3. MACROECONOMIC MODELING

3.1. Flow of Funds model

Description of the Flow of Funds tables

Flow of Funds table is a new analysis tool for Moldova, which presents the information from the four main macroeconomic accounts and four sectors in a single table. Macroeconomic aggregates are traditionally derived from an interconnected network of macroeconomic accounts: the national income and product accounts, balance of payments, government finance statistics, and monetary accounts. The four main macroeconomic sectors (private, government, foreign, and banking) engage in economic and expenditure transactions. Flow of Funds table gives a quick overview of the entire economy, shows how the sectorial deficits are financed, and serves as a tool for examining the accuracy and consistency of macroeconomic data and forecasts. Its purpose is threefold: to show the relationship between domestic economy and balance of payments, to explore the links among sectors of economy, and to develop a tool for analyzing these interrelations in a systematic way.

There are several reasons for compiling and publishing information on macroeconomic accounts and, in turn, of Flow of Funds tables:

- To monitor the behavior of the economy;
- To analyze the causal mechanisms that are working in the economy;
- To support economic policy and decision-making;
- To provide a framework for international comparison.

Sectors' non-financial transactions generate changes in financial assets and liabilities. These changes are, in turn, recorded as the sectors' financial transactions. Thus, for each sector, the real or non-financial transactions (such as imports and exports) and the financial transactions (such as borrowing from abroad or drawings from country's international reserves) embrace the sector's entire economic relations with other sectors.

Flows of funds tables are presented in annexes. The first column, national accounts, shows the aggregate transactions for all economic sectors. The next four columns show a breakdown of the economy into the four sectors: the private sector, the government, the banking system, and the rest of the world. The sum of every column must be zero, because total outflows must equal total inflows of real and financial resources. The rows of the Flow of Funds table record transactions between the sectors. Each row adds up to zero because every inflow of money to one sector must be matched by an outflow of money from another sector.

The flow of funds table is divided into two panels by the row containing the saving/ investment balance of each sector. The top panel records real transactions in goods, services, income, and foreign transfers. The bottom panel records financial transactions that change the assets or liabilities position of the sectors.

Summing the items in the top panel of the table in each column gives us the surplus/ deficit of income over expenditures or saving/investment balance of that sector. The balances are shown in the middle of the table. Non-financial balance for general government sector operations reflects budget deficit (on commitment base), state enterprises balance, and escalation of energy and other state arrears. Summing the balances of all sectors horizontally should give zero as the results, reflecting the equality between the saving/investment balances and the current account, according to the formula:

$$(Sg-Ig) + (Sp-Ip) = CAB$$

The bottom panel of the table shows transactions in financial assets and liabilities. It provides information on the financing of the saving/investment balances. This panel is divided into two sections: foreign and domestic financing.

Foreign financing section rows contain flows of the direct investment and foreign borrowing, growth of the energy and other state arrears as well as change in net foreign assets. Foreign borrowing row reflects loan disbursements minus amortization of foreign debt and repatriated capital. Most of the information in this row comes from the balance of payments, though it should be supplemented by more detailed information from the government statistics. Last row of this section reflects the changes in bank's net foreign assets (National Bank and commercial banks) resulting from transactions with the rest of the world.

Domestic financing section shows the funds the private sector and government borrowed from the banks during the year, which is equivalent to the increase in the stock in the bank credit. The change in money stock (broad money) reflects an increase in private sector's financial assets in the form of bank deposits and currency holdings. The counterpart of this is an increase in the broad money, which is an asset for banks. The main equation, used in the banking system column, is:

Net Foreign Assets + Net Domestic Assets = Broad Money.

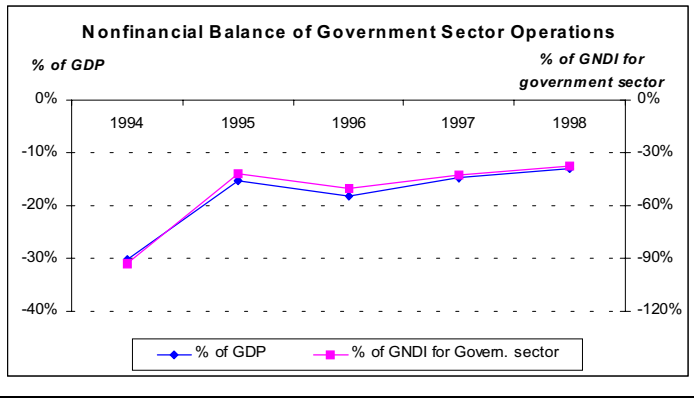
Non-bank borrowing shows private sector landing to the government, which increases financial assets of the private sector and rises the government's debt by the same amount. In the government statistics this is usually shown as non-bank borrowing.

Thus, the elaboration and implementation of Flow of Funds tables, which describe the undergoing macroeconomic processes in a concise form, is necessary for a deeper analysis and for an effective forecast of certain economic development scenarios. The use of tables, combining the main economic accounts with all their links, enriches the theory and practice of economic analysis and forecasting.

Flow of Funds tables for 1994-1998 analysis

This is the first time in Moldova when the Flow of Funds tables, presented in the annexes, are used in the practice of economic analysis. Here, for the purpose of convergence to international standards and IMF standards for instance, the balance of payments, national and fiscal account tables were modified. Monetary survey tables were recalculated to year average conditions in order to compare them with other main macroeconomic accounts, then annual change in the monetary aggregates were calculated.

Flow of Funds tables served the purpose of analyzing the financial activities of the governmental and of the private sector in Moldova. The crisis which hit Moldova in 1998 was partially triggered by the Government's inefficient management in the earlier years. Between 1994 and 1998 the government sector used to spend much more funds than it actually disposed. This excess

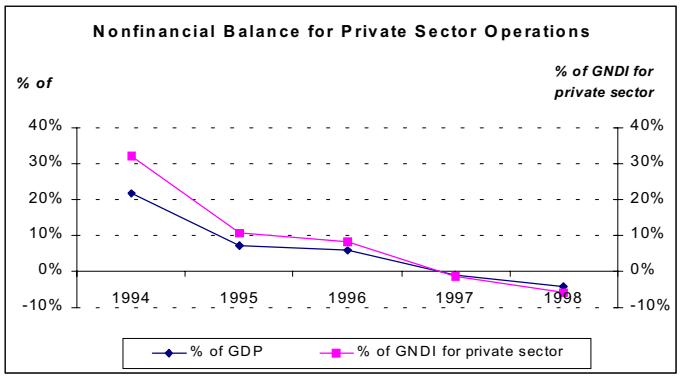


constituted 30 percent of GDP in 1994, or over 90 percent of it's own (governmental) disposable income (GNDIg). In the following years the borrowing gradually decreased, but still constituted significant amounts. In 1998 they accounted for 13 percent of GDP, or 37% of GNDIg.

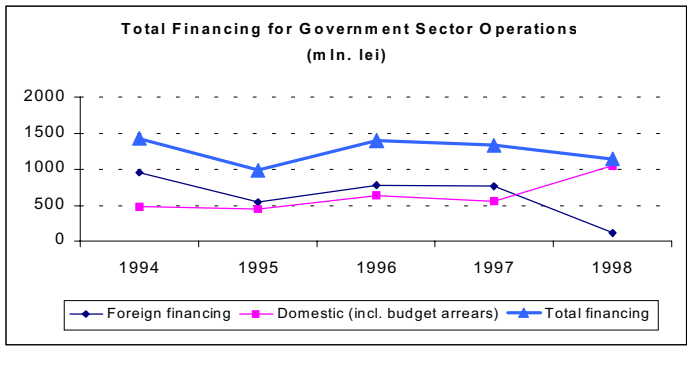
The delays in implementation of the structural reforms in the recent years led to an excessive level of government borrowing (approximately 40-50 percent of GNDIg each year). There is a huge debt burden accumulated by the year 1999, resulting from the government's policy of unlimited borrowing. The country faces a real threat of default, which may be avoided only through the restructuring of the foreign debt.

A totally different picture exists in the private sector. In 1994 the voucher privatization program was launched. Until 1997 the private sector of Moldova (generally speaking) was in the stage of formation: mass privatization was going on, legal framework for the functioning of market economy was in the stage of creation. At the same time, the largest part of the economy remained under state ownership, contributing to large financial flows from other sectors, including the private one.

Between 1994 and 1996 the private sector was unable to accumulate for full utilization the disposable income created in this sector, the unclaimed part of which, was finally redistributed in the governmental sector. In 1994 the utilization of income created in this sector was below 70 percent of the own (private) disposable income (GNDIp), constituting 22 percent of GDP. The following 2 years private sector was seceding the utilization of GNDIp, and in 1997 it started borrowing from other sectors. In 1998 borrowing amounted to 6 percent of GNDIp.

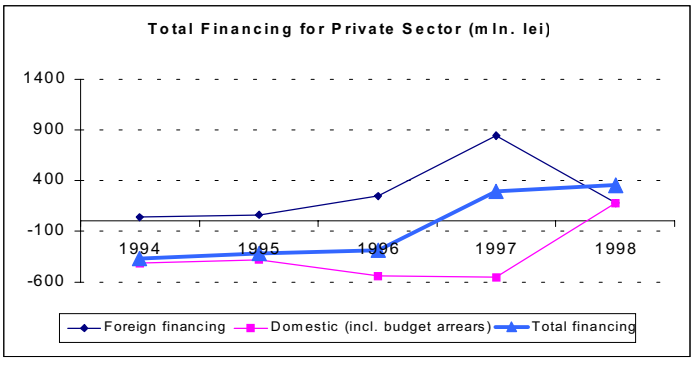


The lack of structural reforms in the budgetary sphere contributed to maintenance of a high level of state borrowing. If in 1994 these internal loans constituted 1.4 billion lei, in 1997 they diminished only by 0.1 billion lei. The financing of the Fiscal Account deficit, that included the increased budget debt, arrears on energy resources utilization, and state enterprises balances, was realized from both external and internal sources. The level of foreign financing in 1994-97 actually exceeded the internal one.

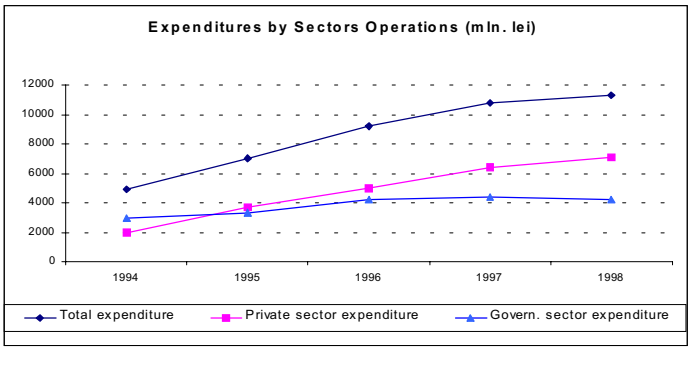


The dramatic cuts in external financing in 1998 conditioned the boost in arrears for pensions and state employees' salaries. Along with the difficulties related to the coverage of the budget deficit, state borrowing remained at a high level (over 1.1 billion lei.) Internal borrowing compensated external financing cuts. The possibilities of relatively easy borrowing of resources did not stimulate intensification of structural reforms and permitted the government to delay their implementation.

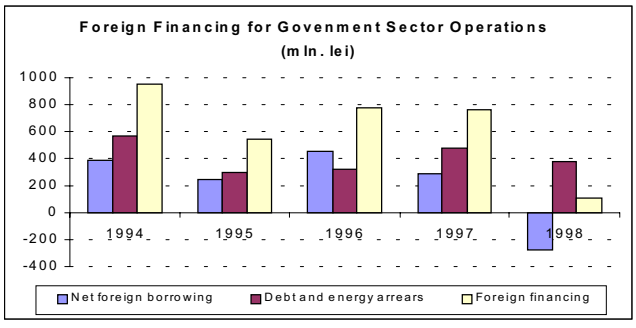
Between 1994 and 1997 private sector of the economy was supplying with its own resources the needs of the government sector (400-500 million lei each year). External financing of the private sector grew from 40 million lei in 1994 to 840 million lei in 1997. The confidence of foreign investors in Moldovan private sector was growing year after year, until the country encountered the financial crisis in 1998. The reaction of investors was quite understandable, and financing of the private sector plummeted to 180 million lei. The satisfaction of sector's needs in 1998 was partially compensated by the accumulation of internal resources. This was the first year when the private sector did not credit the governmental sector from its own resources, but started borrowing on the internal capital market.



The dynamics of demand of the government sector (consumption and investment) slowed down in the last three years. In 1994 this demand constituted approximately three billion lei, in 1996-98 it amounted to 4.3 billion lei, being virtually unchanged. Simultaneously, the demand of the private sector was characterized by an impetuous dynamic: from two billion lei in 1994 to 7.1 billion lei in 1998. Limitation of resources determined the sharpening of contradictions between the high level of government needs and the dramatic increase of demand in the private sector. The press of the government sector resulted in an increase of the shadow component both within that sector and within the private sector.



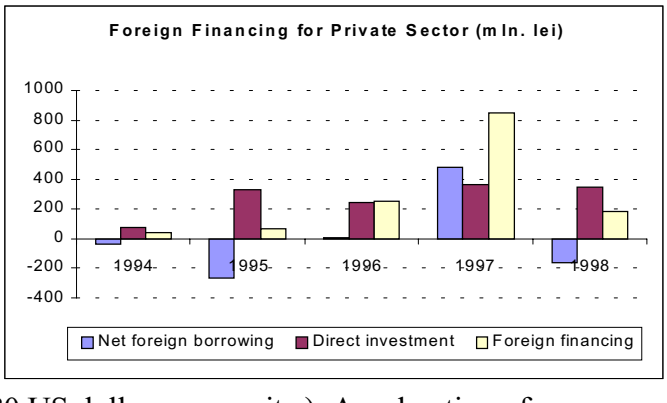
The 1999-year is a turning point for the solution of deepened contradictions between the sectors. Two solutions to this problem exist. The first and the most acceptable for the democratic development of the society, within a market-type economy, is to adjust state spending to revenues, to restructure the foreign debt, to implement an efficient management system for the state debt. The second, least acceptable, that leaves the society far behind in the process of democratization and market-oriented reforms – mandatory seizure of funds from the private sector for the fulfillment of state needs.



Quite interesting is the structure of external borrowing by the state sector of economy. Most foreign loans are acquired by the energetic sector. In 1994 the foreign debt of that particular sector increased by some 570 million lei, the following two years the yearly increase shrunk to approximately 300 million lei. Lack of structural reforms in the energy sector led to the situation, when the state is unable to pay for energy resources imports. Thus, in 1997 their share in the foreign debt increased by some 480 million lei. In 1998 the increase in debts flattened down, but not as a result of implementation of sound structural reforms, - as a result of cuts in the amounts delivered by the suppliers, due to Moldova's insolvency.

The flow of foreign funds into the state sector of the economy was mainly determined by the aid from international organizations, directed towards the implementation of the structural reform in Moldova. By 1998 the pace of reforms slowed down significantly, the Government and the Parliament did not fulfill their obligations to international organizations, the external inflows being thus stop. It was the first time when the amount to be paid as principal and interest for external debt exceeded the amounts flowing in. The foreign financing in 1998 accounted for only 100 million lei, as compared to 800 million lei in 1997.

The external financing of the private sector of the economy is done through loans and through direct investment. The most beneficiary form of foreign financing for the private sector is considered to be foreign direct investment, which is determined by the corresponding investment climate in the country. The dynamic of foreign direct investments shows that Moldova's unattractiveness to foreign investors (in 1998 the total amount of foreign direct investment constituted 80 US dollars per capita.) Acceleration of implementation of structural reforms will allow encouraging of investors' interest in Moldova. Financial inflows for private sector crediting are very volatile. Possibilities of so called "hot money" to rapidly leave the country introduce a destabilizing element both in the development of the private sector and in the functioning of the banking industry.



In spite of the rapid development of the private sector, a large share of the created product is being utilized by the state sector of the economy. In 1995 the state sector used 50 percent of GDP, in 1998 – 47 percent. As a result of implemented structural reforms this share should decrease to 30-40 percent, with a simultaneous relaxation of the pressure imposed by the state sector on the economy, the conditions of functioning of the private sector will improve, and new stimulus for investments inflows in Moldova will emerge.

Flow of Funds equilibrium model and financial program development

A financial program is a comprehensive set of policy measures designed to achieve a given set of macroeconomic goals. These goals could simply be to maintain a given level of economic performance. More often, however, the policies are designed to eliminate disequilibrium between aggregate demand and supply, which typically manifests itself in balance of payment problems, high inflation rates, and low or falling output.

Financial programs emphasize the importance of monetary, fiscal, and exchange rate policies in controlling domestic demand and correcting balance of payments disequilibria. However, financial programs also incorporate the effects of other policy measures, most prominently those aimed at increasing aggregate supply. Such measures should help minimize the losses in output and employment during the adjustment period, while eventually leading to a balance of payments position that is sustainable.

Financial programs are typically designed to restore balance of payments viability, and more generally to restore macroeconomic stability. Financial programs based on view that macroeconomic stability is a necessary condition for economic growth.

Sustainability of the balance of payments may be assessed with reference to the evolution of the current account over the medium term. While circumstances may vary from one country to another, in general terms a sustainable external current account position may be defined as one that can be financed on a lasting basis with adequate inflows. Current account balance, at the same time, is consistent with adequate growth, price stability, and the country's ability to service fully its external debt servicing obligations.

A financial program clearly needs to be set in a forward looking time framework. The medium-term scenarios are generally considered in a time horizon of about five years. Typically financial programs for forthcoming year are worked out in considerable detail because of the more imminent need to formulate a comprehensive package of policy measures. Forecasts of the more distant years are less detailed, often focusing on the broad implications for external adjustment, and are by their nature less certain.

An integrated system of macroeconomic accounts, covering national accounts, the balance of payments, and the fiscal and monetary accounts provides the information needed to assess the performance of the economy and the need for policy adjustment (within financial program maintenance). The accounts also provide a framework for policy analysis and indicate key consistency checks. These accounting relationships highlight the fact that any sector's spending beyond its income must be financed by the savings of other sectors, and that such excess spending by an entire economy is possible only when financed from external sources.

The accounting framework must be complemented by the specifications of a set of behavioral relationship. These relations indicate the typical response of some of the variables included in the accounting framework to changes in other variables. The behavioral relationships together with the accounting identities form a schematic quantitative representation, or "model", of the relevant economic processes.

The behavioral relationships together with accounting framework, and Flow of Funds tables considered as an aggregate is named the Flow of Funds equilibrium model. This model can be used to assess the changes in policy variables, i.e., variables that are under the authorities' control, needed to achieve given policy objectives.

Flow of Funds equilibrium model consists of 7 sectors, which comprise exogenous variables:

Sectors	Exogenous variables
1. Assumptions and policy variables	Real growth rate of GDP; Annual inflation rate (end period); Annual inflation rate (average period); Exchange rate (end period).
2. External debt servicing	Government debt service payments (principal); Government debt service payments (interest); Government new credit receiving; National Bank debt service payments (principal); National Bank debt service payments (interest); National Bank new credit receiving; Private debt service payments (principal); Private debt service payments (interest); Private new credit receiving.
3. Balance of payments	***Current account*** Exports of goods; Net income; Net remittances; Net current transfers. ***Capital and Financial Account*** Direct investment; Portfolio investment; Foreign currency purchases by National Bank; Increase in energy and other arrears by Government.
4. National accounts	Gross fixed investment (percent of GDP); Government sector investment (percent of GDP); Change in stocks (non-government).
5. Fiscal account	General government revenue (percent of GDP); Govern. consumption share in non-interest expenditure; Interest payments for domestic borrowing; Net lending; State enterprises balance; Overall cash basis balance (percent of GDP); Increase in expenditure arrears; Net domestic borrowing from commercial banks; Net domestic borrowing from non-banking sector; Privatization income (in USD); Privatization income (in MDL).
6. Monetary survey	Net foreign assets for commercial banks; Claims on public enterprises from National Bank; Other items, net; Broad money; Currency in circulation; Sight deposits; Time deposits; Residents' foreign-currency deposits.
7. Flow of Funds table	--------

Flow of Funds Equilibrium Model stipulates a range of limitations for the control of adopted assumptions of the financial program. The utilization of limitations in the program is determined by the need for a diversified coordination of the final version of the program, resulted after a certain number of iterations. The following are the major limitations of the model:

- International reserves in months of the goods and service imports;
- Export/GDP;
- Domestic debt stock/Budget expend;
- International reserves/Broad money;
- Velocity (GDP/Broad money).

Design and implementation of the financial program envisage carrying out number of the steps:

Step 1. Identify the economic problems;

Step 2. Set objectives and measures for it achieved, determine policy package and the impact of measures;

Step 3. Forecast the economic date, using flow of funds equilibrium model, which envisages relationships between macroeconomic accounts;

Step 4. Iterate projections to achieve economic and accounting consistency.

Flow of Funds tables for 1999-2002 projection

In the process of elaboration of the Financial Program for the period until 2002 the following major economic problems of the country were exposed:

- Consumption in the government sector significantly exceeds disposable income of the sector, which leads to an increase in the external and internal debt. By 1999 state debt reached a critical value, the amount necessary for its service disrupts the economic security of the country. The energy sector accounts for a significant portion of the debt that requires urgent restructuring.
- The real sector of the economy is in stagnation, investment in this sector reached an extremely low level, and the share of informal economy is high. The Russian financial crisis triggered a dramatic fall in Moldovan exports, deepening the problems of the real sector.
- The low level of foreign exchange reserves does not allow to promote a tight policy with regard to the national currency, the threat of currency devaluation is persistent, which, in the conditions of an open country, will result in high inflation rates.

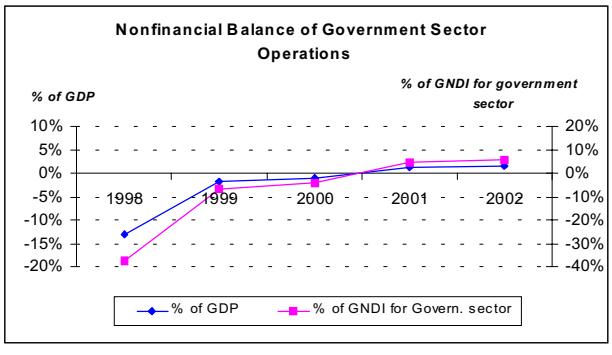
The implementation of the Financial Program pursues the following major objectives of the macroeconomic policy:

- To adjust spending to revenues in the governmental sector, and to attain by the end of the period a budget surplus of 1.5 percent of GDP.
- Attain a 3.3 percent yearly growth rate of GDP by the end of Program period.
- Reduce inflation to 6 percent per year by the end of Program period.
- Increase international reserves to 3.5-4 months of the goods and service imports.

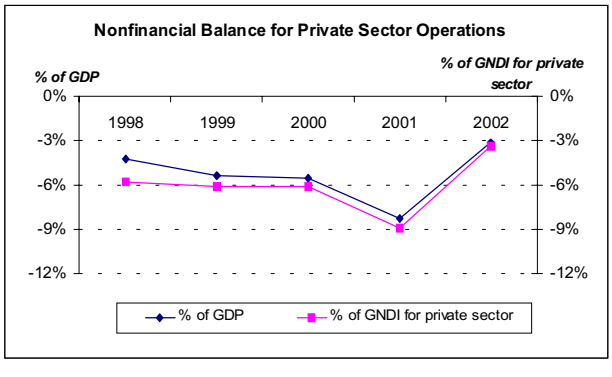
In order to achieve the objectives raised by the Program a range of measures should be undertaken, including the acceleration of structural reforms in the areas related to budgetary spending (pension system reform, education, health care, and so on), transition to a qualitatively new level of budget management, acceleration of the energy sector and agrarian reform. In order to revive the real sector of the economy it is necessary to ensure the fiscal

discipline, to guarantee the private property protection, to eliminate the barriers to merchandise movements towards the global markets, taking into consideration the adherence to WTO and the free trade agreements signed with the EU countries. The measures towards the reanimation of the real sector of the economy will allow attracting flows of foreign investment, mostly into export-oriented industries. In order to ensure the stability of the Moldovan lei one should implement the policy of growth of currency reserves of the country.

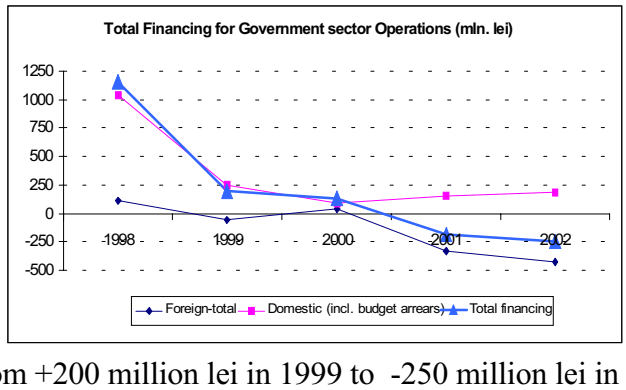
The period being forecasted (1999-2002) is characterized by a shift in the emphasis of lending policy in the governmental sector towards the gradual diminishing of the level of debit obligations. The period 1999-2000 is reserved for the implementation of the structural reform, while the Government will still use financing from the other sectors of the economy (1-1.7 percent of GDP or 3.9-6.5 percent GNDIg). Proceedings from cash privatization (telecommunication and energy sector enterprises) will cushion at the first stages the effects of plummeted loan inflows. In 2001-2002 the absorption (consumption and investment) will be below the GNDIg index, therefore, in the governmental sector will be created conditions for the reimbursement of earlier received loans. These years the amount to be repaid will constitute 1.2-1.5 percent of GDP or 4.7-5.9 percent of GNDIg.



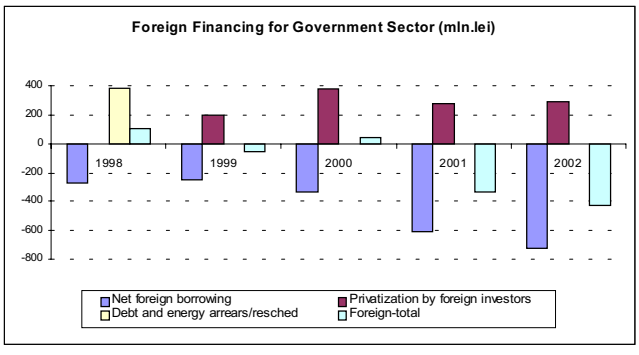
In 1999-2002 the financing of the private sector of the economy at the expense of other sectors will continue. The dynamics of financing will evolve from 5.1 to 9.8 percent of GDP or from 5.8 to 11.3 percent of GNDIp. The positive dynamics of these indicators is determined by the amelioration of the investment climate in the country, based on the implementation of structural reforms, on the increase of the share of the private sector, on the consolidation of investor's confidence in it and in the country overall. The realization of cash privatization program will also boost investor's interest in financing the private sector projects.



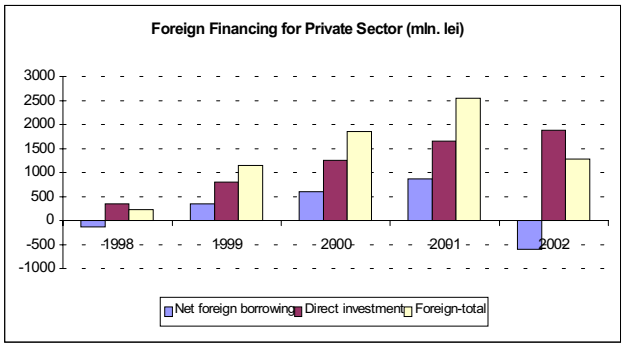
During the considered period the level of financing of the government sector from local resources will be within 150-250 million lei. The inflows of foreign financing in 1999-2000 will be virtually zero, but in the following years it will be directed out of the governmental sector and will constitute 330-430 million lei. The tendency of the general financing of the governmental sector will shift during the program period from +200 million lei in 1999 to -250 million lei in 2002.



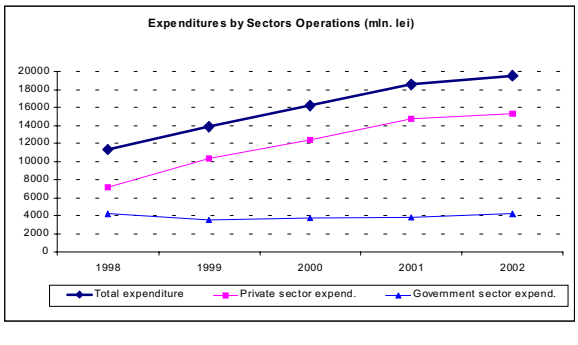
The main inflows of foreign financing of the governmental sector during the program period include net foreign borrowing and privatization income by foreign investors. According to the program of cash privatization and individual privatization plans, the main articles of revenues will be the proceedings from energy sector and telecommunication privatization. The average forecasted yearly revenues from privatization by foreign investors are 300 million lei. Net foreign borrowing is calculated as the difference between drawings (new credits inflows) and amortization of the last credits received. As a result of the restructuring of the foreign debt and of the policy of limitation of foreign borrowing on the one hand, and of economy of budget resources in order to lower the overall level of foreign debt on the other hand, net foreign borrowing will increase from -250 million lei in 1999 to -720 million lei in 2002. For a longer-term forecast one should mention a dramatic drop in that index to -400...-500 million lei.



The foreign direct investment will play an increasing role in the structure of private sector financing. During the forecasted period FDI will increase from 800 million lei in 1999 to 1900 million lei in 2002. The volume of net foreign borrowing will increase from 350 to 880 million lei in the period ending in 2001. The boost in the amount of private sector financing (from 1150 million lei in the beginning of the program period, to 2500 million lei at the end) will allow surpassing the negative tendencies in the development of the real economy, will increase the export potential of the country and will create thousands working places.



The increased role of the private sector of the economy is reflected in the amounts of sectors spending. If during the program period government sector expenditure will increase from 3500 only to 4200 million lei, private sector expenditure will boost from 10400 to 15300 million lei. Thus, the share of private sector expenditure in overall expenditure of the country will increase from 63 to 78 percent. By the end of program period the private sector will play a major role in the economic development of Moldova.



At the end of program period the imports of goods and services will be covered by international reserves of up to 4 month. Domestic debt stock will not exceed 15 – 17 percent of consolidate general government budget expenditures. By 2002 the level of state debt will constitute 93 percent of GDP, in a longer-run time frame (2005) this indicator will decrease to 70 percent. Thus, during the program period conditions for the effective functioning of Moldovan economy will be created, both in the governmental and in the private sector.

3.2. Modeling the budget revenues

The model developed by IEAG-CASE is designated to enhance the tax forecasting capabilities of the Government and is expected to facilitate the Government in designing its budget policy. It is based on a set of econometric equations that reflect the influence of the real economy developments on the revenues from tax collection.

This model has common goals with the project "Medium Term Financial Planning" (MTFP) implemented by GTZ – German Technical Assistance Agency – in Moldova. Further cooperation will allow for an adjustment and modernization of the model taking into account aspects of medium term financial planning.

Fiscal policy in Moldova

It is well established that transition countries that implemented tight fiscal policy resumed the growth sooner and it was both more stable and higher in comparison to countries with large and unsustainable budget deficits and associated high levels of government spending. Macroeconomic developments in Moldova in last years exhibit striking contrast between consequent tight monetary policy and loose, arguably unsustainable fiscal policy. While the inflation and monetary aggregates show low dynamics, not achieved yet even by the most advanced transition economies, budget deficit share in GDP exhibited almost double digit values. The most apparent result of such policy was rapid accumulation of foreign debt. It may be argued that the reduction of state budget deficit is the most important condition for medium-term stabilization and growth of Moldovan economy.

Three factors drive fiscal policy of Moldovan government. The first one is the general recession that reduces the tax base. Second factor is the inability of fiscal administration to collect taxes, which is a result of the widespread tax evasion and corruption. Third factor is the absence of the proper adjustment on the expenditure side. This inertia of expenditure commitments derives from the absence of a political group that would gather the public support for explicit constraint of social expenditures. Unsustainable fiscal imbalances are therefore a result of the myopia of Moldovan policy-makers and common substituting the realistic forecasts with wishful thinking. As long as the practice of unjustifiable raising of revenue side in the budget process is continued and realistic forecasts are neglected, the chances for sustainable and efficient fiscal policy are low.

The consequences of unrealistic forecasts

As creditors are reluctant to finance unexpected increase in government imbalances, additional borrowings prove to be costly, which adds up to already heavy burden of debt service. However, as the experience shows, the lower than expected revenues are only partly reflected in the increased cash deficit. Instead, the budget is forced to withhold its due expenditures. The expenditure adjustment that should have taken place in the budgeting process is therefore postponed to the later date and hence one may argue that the problem of unrealistic forecasts is minor. There is, however, a big difference between planned reduction in expenditure commitments and ad hoc withholding of budget expenses.

When revenue plans are not realized the government is prone to accumulate expenditure arrears. We do not wish to name here negative consequences of arrears, by now they seem to be obvious to everybody in Moldova. It also seems politically impossible to increase the stock of arrears even further in 1999. In response to lower than expected revenues, the government is also likely to introduce across the board cuts in expenditures. This solution although favorable in shorter term only aggravates the fundamental problem of Moldovan public finance: the absence of prioritization of budget expenses. Ad hoc cuts are usually made according to the political sensitiveness of expenditures, therefore the allocation of scarce public resources is increasingly based upon the relative strength of groups of interests and extrapolation of existing spending patterns. Distribution of expenditures based

on economic or equity considerations would only be possible if the government starts to realistically assess its spending capabilities in the budgeting process. The failure to gather anticipated revenues and make foreseen expenses pushes also the government towards involvement in dubious non-cash operations that both decrease the efficiency of the government and distort economic life in Moldova.

Models vs. intuition and experience

There are several reasons to model both the expenditure and revenue side of the budget. The first and foremost reason is that the model provides relatively objective assessment of the fiscal policy capabilities. Consequently, it provides information on the need for policy adjustment. Secondly, it allows for more transparent formulation of the policy targets and instruments necessary to achieve these targets. Thirdly, it helps to underline links between various economic factors that are not apparent otherwise. The budget revenue models are therefore widely used not only by national fiscal authorities, but also by international lenders when assessing the viability of planned fiscal policy.

The forecasting process can be viewed as the spectrum of approaches, with purely mathematical methods at one extreme and purely subjective method on the other. Mathematical models are based on the quantitative analysis and yield the results that are independent of political interests and subjective opinions. True, mathematical models can not incorporate all intuition and experience of the staff in the Ministry of Finance. Forecasts based exclusively on the subjective views are however difficult to defend, sensitive to political pressures, and may be wrong in the first place. Moldovan experience shows that forecasts of Ministry of Finance tend not to acknowledge the real macroeconomic performance, not to account for low level of tax compliance and to not fully reflect the impact of exemptions on effective tax rate. Mathematical models are relatively prove to such errors, and are not readily influenced by the political pressures. Also the model guarantees some time consistency of forecasts even under higher turnover of Ministry of Finance employees due to the changing cabinets or any other reasons.

The development of model

The simplest mathematical method of tax revenue projections is the extrapolation of the recent trends in the collections (for example the real term changes, changing share in GDP etc.). As such, forecasts do not reflect the extent of the changes of tax base and their impact on the tax collection. The identification of links from the changes in tax base to the changes in the collection is therefore the necessary condition for precise forecasting.

To be interesting for policymakers the forecasts have to be based on the behavioral relationships in the economy. It means that the forecasted revenues are not derived on potential and legal relationships between tax base and tax collection but rather on the real life response of collection to various changes in economic environment. The model represents the typical economic processes in the revenue collection process. Ideally, the model also reflects the possible results of changes of variables that are under the control of authorities on the revenue target. As the dependent variable is the actual collection of taxes, the model by definition accounts for effects of tax evasion, tax exemptions on the collection of revenues.

The model of fiscal revenues presented by IEAG-CASE is based on the set of external assumptions related to the macroeconomic developments of Moldova that are exogenous to the model: the model does not attempt to forecast GDP growth or its composition. Consequently, there is no feedback from tax collection to the development of real economy or prices. Such partial equilibrium approach may be justified by requirements of:

- tractability of the model necessary for its role as a practical tool for policymakers
- focus on short-term forecasts (1-2 year time horizon)

- institutional arrangements – in Moldova, as in most countries, revenue forecasting is the role of Ministry of Finance that imports the macroeconomic forecasts from other government institutions (Ministry of Economy)
- weak statistical base - correct GDP modeling requires the accurate information on the components of GDP and such information on Moldova is unavailable

Major tax categories are forecasted. The breakdown of tax revenues was done in order to find a balance between the need to separate revenues with different legal regulations and the preference for forecasting broad tax categories with more stable and substantial contributions. Proxies for tax base for each category are provided. Theoretically, these should correspond to the legal tax base of the given tax. However, as broad categories of taxes are considered and they cover important parts of overall economic activity, it is chosen to use national account and balance of payment items as proxies for the tax base. As such, the model does not require very detailed information on entities that are subject to taxation. For the scarcity of such data, this feature is the additional advantage of the model.

Limitations of the model

The incidence of structural reforms, policy shifts and exogenous shocks lead to reduced credibility of established behavioral relationships. There is also the problem of the timing of the impact of changes on the predicted tax collections. In many cases the sole expectations of some policy shifts may lead to changes in the process of collection generation. The most recent example of this sort relates to the surge in the registered import-export transactions in the last days of December 1998 in the eve of the change of VAT principle in the trade with Russia and Belarus

The analysis of Moldova does not reveal, however, the strong influence of fiscal regulation on tax collection. The best known example is the collection of excise taxes, in which the growth in tax rates did not lead to any increase in revenues. Moreover, many of the changes in the tax regime had rather implicit and therefore difficult to quantify character. The obvious example is the changing willingness of authorities to grant tax exceptions and amnesties. On the other hand, revenues collected through the non-cash transactions make the interpretation of the results less straightforward.

The good results of econometric interference depend crucially on the data quality and number of observations available. Both factors reduce the reliability of results as applied to Moldova. Especially the available data on the national accounts is of doubtful quality. Also analyzed time series that exhibited smooth development during the period of time 1994-1997 were subject to sharp movements in the second half of 1998. Therefore, some of structural relationships discovered in the data are not likely to pertain afterwards.

Monthly vs. Quarterly Model

The monthly-date model provides the number of observation that is sufficient for econometric interference. Results of estimations are therefore statistically satisfactory and relatively reliable. However, they are rather unsatisfactory from the economic point of view, as the specification is not well underpinned by the economic theory or the economic intuition. Especially the overwhelming role of exports in the tax revenue generation process is difficult to explain.

Introduction of some additional variables, which are reported by the statistical authorities only on quarterly basis, eliminates the problem. Specifically, these are activities in trade, banking sector, transport and other services that directly determine the tax collection in Moldova. The role of agriculture and industry production is relatively limited. Moreover, performance of services (that are reported in national accounts as “other activities’’) is highly correlated to the exports what provides the link between tax revenues and exports observed in the monthly model.

Model - description

The model uses the following variables:

A) Dependent Variables:

- Direct taxes:
  - revenues from the individual income tax,
  - revenues from the corporate income (profit) tax.
- Indirect taxes:
  - revenues from the VAT,
  - revenues from the excise tax.
- Revenues from taxes in external trade.

Current prices (millions of lei)

B) Independent Variables:

- industrial production - millions of lei (current prices),
- agricultural production - millions of lei (1996 fixed prices),
- services - millions of lei (1996 fixed prices),
- exports - millions of U.S. dollars,
- imports - millions of U.S. dollars,
- inflation rate

The data sample contains observations within the period Jan 1994 –Nov 1998 (59 observations) for the monthly version and within Q1 1995 – QIII 1998 (15 observations) in case of the quarterly variant.

In the first case, all variables are deflated by CPI, except exports, which are expressed in millions of USD. In the quarterly model, all variables are expressed in nominal terms.

Monthly Model

- **Individual Income Tax**
  D(INCOME) = 0.0008992666994*D(AGR) + 0.05995747123*D(EXPORT) + [AR(1)=-0.9148058246,MA(2)=-0.9373553056]
- **Corporate Profit Tax**
  LOG(PROFIT) = -0.6942937522*(@SEAS(1)) + [AR(2)=0.4688312431,AR(8)=0.4420520819,MA(10)=-0.8579624606]
- **VAT**
  VAT = 0.223284945*EXPORT + 23.37758161*(@SEAS(12)) + 5.220349538*(@SEAS(11)) + 0.006337445932*AGR + [AR(1)=0.6967946855]
- **Excise Tax**
  DLOG(EXCISE) = 1.250384736*DLOG(EXPORT) - 0.4937379516*DLOG(EXPORT(-2)) + 0.5164273359*DLOG(EXPORT(-3)) + [AR(1)=-0.5833835263]
- **Custom tariffs**
  LOG(DUTY) = -3.628219568 - 0.6552793022*LOG(IND(-1)) + 1.02085932*LOG(EXPORT) + 0.7227923193*LOG(EXPORT(-1)) + 1.566221996*D1098 + [MA(1)=0.6126282198]

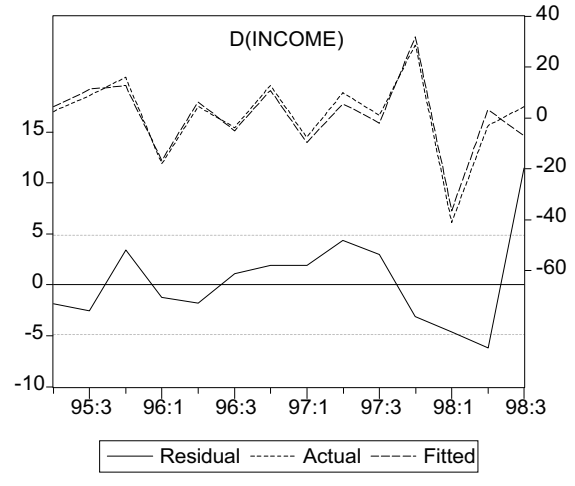
Quarterly Model

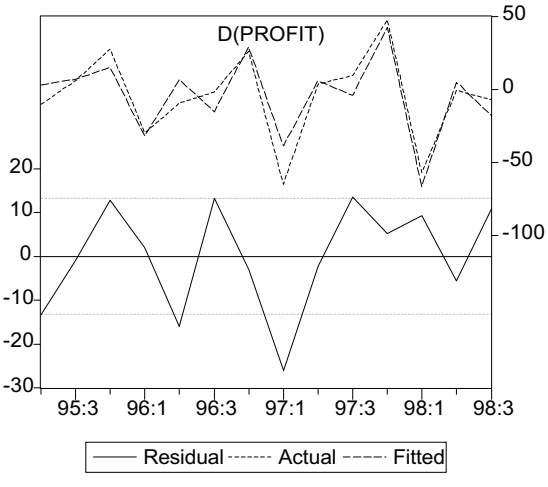
- **Individual Income Tax**
  D(INCOME) = -0.0274444192*D(IND) + 0.03530133467*D(OTHER) + 0.02665206462*D(EXPORT)
- **Corporate Profit Tax**
  D(PROFIT) = -5.343030683 + 0.05039429115*D(OTHER) + 0.04455338418*D(EXPORT)
- **VAT**
  D(VAT) = 0.04970078945*D(AGR) - 0.2199537333*D(IND) + 0.4046822336*D(OTHER)
- **Excise Tax**
  D(EXCISE) = 0.03967693193*D(OTHER) + 0.01425590946*D(AGR) + 43.16237409*D9702
- **Custom tariffs**
  LOG(DUTY) = -11.76802426 + 2.086096715*LOG(IMPORT) + 0.6311912015*D9702 + [MA(2)=-0.8813467176,BACKCAST=1995:1]

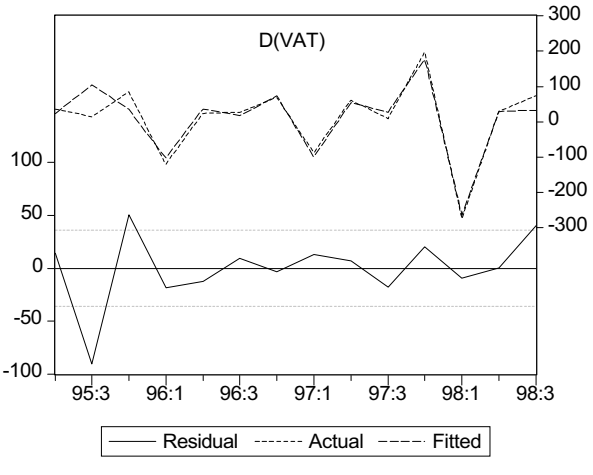
In order to forecast the future revenues, we used the following assumptions

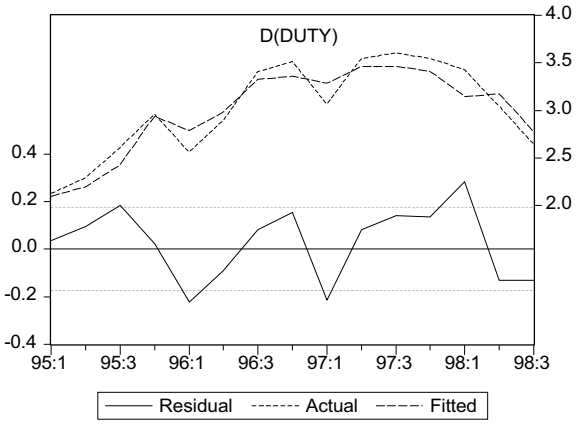
1) rate of growth of real industrial production in 1999
2) rate of growth of real agriculture production in 1999
3) rate of growth of $ exports in 1999
4) inflation rate in 1999

Actual and Fitted Values are presented in the following graphs for the quarterly model









8. Using the above estimations and the corresponding forecasts, we can summarize the results as it follows

Underlying Economic Developments (% change – real terms)

	GDP	Industrial Production	Agricultural Production	Exports	CPI (Dec - Dec)
1999	-6%	-10%	-6%	-15%	15%

Tax revenues – leu millions (current prices)

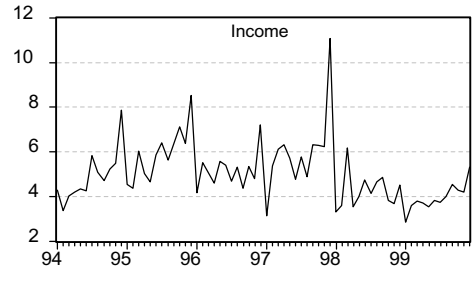
	Income	Profit	VAT	Excise	Duty	***TOTAL***
budget 1997	230	380	800	440	135	***1,985***
1997	282	244	948	401	127	***2,002***
budget 1998	330	330	860	590	120	***2,060***
1998	223	177	1124	374	109	***2,010***
budget 1999	155	240	920	683	95*	***2,093****
CASE forecast 1999	250	155	1,190	355	79	***2,029****

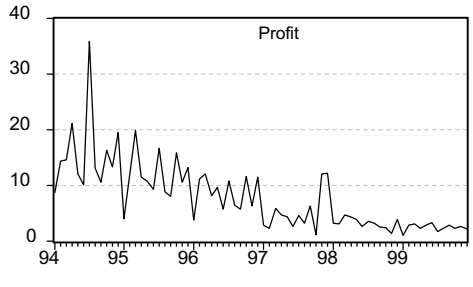
Tax Revenues as share of GDP**

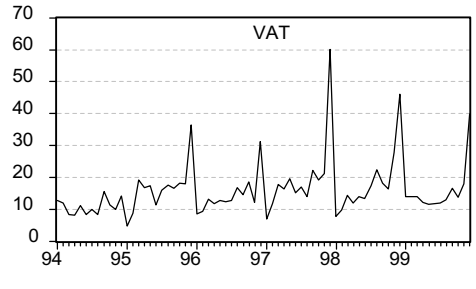
	Income	Profit	VAT	Excise	Duty	***TOTAL***
budget 1997	2.6%	4.3%	9.0%	4.9%	1.5%	**22.3%**
1997	3.2%	2.7%	10.6%	4.5%	1.4%	**22.5%**
budget 1998	3.7%	1.8%	9.8%	6.7%	1.4%	**23.4%**
1998	2.5%	2.0%	12.8%	4.3%	1.2%	**22.8%**
budget 1999	*1.5%*	*2.4%*	*9.1%*	*6.7%*	*0.9%*	***20.7%***
CASE forecast 1999	*2.5%*	*1.5%*	*11.7%*	*3.5%*	*0.8%*	***20.1%***

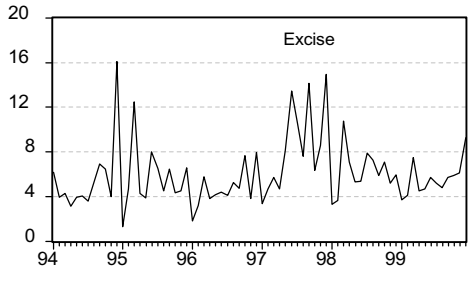
** excluding the import surcharge tax in 1999 (leu170 million – 1.7% of GDP),*
*** GDP equal to leu 10,150 million (6% decrease in real terms)*
Sources: Ministry of Finance, own calculations

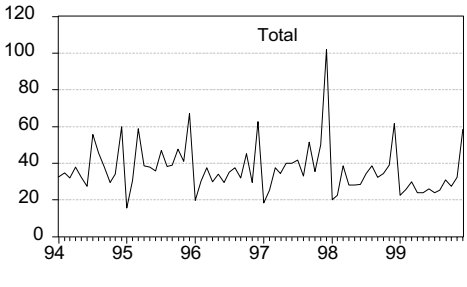
Monthly Tax Revenues – Real Terms – 1994 -1999











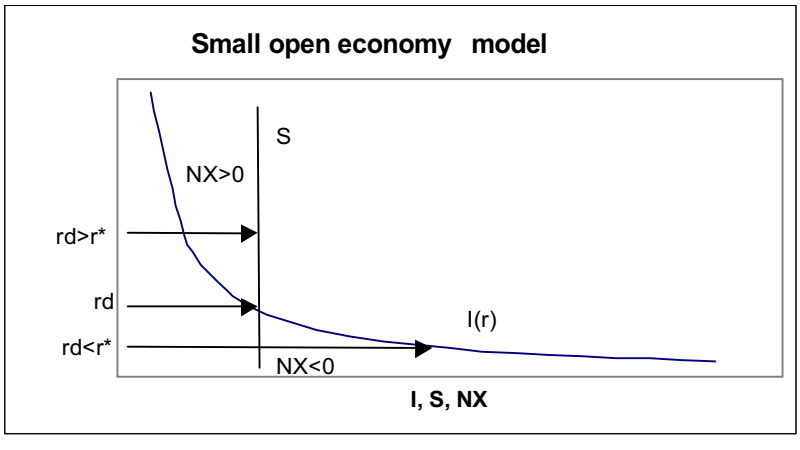
3.3. Small open economy: concise macroeconomic model

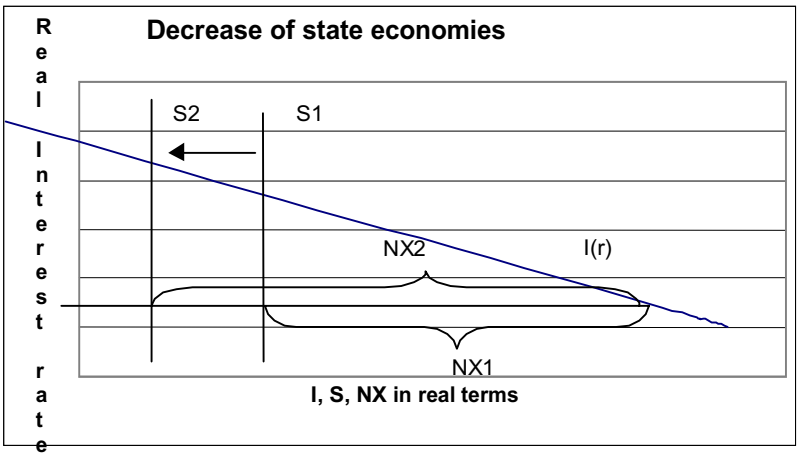
The notion of open economy has several meanings. It can be open for the circulation of goods. In a long run it will result in equalization of internal and world prices. The economy can be open for the circulation of capital. This leads to the equalization of internal and external real interest rates. The economy can also be open for the circulation of labor force, which implies the equalization of the internal and external wages. Finally, it can be open for the flows of information. This will contribute to the acceleration of the first three processes. It is clear that every economy has its own degree of openness of every of the above-mentioned criteria, and the notion of "completely open economy" is just a theoretical extreme case.

The model examined in our case is referring to the first two kinds of "openness" of the economy. The notion of small economy will be specified below.

The *basic assumptions for the model of the small open economy are*:

1) GDP is a function of production factors – capital and labor force;
2) Consumption grows to the extend of the growth of income: **C=C(Y); C'>0**;
3) Volume of investments grows to the extend of the decrease of real interest rate **r, I= I(r)**, because growth of the real interest rate means that the supply of sources for investments becomes more expensive **(I'< 0)**;
4) The economy is small – this means that the economy does not influence the world real interest rate. Moreover, in a small open economy the domestic real interest rate tends to the world one through a simple mechanism: if the domestic real interest rate **(rd)** becomes smaller than the world real interest rate **(r*),** this leads to the outflow of capital from the country and rise of domestic interest rate, and conversely: if the domestic real interest rate is bigger than the world one, this causes an inflow of capital in the country and diminishes the domestic interest rate. As a result **rd=r*.**





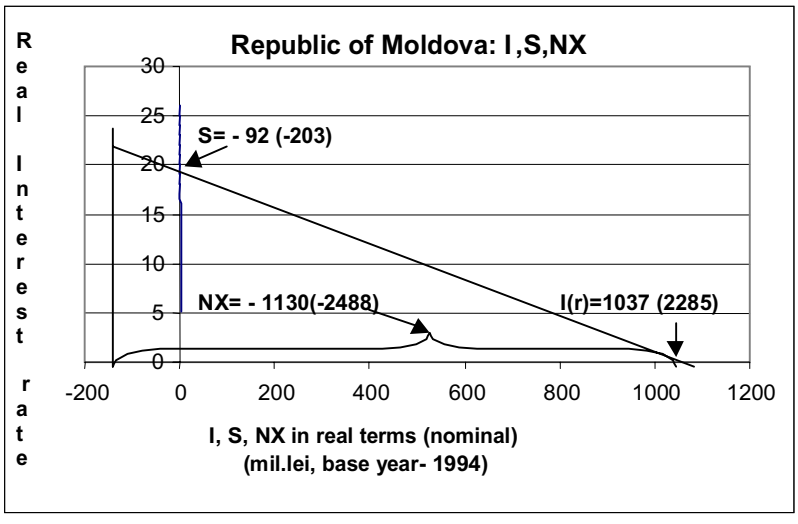
Let's denote total savings by **S**, the net export by **NX**.

It is known that

S – I(r*) = NX. (1) that is to say, if savings are smaller than investments, than the net export is negative.

In the picture the curve of investments is an inverse function of real interest rate - **I(r)**, the curve of savings – **S** (which in a short run does not depend on the interest rate, and therefore is a vertical line), and net export – distance between **S** and **I**, according to the expression (1), are displayed.

Should the economy be closed, then the market would stabilize a real interest rate equilibrating savings and investments – **rd*** at the intersection of **I** and **S**. The fact that the economy is closed, and small, **rd = r*** has an impact on the net export. If the real domestic interest rate (in case of *closed economy* –**rd*)** is higher than the real world interest rate **(rd* > r*),** this implies in an univocal mode, that net export (current account) would be negative **(NX<0)**. And conversely,



if **rd* < r*** (*ceteris paribus assumption*), this implies that **NX** will be positive. That is to say, the slope of the investment curve and the position of the curve of savings determine univocally the sign of net export, and consequently, current account.

Total savings as a share of GDP of the Republic of Moldova diminished from 24% in 1994 to - 2% in 1998. At the same time, the share of gross capital formation diminished slower. This implied the decrease of net exports from –4% in 1994 to –28% in 1998.

Savings, investments and net exports (% of GDP)

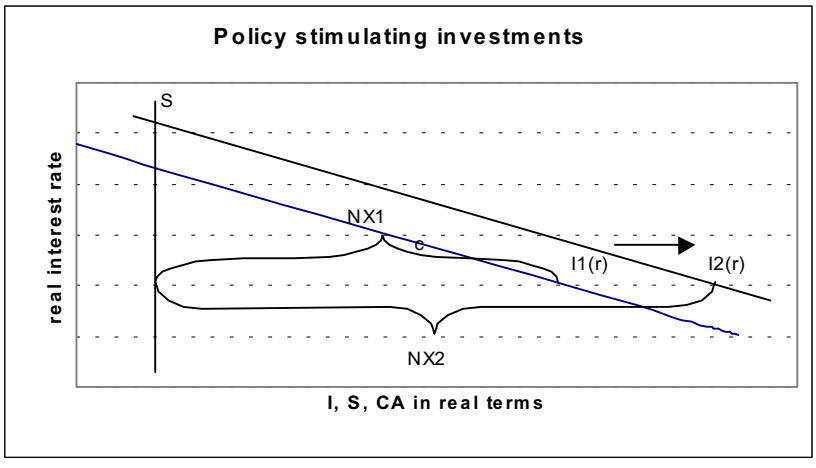
	1994	1995	1996	1997	1998
Total savings	24.57	17.11	4.19	2.52	-2.31
Investments (gross capital formation)	28.83	24.88	24.39	23.67	25.95
Net export	-4.25	-7.76	-20.20	-21.15	-28.26

First calculation on the model of small open economy was accomplished on the base of real data of Moldova. First results (although insufficiently stable, because the calculation needs an utilization of long time series) shows that in the Republic of Moldova investments in real terms depend on the real interest rate in such a way, that any growth of the real interest rate by one percent was accompanied by a decrease of total real investments by 30 million lei, or in nominal terms - by 66 million lei (prices of 1998).

The real interest rate grew continuously during the last four years, which caused an essential decrease of real investments. According to our calculations, the real domestic interest rate **rd*,** which equilibrates the savings and investments in the case when the economy would be closed, exceeds 20%, and it is evidently bigger than the world real interested rate. This fact implies that net export, and, consequently, the current account, will be unconditionally negative. Moreover, savings in real terms move continuously to the left, which imply worsening of **NX**. Evolving under inertia, net exports will diminish even more. Therefore, elaboration of measures aimed at improving the situation is needed. As a way to achieve it could be an attempt to "push" the curve of savings **S** to the right, by promoting a policy stimulating savings (and, correspondingly, bank deposits).

The model of a small open economy shows that the real interest rate is not the only way of affecting net exports. A *stimulating budgetary or fiscal policy* could have a substantial impact. Thus, decrease of the state savings will push the curve of savings **S** to the left; as a result **NX** will diminish from **NX1** to **NX2**. The same will happen in case of diminishing taxes (**T**) - *fiscal stimulating policy*, because **S = (Y – C (Y-T) – G),** where Y is GDP, **C** – consumption, **G** – government expenditures.

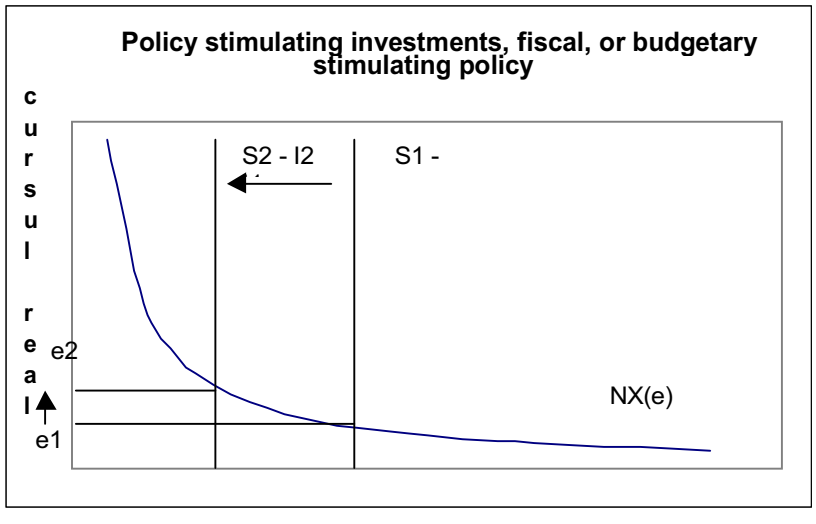
Policy stimulating investments causes the shift of the curve of investments outside (from **I1(r)** to **I2(r)**) and thus aggravates the net exports (a change from **NX1<0** to **NX2<0**).



There is another way to influence the net export – through *the real exchange rate* of the national currency (**e**).

In the picture the curve **NX** depends negatively on the real exchange rate (**NX' (e)<0**). The curve **S-I** is vertical because it does not depend of the real exchange rate. Stimulating *budgetary or fiscal policies* will cause a decrease of savings, and shift of the **S-I** curve to the left. This will result in the growth of real exchange rate, and, consequently, diminishing net export.

The *policy stimulating investments* will cause the shift of curve **S-I** to the left and will result in worsening of the situation of current account as well.



***Conclusions*:**

First calculations on the model of small open economy on the base of *de facto* data for the Republic of Moldova displayed an essential sensibility of investments to changes in the real interest rate.

During last years the real interest rate in the Republic of Moldova was continuously growing, which fact essentially disfavored the investment climate in the country.

The domestic "equilibrium" real interest rate in case when the economy should be closed exceeds a lot the world real exchange rates, which implies negative net exports.

Another cause of diminishing net export of Moldova is the real appreciation of national currency.

Real national savings diminish continuously, having negative consequences for current account.

Investments stimulating policy or tax burden reduction, will aggravate situation in current account.

Improvement of the situation demands an intervention of the state by promoting two kinds of policies. *First, savings stimulating policy* could be realized through a set of measures, as follows:

- Introduction of a system of bank deposits insurance;
- Setting up a system of modern banking services, such as utilization of magnetic saving cards, credit cards, direct depositing of wages on banking accounts;
- Abrogation of taxing bank deposit interests from bank deposits provided in the new Fiscal Code.

The *second policy, of real depreciation of national currency*, could be realized through holding back the inflation rate lower than the rate of depreciation of national currency.

4. ANNEXES

4.1. Macroeconomic scenarios for 1999-2002 (tables and charts)