has inflationary effects, either by its effect on aggregate demand, or whether through the formation of inflationary expectations of economic agents. In the first case, rising budget deficit tends to increase aggregate demand and price level.

In the second case, according to the theory of rational expectations, inflation evolution depends on adopted economic agents expectations under the government's budget policy.¹³ It seems hard to break the link between inflation expectations of economic agents and persistent fiscal deficits. If economic agents do not have confidence in the ability or willingness of governments to continue permanently a restrictive fiscal policy, the fears of future monetization of fiscal deficits can contribute to greater food inflation expectations.

Although budget deficit is a principal determinant of inflation, the evidence indicates that other factors than public finances imbalances may play a role in triggering inflation. Recognition of inertial inflation role constitutes one of the fundamental keys analysis of hyperinflation in Latin America countries.¹⁴ For Coorey et al., 1998 inertia expressed by lagged inflation plays a significant role in inflation level in transition economies.

Inertial inflation theory affirms that current inflation depends primarily on past inflation. The main cause of the inertial nature of inflation remains wage indexation mechanism and nominal asset returns. Their full indexation contributes to self-maintenance and persistent nature of inflation process. In this case inflation includes a strong component of inertia. It is no longer based on exogenous money creation; monetary emission becomes passive, because it tends to catch up prices rising.

¹³See, Blejer M., Cheasty A., "High Inflation, Heterodox Stabilization, and Fiscal Policy", *World Development*, Vol. 16, No 8, p. 867. Sachs J., Larrain F., *Macroeconomics in the Global Economy*, Prentice Hall, 1993, p 462-463. Agénor P., Montiel P., *Development Macroeconomics*, Princeton University Press, 1994, p. 126.

¹⁴ Grellet G., *Les politiques économiques des pays du Sud*, Presses Universitaires de France, Paris, 1994, p. 58-59. Kiguel M., Liviatan N., "The inflation-Stabilization Cycles in Argentina and Brazil", in Bruno M., Fischer S., Helpman E., Liviatan N., Meridor L., *Lessons of Economic Stabilization and Its Aftermath*, The MIT Press, Cambridge, 1991, p. 191-239. Cardoso E., "From Inertia to Megainflation: Brazil in the 1980s", in Bruno M., Fischer S., Helpman E., Liviatan N., Meridor L., *Lessons of Economic Stabilization and Its Aftermath*, The MIT Press, Cambridge, 1991, p. 143-189. Bruno M., Meridor L., "The Costly Transition from Stabilization to Sustainable Growth: Israel's Case", in Bruno M., Fischer S., Helpman E., Liviatan N., Meridor L., *Lessons of Economic Stabilization and Its Aftermath*, The MIT Press, Cambridge, 1991, p. 241-281.

To count for these effects, there are added two explanatory variables into the equation 21. First the budget deficit to gross domestic product ratio that allows capturing the impact of aggregate demand increase on prices due to higher budget deficit and then lagged inflation rate allows capturing the effect of inertia. We obtain an equation of the form below:

$$\pi_t = b_0 + \sum_{k=0}^n b_{1k} m_{t-k} + \sum_{k=0}^n b_{2k} d_{t-k} + \sum_{l=1}^n b_{3l} \pi_{t-l} \quad \text{where } k = 0, 1, \dots, n. \quad (22)$$

where $l = 1, 2, \dots, n.$

Where current inflation rate π_t , depends on money supply increase, budget deficit increase, as well as lagged inflation.

3.2 Econometric analysis

We used in this econometric analysis quarterly time series in order to increase the number of observations since analysis period in the case of Albania, Bulgaria and Romania remains very short. The hypotheses that budget deficits are one of principal factors of monetary growth and then the process of inflation, led to testing with ordinary least squares method equations 20 and 22.

Our econometric approach consists firstly to introduce the variables used in building series process, the observation period, and stationary tests. Then we derive by an estimating process from general to the particular basic equations in the case of each country. Finally, we test the econometric hypothesis for the presence or absence of residual autocorrelation, the econometric hypothesis of normality and stability of coefficients.

3.2.1 Variables presentation and observation period

The variables used are taken from statistics of the Central Banks, Ministries of Finance and Statistics Institutes of each country in our sample. The variable used to measure nominal money supply growth rate is narrow money M1, for Albania and Romania. M1 consists of fiduciary money (banknotes in public circulation) and bank money (demand deposits in banks). For Bulgaria we retained monetary base variable Mb. Monetary base in Bulgaria consists of fiduciary money and the reserves of second level banks at Central Banks. The high significant relationship between monetary base growth and the growth of claims on Treasury explains this choice in the case of Bulgaria. The indices m_t and h_t , also represent nominal narrow money supply growth rates and monetary base.

The variable chosen to measure inflation rate is consumer prices index. The variable, INF represents the relative variation of quarterly consumer price index.

The real growth rate of gross domestic product was estimated from gross domestic product measured quarterly for Albania and Bulgaria. The real growth rate of gross domestic product, Y_t , is calculated starting from this level deflated by quarterly average consumer prices index. For Romania, in absence of quarterly data on gross domestic product we have calculated the real rate of quarterly growth of industrial output, YI_t , as it can be considered a representative rate of overall growth.

The explanatory variable of budget deficit is also retained as quarterly nominal budget deficit to quarterly gross domestic product at current prices ratio DEF_t for Albania and Bulgaria. For Romania, as there are no available data of gross domestic product, we can't retain budget deficit to gross domestic product ratio. We then calculated quarterly real budget deficit level. Quarterly nominal budget deficit level is deflated by quarterly average consumer price index.¹⁵ $DEFR_t$ index also represents real budget deficit.

Analysis period for Albania and Bulgaria lies from first quarter 1991 to last quarter 1997. As quarterly data on fiscal deficit level are available only from first quarter 1992 for Romania, thus analysis period on this country concerns from first quarter 1992 to first quarter 1998.

3.2.2 Unit root test Dickey and Fuller

Based on the variables retained above, we have constructed the following series: inflation rate, INF, for all three countries, nominal money growth, m , for Albania and Romania, monetary base growth, h , for Bulgaria, budget deficit to gross domestic product ratio, DEF , to Albania and Bulgaria, real budget deficit, $RFLDs$, for Romania, the real gross domestic product growth rate, Y , for Albania and Bulgaria, as well industrial output growth, YI , for Romania.

We tested for stationarity of the variables with Augmented Dickey-Fuller (ADF). ADF test set up as null hypothesis, the presence of a unit root in the series. The results of these test are summarized in Table 1 for Albania, in Table 2 for Bulgaria and in Table 3 for Romania.

¹⁵Giannaros et Kolluri (1985) use an indicator close to this. They divide nominal deficit budget level by gross domestic product index deflator.

Table 1: Stationary test for Albania

Variable	Test Value	Critic value	Stationarity
m	-5,1275	-2,9969	I(0)
INF	-3,1117	-2,9750	I(0)
Y	-3,3936	-1,9546	I(0)
DEF	-3,3896	-2,9969	I(0)

Note: Critic values are the values at 5% tabulated from McKinnon

Table 2: Stationary test for Bulgaria

Variable	Test Value	Critic value	Stationarity
h	-1,9720	-1,9540	I(0)
INF	-5,6233	-2,9750	I(0)
Y	-5,4800	-1,9546	I(0)
DEF	-5,6723	-2,9750	I(0)

Note: Critic values are the values at 5% tabulated from McKinnon

Table 3: Stationary test for Romania

Variable	Test Value	Critic value	Stationarity
m	-3,8966	-2,9969	I(0)
INF	-3,3916	-2,9705	I(0)
DEFR	-3,1000	-3,0294	I(0)
YI	-5,6758	-1,9540	I(0)

Note: Critic values are the values at 5% tabulated from McKinnon

Tests of Table 1, Table 2 and Table 3 show that the series are stationary. The series are also integrated of order I(0). At a 5% level we reject the null hypothesis for the presence of unit root. At this threshold we observe that calculated ADF test statistics of all variables are below the critical values tabulated by McKinnon.

3.2.3 The results of estimations and econometrics tests

Based on equation 1 and equation 2 in the general model we have built for each country two equations: money supply growth rate equation and inflation rate equation. In addition, we also have introduced dummies variables for each coun-

try, which we named D1, D2, Dn. These variables allow capturing the contribution of administrative decisions on inflation rate and money supply growth rate. The decisions concern price liberalization, as well as the increase of prices, still under the government control (electricity price or gasoline prices, for example). Each of restraint variables corresponds to the period when these decisions were made. Their specification is presented in Table 4.

Table 4: Identification of dummy variables

Dummy variables	D1	D2	D3	D4	D5	D5
Albania	August 1992	July 1993	April 1994	x	x	x
Bulgaria	February 1991	Mai 1992	x	x	x	x
Romania	April 1991	July 1991	July 1992	May 1993	February 1994	December 1994

After equations specification for each country, our approach was to estimate them by the ordinary least squares method. The equations we have chosen for each country and the results obtained are:

Albania

Money supply equation

$$m = + 5,01 + 0,20DEF_{(-3)} + 0,68Y_{(-1)} \quad (23)$$

(2,13) (2,62)

$$\bar{R}^2 = 0,24$$

$$LM (1) = 0,40 \quad LM (4) = 0,41$$

$$\text{Jarque - Bera probability} = 0,62$$

$$F = 4,55$$

$$\text{Observation period} = 1992:01 \div 1997:04, \text{ Number of observations} = 24$$

Inflation equation

$$INF = -3,79 + 0,51DEF_{(-2)} + 0,37M_{(-1)} + 0,18INF_{(-2)} - 0,28INF_{(-4)} + 45,6D_1 + 28,22D_2 + 9,65D_3 \quad (24)$$

(4,56) (2,95) (2,05) (-2,15) (8,25) (3,10) (1,95)

$$\bar{R}^2 = 0,90$$

$$LM(1) = 0,14 \quad LM(4) = 0,46$$

$$\text{Jarque - Bera probability} = 0,34$$

$$F = 29,8$$

$$\text{Observation period} = 1992:02 \div 1997:04, \text{ Number of observations} = 23$$

In Equation 23, current money supply growth rate m , depends on past values of budget deficit ratio, DEF , and past values of real gross domestic product growth rate, Y . In Equation 24, current inflation rate INF , depends on past values of budget deficit ratio, DEF , past values of money supply growth rate, m , past values of inflation rate, INF , and dummy variables, $D1$, $D2$ and $D3$..

Bulgaria

Equation of money supply

$$h = -5,71 + 1,48DEF_{(-1)} - 0,45Y + 0,68H_{(-1)} \quad (25)$$

(2,15) (-2,42) (4,94)

$$\bar{R}^2 = 0,51$$

$$LM(1) = 0,75 \quad LM(4) = 0,22$$

$$\text{Jarque - Bera probability} = 0,26$$

$$F = 10,18$$

$$\text{Observation period} = 1991:02 \div 1997:04, \text{ Number of observations} = 27$$

Inflation equation

$$INF = -29,91 + 2,71DEF + 2,66h - 1,74h_{(-4)} - 0,38INF_{(-1)} \quad (26)$$

(2,61) (12,26) (-3,97) (-4,72)

$$\bar{R}^2 = 0,88$$

$$LM(1) = 0,79 \quad LM(4) = 1,60$$

$$\text{Jarque - Bera probability} = 0,45$$

$$F = 46,35$$

Observation period = 1992:01 ÷ 1997:04, Number of observations = 24

For Bulgaria, in equation 25, current monetary base supply growth rate h , depends on past values of budget deficit ratio, DEF, current real gross domestic product growth rate, Y , and past values of monetary base growth rate, h . In Equation 26, current inflation rate INF, depends on current budget deficit ratio, DEF, past values of current monetary base growth rate, H , and past values of inflation rate.

Romania

Money supply equation

$$m = -5,51 + 0,91DEF_{(-3)} + 1,05YI_{(-2)} + 0,78YI_{(-4)} + 0,61m_{(-4)} + 18,35D_4 \quad (27)$$

(4,40) (4,37) (3,32) (7,72) (2,09)

$$\bar{R}^2 = 0,80$$

$$LM(1) = 0,72 \quad LM(4) = 1,09$$

$$\text{Jarque - Bera probability} = 0,49$$

$$F = 18,17$$

Observation period = 1992:04 ÷ 1998:01, Number of observations = 22

Inflation equation

$$INF = -2,11 + 0,60DEF + 0,39m_{(-1)} + 0,42INF_{(-1)} + 32,89D_4 \quad (28)$$

(1,54) (2,67) (2,53) (2,14)

$$\bar{R}^2 = 0,37$$

$$LM(1) = 0,81 \quad LM(4) = 0,84$$

$$\text{Jarque - Bera probability} = 0,0$$

$$F = 4,39$$

Observation period = 1992:01 ÷ 1998:04, Number of observations = 24

For Romania, in equation 27, current money supply growth rate m , depends on real budget deficit, $DEFR$, past values of real industrial output growth rates, YI , past values of nominal money supply growth rate, m , and dummy variable, $D4$. Finally, in equation 28, inflation rate INF , depends on current real budget deficit $DEFR$, past values of money supply growth rate, m , past values of inflation rates INF , and dummy variable, $D4$.

Given to results we have presented above, the variables related to budget deficits is the ratio in the case of Albania and Bulgaria, the real deficit in case of Romania in the equations of money supply we obtained the expected sign. The coefficients before DEF and $DEFR$ variables that represent the budget deficit to gross domestic product ratio in Albania and Bulgaria and the real budget deficit in Romania are positive and statistically significant.

An increase in deficit to gross domestic product ratio by 1% causes an increase in money supply by 0.2% in Albania and about 1.5% in Bulgaria. An increase by 1 point percent in the real deficit in Romania results in an increased money supply equal to 0.9%. Consequently, conclude that monetary financing of budget deficits is one of the principal causes of monetary growth.

As is evident from inflation equations, money supply growth or monetary base and budget deficits play a significant role in the inflationary process. The values in parentheses of student test are statistically significant. 1% increase in budget deficit ratio in Albania leads to an increase by 0.5% of inflation. In particular we note that the coefficient before budget deficit ratio variable remains very high in Bulgaria. 1% increase in the budget deficit ratio leads to a higher increase of inflation rate equal to 2.7%. One point increase in budget deficit, in Romania, result in an increase of 0.6% in inflation rate.

However, the econometric hypothesis tests determine the validity of estimations of above equations. Thus, we propose the presentation of autocorrelation test of residuals, normality test of residuals, and the stability test of the coefficients.

Autocorrelation tests

This test allows us to test the null hypothesis for the presence of autocorrelation, which connects the residuals with their lagged values of a period. We proceeded by applying the principle of LM-test. The equations have no autocorrelation measured by Breusch and Godfrey test at order one and order four. Non significant values of F-statistics, allow us to reject the hypothesis of residuals autocorrelation.

Normality tests

Normality hypothesis ask to identify whether the residuals follow a normal distribution. We have tested this hypothesis by Histogram-Normality Test. As the value calculated by the test approaches to 1, the residuals follows a more normal distribution. According to Jarque - Bera test the residuals, whose values are presented in the equations for each country, seem to have a normal distribution, except inflation equation in the case of Romania.

Stability tests

Unlike above tests that focus on residuals, stability test of coefficients addresses explanatory variables. Chow test allow us to verify whether or not there is stability in coefficients. Our first step is to identify for each country, the break point of the sample.

Table 5: Stability test of coefficients

	Albania	Bulgaria	Romania
Money supply equation	1,70	1,87	1,49
Inflation equation	0,11	0,79	0,46

This break point corresponds to the second quarter 1994 for Albania, first quarter 1994 for Bulgaria and Romania. In July 1994 Albania introduced for the first time public securities as a way of budget deficit financing. In Bulgaria, the break point corresponds with financial crisis of first quarter 1994. For Romania, the break point corresponds with new stimulus of stabilization reforms in Romania.¹⁶ The null hypothesis of stable coefficients is not rejected as F-test statistics values are not significant (see Table 5).

Conclusion

The objective of this chapter was to establish a link between the amount of budget deficits, money supply expansion and inflationary pressures on three economies in transition. The analysis of budget deficits financing impact in the case of tran-

¹⁶The issue of negotiations at the end of December 1993 with I.M.F. is followed with the adoption of a memorandum of macroeconomic stabilization approved by the Romanian Parliament in February 1994.

sition economies shows that monetary financing constitutes a principal factor in the evolution of supply monetary aggregates. Monetary financing now includes not only the purchase of government bonds or direct loans to state by monetary authority, but also the purchase of government bonds or direct loans to state by second level banks. The impact of budget deficit monetary financing by second level banks depends on whether the public debt securities enlarge banks portfolio or substitute other assets in this portfolio, including loans to the economy.

We asked ourselves about the impact of financing public fiscal imbalances on the creation of monetary base and of monetary mass in the broad sense in the case of Albania, Bulgaria and Romania. We found that there is a positive relationship more pronounced between monetary financing of government deficits and money base growth in the case of Albania and Bulgaria, as financing by monetary authority is more important compared to Romania. Regarding the impact on monetary mass in the broad sense, it results that budget deficits financing has led to money supply expansion in the case of three countries, which is also more pronounced in the case of Bulgaria.

Then we examined inflation transmission modes depending on budget deficits financing type. As our analysis concerns “financially repressed” economies, it appears that monetary financing of budget deficit may explain inflation mechanism through nominal exchange rate changes. Monetary financing of budget deficits tend to depreciate exchange rate, which then leads to an acceleration of inflation rate. Even if we can not identify a direct relationship between bond financing and inflation rate in transition economies, we analyzed inflation mechanism of this type of financing.

Finally, we tried to test the theoretical model, which may explain inflation at public finances imbalances origin. The econometric model that we have used confirms our hypothesis that public finances are the main cause of money creation and inflation in the case of Albania, Bulgaria and Romania. The results of the econometric estimation are satisfactory. The coefficients have the expected sign and are statistically significant. Budget deficits and gross domestic product growth rate variables explain satisfactorily money supply. It seems that budget deficits play an important role in determining money supply. However, the coefficients before budget deficit variable are more pronounced in the case of Bulgaria and Romania. The estimations of inflation equation show that chosen variables explain inflation significantly in transition countries. We find that inflation depends mainly on the evolution of money supply and the evolution of budget deficits. The experience shows that lower inflation on transition countries, the authorities must drastically reduce budget deficits and lax monetary policy.

Bibliography

1. Agénor P.R., Montiel P. (1994). *Development Macroeconomics*, Forthcoming, Princeton University Press, 126.
2. Anand R., Wijnbergen S. (1989). Inflation and the Financing of Government Expenditure: An Introductory Analysis with an Application to Turkey, *The World Bank Economic Review*, 1(3), 17-38.
3. Begg D., Ficher S., Dornbusch R. (1996). *Macroéconomie*, Ediscience, International, 2e édition, 254.
4. Blejer M., Cheasty A. (1988). High Inflation, Heterodox Stabilization, and Fiscal Policy, *World Development*, 8(16), 867-882.
5. Blundell-Wignall A. and Chouraqui J.C. (1981). Financement du Déficit Budgétaire et Contrôle Monétaire, *L'Observateur de l'OCDE*, 113, 14-18.
6. Bruno M. (1995). L'inflation freine-t-elle vraiment la croissance, *Finances & Développement*, 3(32), 36.
7. Buitter W. (1990). *Principles of Budgetary and Financial Policy*, Harvester Wheatsheaf.
8. Coorey Sh., Mecagni M., Offerdal E. (1998). Juguler l'inflation dans les pays en transition, *Finances & Développement*, 30-33.
9. Dornbusch R., Ficher S. (1986). Stopping Hyperinflations Past and Present, *Weltwirtschaftliches Archiv*, 1(122), 1-47.
10. Giannaros D.S., Kolluri B.R. (1985). Deficit Spending, Money, and Inflation: Some International Empirical Evidence, *Journal of Macroeconomics*, 3(7), 401-417.
11. McCallum B. (1984). Are Bond - financed Deficits Inflationary, *Journal of Political Economy*, 1(92), 123-135.
12. Modigliani F. (1987). *The Economic of Public Deficits, Economic policy in Theory and in Practice*, ed. Assaf Rasin and Efraim Sadka, 3-49. London: Macmillan.
13. Montiel P.J. (1989). Empirical Analysis of High Inflation Episodes in Argentina, Brazil and Israel, *IMF Staff Papers*, 3(36), 527-549.
14. Protopapadakis A. A. (1986). Is Money Growth and Inflation Related to Government Deficits, University of Pennsylvania and the Federal Reserve Bank of Philadelphia, Working Paper 86-11.
15. Sargent Th.J., Wallace N. (1985). Some Unpleasant Monetarist Arithmetic, *Federal Reserve of Minneapolis Quarterly Review*, 1(9), 15-31
16. Sachs J D., Larrain B.F. (1993). *Macroeconomics In The Global Economy*, Englewood Cliffs, New Jersey: Prentice Hall.
17. Sterdyniak H. (1983). Théories et pratiques du déficit public, *Observations et diagnostics économiques, journal of OFCE*, 3, 65-89.

18. Tanzi V. (1993). "The Budget Deficit in Transition", *IMF Staff Papers*, 3(40), 697-707.