



**BULGARIAN NATIONAL BANK**

**Macroeconomic Models of the  
International Monetary Fund and  
the World Bank  
(Analysis of Theoretical Approaches and  
Evaluation of Their Effective  
Implementation in Bulgaria)**

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**Victor Yotzov**

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DISCUSSION PAPERS

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## DISCUSSION PAPERS

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# Contents

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<b>1. The IMF Approach .....</b>	<b>6</b>
<b>2. The World Bank Approach .....</b>	<b>12</b>
<b>3. The IMF and World Bank Merged Model .....</b>	<b>18</b>
Prices and Output .....	19
Monetary Sector .....	19
External Sector .....	20
<b>4. Criticism of Applied Approaches .....</b>	<b>22</b>
<b>5. Evaluation of the Results from Implemented     Adjustment Programs .....</b>	<b>24</b>
<b>References .....</b>	<b>34</b>

**SUMMARY.** IN THE PROCESS OF TRANSITION TO A MARKET ECONOMY BULGARIA ESTABLISHED SUSTAINABLE RELATIONS WITH INTERNATIONAL FINANCIAL INSTITUTIONS, THE INTERNATIONAL MONETARY FUND AND THE WORLD BANK IN PARTICULAR. RELATIONS WITH THESE INSTITUTIONS ARE BASED ON IMPLEMENTATION OF SPECIFIC PROGRAMS FOR ECONOMIC REFORMS. THIS PAPER PRESENTS AN ANALYSIS AND OVERVIEW OF THE DIFFERENT APPROACHES TO ADJUSTMENT PROGRAM FORMULATION. IT REVIEWS THE MACROECONOMIC MODELS OF THE IMF AND THE WORLD BANK, WHICH SERVE AS A BASIS FOR DEVELOPING SPECIFIC PROGRAMS. BASED ON THE STATISTICAL DATA FOR THE PERIOD SINCE THE START OF TRANSITION TO DATE AN ATTEMPT IS MADE AT ASSESSING THE RESULTS AND EFFECTIVENESS OF ALL STANDBY AGREEMENTS IMPLEMENTED BY BULGARIA OVER THE LAST TEN YEARS.

**JEL classification:** E41, F41, K42

The use of macroeconomic models in the process of designing, implementing and controlling programs supported by international financial institutions has a long history. Since their establishment in 1946 the International Monetary Fund (IMF) and the World Bank (WB) have been called upon to provide financial support to their members. Credits are made after a comprehensive analysis of the reasons causing the deficits (internal and/or external) and the necessary measures to eliminate them. Based on the results from the analysis a specific program is developed aimed at restoring macroeconomic equilibrium.

The IMF approach to economic stabilization (generally referred to as financial programming) is based on the models designed in the 1950s and 1960s by *J. J. Polak* and *E. Walter Robichek*.<sup>1</sup> The theoretical foundations of financial programming have remained generally unchanged for nearly 40 years. The RMSM model<sup>2</sup> (revised minimum

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<sup>1</sup>*Polak, J. J.* Monetary Analysis of Income Formation and Payments Problems. IMF Staff Papers. Vol. 6, November 1957; *Robichek, E. Walter.* Financial Programming Exercises of the IMF in Latin America. Seminar in Rio de Janeiro, September 1967.

<sup>2</sup>Currently the model is known as the RMSM-X (*revised minimum standard model – extended*). Here we will consider only its basic features so no difference will be made between the two models, although they differ significantly in some aspects.

standard model) is formulated by the World Bank in the late 1960s and early 1970s and is based on contributions by *Chenery, Strout, Weisskopf* and *Blomqvist*<sup>3</sup>. Its theoretical background can be found in *Harrod and Domar's* two-gap growth model for an open economy.

Since the early 1970s, however, the conception and the structure of adjustment programs have gradually evolved and expanded. In part, this reflects institutional and structural changes in the countries seeking support from international financial institutions. On the other hand, significant events occurred in the world economy<sup>4</sup> that entailed changes in the approach to program design. Since the early 1990s a new group of countries has emerged, collectively called 'transition economies.' It turned out that application of the standard model for analysis and forecasting in transition economies produced weaker results (according to the words of *Polak* himself).<sup>5</sup>

The IMF and WB models, though having different approaches to economic problems, have a common macroeconomic basis. An economy is divided into four sectors, assuming that the private sector has all the factors of production. Revenue from sales of goods and services forms the income [ $Y$ ] of the *private sector*, which is used for consumption [ $C_p$ ], tax payment [ $T$ ], and investment [ $\Delta K$ ]. The remaining private sector income comprises accumulation of financial assets (savings) which may take the form of money [ $\Delta M$ ] and foreign assets [ $\Delta F_p$ ] net of total banking system credits [ $\Delta D_p$ ]. Therefore budgetary constraints to the private sector are set by:

$$Y - T - C_p - \Delta K \equiv \Delta M + \Delta F_p - \Delta D_p \quad (1).$$

The *public sector* uses resources collected from taxes for its own consumption [ $C_g$ ], the remaining portion being financial assets in the form of foreign assets [ $\Delta F_g$ ] net of banking system credits [ $\Delta D_g$ ]:

$$T - C_g \equiv \Delta F_g - \Delta D_g \quad (2).$$

<sup>3</sup> *Chenery, Hollis B., Alan M. Strout. Foreign Assistance and Economic Development. American Economic Review # 56, Sept. 1966; Weisskopf, Thomas E. The Impact of Foreign Capital Inflow on Domestic Savings in Underdeveloped Countries. Journal of International Economics, Feb. 1972; Blomqvist, A. G. Empirical Evidence on the Two-Gap Hypothesis. Journal of Development Economics # 3, 1976.*

<sup>4</sup> Among the most important events are the end of the gold-dollar standard; the sharp price rise in energy commodities and dramatic fluctuations in other goods' prices; fast interest rate growth in international credit markets; reduced trade volumes and a slowdown in growth globally.

<sup>5</sup> *Polak J. J. The IMF Monetary Model at Forty. IMF Working Paper, WP/97/49.*

The *external sector* receives income from imports<sup>6</sup> of goods and services [ $Z$ ] and makes expenditure on exports of goods and services [ $X$ ], the result being changes in net foreign assets of the private and public sectors and in official foreign currency reserves [ $\Delta R$ ]:

$$Z - X \equiv -(\Delta F_p + \Delta F_g + \Delta R) \quad (3).$$

The *banking system* is represented only by the central bank which is treated as a financial intermediary acquiring assets in the form of official foreign currency reserves and loans to the private and public sectors, and liabilities in the form of money for the private sector:

$$\Delta M \equiv \Delta R + \Delta D_p + \Delta D_g \quad (4).$$

Combining budgetary constraints to the four sectors of the economy (1) ÷ (4), one obtains the generally known identity describing GDP final use:

$$Y - C_p - C_g - \Delta K - X + Z \equiv 0 \quad (5).$$

Based on these generally accepted macroeconomic relationships the IMF and the World Bank have built two different approaches which, before being combined, need be summarized and distinguished.

## 1. The IMF Approach

Since IMF major goal is to support the balance of payments of countries with chronic current account deficits, there is clearly the need to relate policy variables to foreign reserves dynamics. In this light, the IMF model sets an explicit relationship between variables controlled by the authorities and the balance of payments. This approach involves exogenous setting of the nominal GDP:

$$Y = P\bar{y} \quad (6),$$

where

$P$  is the price level, and  $\bar{y}$  is real GDP<sup>7</sup>.

In turn, a change in the nominal GDP [ $\Delta Y$ ] is treated as resulting from price and autonomous changes. Real GDP [ $y_{,t}$ ] and the price level [ $P_{,t}$ ] in the previous period are known, the change in the price level [ $\Delta P$ ] is endogenous for the model, and growth [ $\Delta \bar{y}$ ] is set exog-

<sup>6</sup> From external sector point of view imports represent income, while for the economy these are expenditures. The same approach applies to exports.

<sup>7</sup> Although real GDP is set as an exogenous variable in the model, this does not mean that in IMF programs it is treated likewise. Usually growth is derived from the simultaneous assessment of structural changes and the external environment.

enously<sup>8</sup>:

$$\Delta Y = \Delta P y_{-1} + P_{-1} \Delta \bar{y} \quad (6')$$

Velocity of currency circulation [ $v$ ] is assumed as constant (or predictable but outside the model framework) which gives ground to relate money demand [ $M^d$ ] to income:

$$\Delta M^d = v \Delta Y \quad (7)$$

It is also assumed that the money market is in equilibrium, which means that money demand matches money supply [ $M^s$ ], i.e.

$$\Delta M^d = \Delta M^s = \Delta M \quad (8)$$

Based on the last three equations and identity (4) the change in official foreign currency reserves can be presented as a function of exogenous and policy variables:

$$\Delta R = v \Delta P y_{-1} + v P_{-1} \Delta \bar{y} - (\Delta \hat{D}_p + \Delta \hat{D}_g) \quad (9)$$

where the sign ‘ $\hat{\phantom{x}}$ ’ above credits to private and public sectors defines them as instrumental variables controlled by the monetary authorities.

Equation (9) illustrates the monetary approach to the balance of payments, presenting the change in official foreign currency reserves as the difference between money supply and domestic credit. In formulating a specific financial program the equation is resolved for a desired value of the endogenous variable  $\Delta R$ , and domestic credit growth is set as a ceiling. It is obvious that credit-ceiling setting depends to a large extent on money supply. Therefore the sustainability of the money demand function is critical to the entire model.<sup>9</sup>

The inclusion of two endogenous variables [ $\Delta R$  and  $\Delta P$ ] in equation (9) means that by setting restrictions to domestic credit the solution may be found for any value of inflation, but this is not acceptable. Including an additional behavioral equation relating GDP [ $Y$ ] to imports [ $Z$ ] solves the problem:

$$Z = \alpha Y = \alpha(Y_{-1} + P_{-1} \Delta \bar{y}) + \alpha y_{-1} \Delta P \quad (10)$$

where  $\alpha$  is the marginal propensity to import.

<sup>8</sup> The combined impact of autonomous and price factors [ $\Delta P \Delta \bar{y}$ ] is considered negligibly small.

<sup>9</sup> In order for changes in domestic credit to have a *predictable* effect on the balance of payments, money demand should be stable and be a function of a limited number of independent variables. However, this does not mean that the velocity of currency circulation should be constant.

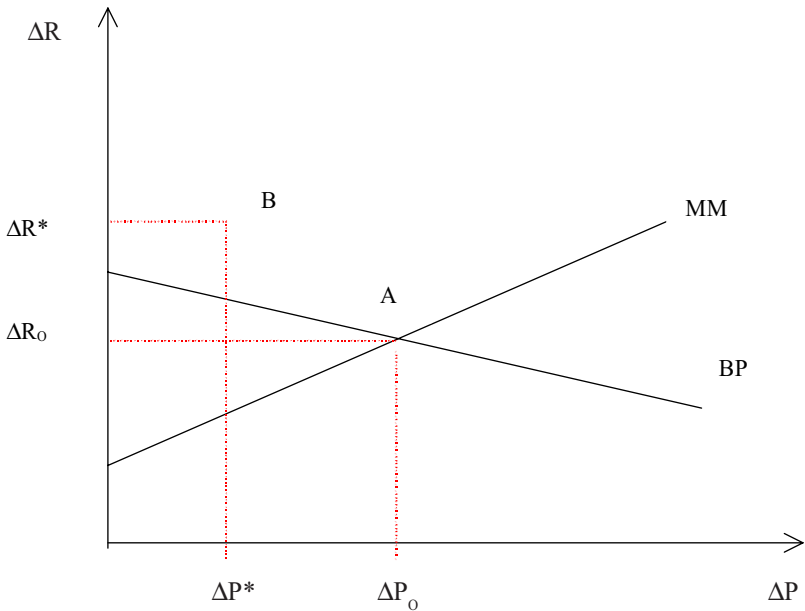
Therefore reserves can also be derived from the combination of equations (3), (6') and (10), and the relationship between reserves and changes in the price level (inflation) is determined by another equation:

$$\Delta R = (\bar{X} - \Delta \bar{F}) - \alpha(Y_{-1} + P_{-1}\Delta \bar{y}) - \alpha y_{-1}\Delta P \quad (11).$$

If the relationship between the balance of payments and monetary and credit aggregates is presented graphically, assuming prices as an endogenous variable, it will look as follows:

**Chart 1**

**MONETARY APPROACH TO THE BALANCE OF PAYMENTS  
(J. J. POLAK MODEL)**



Equation (9) is described by *MM* line, and equation (11) is described by *BP* line. If we assume that equilibrium is achieved in point *A*, domestic credit contraction will move *MM* upward left and the equilibrium point will move along the *BP* line in the same direction. This means that forex reserves grow at lower values of inflation. The targets for reserves and inflation in this model cannot be taken independently of each other. Since changes in domestic credit can move the equilibrium point only along *BP* line,  $\Delta \hat{D}$  alone can influence the combina-



tion of  $\Delta R$  and  $\Delta P$ . If the targets for reserves and inflation are selected so as not to lie on  $BP$  (for example in point  $B$ ), they cannot be achieved only through changes in domestic credit. This embodies the *Tinbergen rule* that two objectives cannot be achieved by using only one instrument.

The use of the exchange rate as a *policy variable* provides solution to the dilemma:

$$\Delta P = (1 - \theta)\Delta P_d + \theta\Delta\hat{e} \quad (12),$$

where

$P_d$  is the index of internal prices,

$\theta$  is the share of imported goods in the general price index, and

$\hat{e}$  is the desired level of the exchange rate.

By including a new equation and a new endogenous variable ( $P_d$ ) the authorities have one more policy variable at their disposal: the exchange rate. Besides, equation (10), describing the relationship between GDP and imports, can be modified so that import volumes can be affected by relative prices of imported goods in respect of the prices of domestically manufactured goods.

$$Z = Z_{-1} + (Z_{-1} - b)\Delta\hat{e} + b\Delta P_d + \alpha\Delta\bar{y} \quad (10'),$$

where

$b$  is a parameter measuring the elasticity of import volumes to changes in relative prices of imported goods.

Parameters  $\alpha$  and  $b$  being positive, equation (10') postulates that an increase in domestic prices and/or real GDP leads to increased imports, while national currency devaluation leads to reduced imports.

Including the exchange rate as a policy variable requires modification of equation (4) to accommodate the impact of exchange rate changes on the balance sheet of the central bank:

$$\Delta M \equiv \Delta R + \Delta\hat{e}R_{-1}^f + \Delta\hat{D}_p + \Delta\hat{D}_g \quad (4'),$$

where  $R_{-1}^f$  are monetary authorities' reserves in the previous period, expressed in currency units.

Finally, export volumes (similarly to import volumes) are assumed as being impacted by relative prices of tradable goods while net capital flows are assumed as exogenous:

$$X = X_{-1} + (X_{-1} + c)\Delta\hat{e} - c\Delta P_d \quad (13)$$

$$\Delta F = \Delta\bar{F}(1 + \Delta\hat{e}) \quad (14).$$

By the latter additions equation (9) and (11) can be reformulated to eliminate the problem with the missing instrument.

$$\Delta R = v_{y-1}(1-\theta)\Delta P_d + (v_{y-1}\theta - R_f^f)\Delta \hat{e} + v\Delta \bar{y} - (\Delta \hat{D}_p + \Delta \hat{D}_g) \quad (9')$$

$$\Delta R = (X_{-1} - Z_{-1} - \Delta \bar{F}) + [X_{-1} - Z_{-1} - \Delta \bar{F} + (b+c)]\Delta \hat{e} - \alpha \Delta \bar{y} - (b+c)\Delta P_d \quad (11')$$

This model is referred to as the expanded Polak model. It is analyzed in the same way as the basic model, the only difference being that the abscissa in Chart 1 represents the change in domestic prices ( $\Delta P_d$ ) alone. Essentially, controlling the change in the exchange rate ( $\Delta \hat{e}$ ) makes it possible for *BP* line described by equation (11') to move so that higher values of forex reserves can be achieved for a given level of inflation. This allows for eliminating the requirement for setting restraints to domestic credit and inflation only in combination so that they would always lie on *BP* line. Points outside *BP* (for example point *B*) can be achieved through a change in the exchange rate so that *BP* passes through point *B*, and control over domestic credit growth can move *MM* to achieve the desired target.

The general structure of the model used by the IMF is given in the table below.

**Table 1**

**STRUCTURE OF THE IMF MODEL**

Targets	Endogenous variables	Exogenous variables	Policy variables	Parameters
$\Delta R$	$\Delta Y$	$\Delta y$	$\Delta D$	$v$ – velocity of currency in circulation
$\Delta P_d$	$\Delta M$	$P_f$	$\Delta e$	$a$ – marginal propensity to import
	$\Delta P$	$X$		$\theta$ – share of imported goods in the price index
	$Z$	$Z_{-1}$		$b$ – price elasticity of imports
	$\Delta F$	$\Delta F_p$		$c$ – price elasticity of exports
	$T - C_g$	$\Delta F_g$		

Constraints on domestic credit growth set by the policy variable ( $\Delta D$ ) usually take the form of ceilings. The IMF practice with standby programs has shown that instances of credit ceiling abuse are often due to excessive growth in credit to the public sector. It is therefore common practice to set constraints only to credit to the public sector, whereby credit to the private sector can be treated as an auxiliary policy variable ( $\Delta D_p^*$ ). This target is achieved by assuming public sec-

tor credit growth as a policy variable:

$$\Delta \hat{D}_g = \Delta D - \Delta D_p^* \quad (15).$$

Due to absent or underdeveloped stock markets in the countries implementing adjustment programs the relationship between GDP and credit to private sector is generally positive and sufficiently strong. This gives grounds for assuming similar growth rates in nominal GDP and credit to the private sector, making it possible to formulate a simple function of credit demand:

$$\Delta D_p^* = (D_p / Y)_{-1} \Delta Y \quad (16).$$

As regards budgetary restraints to the nonfinancial public sector equation (16) fixes explicitly the admissible deficit since the modification (2') of equation (2):

$$T - C_g \equiv \Delta \bar{F}_g - \Delta D_g \quad (2')$$

means that the public sector will have to adjust to the fixed deficit by increasing revenues and/or decreasing expenditures.

As the general structure of the model shows, it is focused on impacting demand rather than supply. Most IMF adjustment programs focus on reducing absorption, considerable attention being paid to constraining government expenditures. This approach is associated with externalities – restrictions on absorption affect income. Although the IMF is fully aware of the negative effects that a continuous contraction in demand may have, adjustment programs are still being applied by a number of countries. Macroeconomic stabilization, being of decisive importance, is pointed out as a reason for applying adjustment programs. It is assumed (although unproved) that favorable effects of internal and external equilibrium are significantly greater than potential income losses.

The other approach in designing adjustment programs involves influence on monetary aggregates. An understanding of the monetary nature of inflation underlies this approach. Provided aggregate spending exceeds the production capacity of the economy (under the existing price level) prices will increase to the equilibrium level. Usually this is effected by decreasing the real value of financial assets. Conversely, the price level may decline (if prices are flexible tending downward), and (which is more likely) unemployment may rise or/and the degree of production capacity utilization may fall, resulting in a reduced factor productivity.

It is an elementary truth that two divergent targets cannot be

achieved employing one and the same instrument. Achievement of internal and external balance entails measures reducing internal spending as well as measures aimed at restructuring general (internal and external) spending. Again, this is the real expression of the well-known Tinbergen rule<sup>10</sup> that the number of employed instruments may not be less than the targets pursued. If absorption exceeds output, decreased internal demand releases inflationary pressure but this will hardly contribute to simultaneous internal and external balancing. The implementation of the policy intended to both internal and external equilibrium will result in a sizable income loss and increased social tension. In this case measures aimed to strengthen demand for local goods and services without increasing absorption should be taken. This can be achieved by implementing expenditure switching policy, particularly by a change in the exchange rate.

Combined implementation of restrictive and expenditure switching policies poses the question of dichotomy between tradable and non-tradable goods which is considered an important analytical instrument in studying depreciation or devaluation effects of the local currency<sup>11</sup>. Therefore, the philosophy of adjustment programs explains the reason for employing combined measures intended to reduce internal demand on the one hand, and measures encouraging exports and depressing imports, on the other hand. In turn, expenditure switching policy includes various measures (a change in the exchange rate, price liberalization, lifting trade and nontrade constraints on foreign trade), intended to eliminate price discrimination of local goods and services.

In cases when GDP is smaller than targeted due to inefficient resource allocation, the expenditure switching policy in respect of demand may also have a positive effect on the volume of output improving output structure in terms of supply. Problems in designing and applying growth-oriented programs are associated with the fact that expenditure switching policy entails a number of structural changes having uncertain effects and normally requiring a longer period of time.

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<sup>10</sup> Tinbergen, J. *On the Theory of Economic Policy*, North Holland, 1952.

<sup>11</sup> The analysis aims at distinguishing tradable and nontradable goods rather than imported and exported goods as it is assumed that *terms of trade* are exogenously set. See Swan, Trevor. *Economic Control of Dependent Economy*, Economic Record, vol. 36, 1960.

## 2. The World Bank Approach

The World Bank approach in applying expenditure switching policy implies the use of effects from income reallocation. In contrast to IMF programs focused primarily on achieving balance of payments equilibrium, the World Bank is mostly involved in development projects accenting on medium-run economic growth. National accounts are tied to the balance of payments. Concurrently, any emerging deficits and possibilities for deficit financing should be carefully monitored. The World Bank basic model focuses entirely on the real sector. Inflation is not determined by the model itself (inflation is not an endogenous variable), and it is exogenously set. To simplify the presentation of the model structure and comparison with the IMF model, it is assumed that prices are constant ( $\Delta P = \Delta P_d = \Delta P_f = 0$ ). In the context of general macroeconomic model, the World Bank approach requires inclusion of four additional equations:

1. One of the major exogenous variables in the model is the ratio of investment growth to GDP (ICOR – *incremental capital output ratio*).

$$\text{ICOR}_t = \frac{I_{t-1}}{Y_t - Y_{t-1}},$$

where

$I$  is investment (gross capital formation), and  $Y$  is the gross domestic product.

This relationship is fundamental, as a significant deviation in its setting predetermines the failure of the entire model. Simplicity is the major advantage of this approach, since no building of an individual investment function is required in which capital stock occur as a variable<sup>12</sup>. However, simplification increases the risk of errors since important relationships are ignored:

- Increasing capacity utilization has a strong effect on ICOR forecast. For example, other conditions being equal (i.e. if no increases in capital stock and investment occur) greater loading of existing capacities will result in greater output volume and GDP respectively, prompting a decrease in ICOR values. Obviously, expectations for a change in intensity of utilizing existing production capacity should be taken into account if ICOR is exogenously set.

<sup>12</sup> Since evaluation of capital stock is difficult, it is recommendable to use information on investments as it is much more reliable. If data on capital stock is comparatively reliable, the relationship between capital stock and investments is expressed through the identity  $K_t = K_{t-1} + I_t - A_t$ , where  $K$  is the capital stock,  $I$  investment and  $A$  amortization.

- The structure of investment also has a strong effect on ICOR. Since the dynamic relation between investment and GDP concerns only two consecutive periods, it should not be expected that investment in infrastructure projects, and that directed in output would equally relate to growth. The same refers to the sectoral structure of investment. Appropriate setting of ICOR necessarily entails distinguishing investment as its relationships to future growth significantly differ.

It is assumed that the ratio of investment growth to output growth, i. e. ICOR, is predetermined by past values or it may be forecast on the basis of changes in the technological level of output. The concept of ICOR allows for expressing output volumes as a function of the amount of investment:

$$\Delta y^* = \rho^{-1} \Delta K \quad (17),$$

where

$\Delta K$  is investment (capital growth) and  $\rho$  is ICOR.

This equation allows to determine growth based on available investment opportunities, or required investment to achieve the targeted growth rate.

2. Exports are set exogenously.

3. The relationship between GDP and imports is assumed as stable. The equation is similar to the IMF model equation (10) though excluding price changes:

$$Z = \alpha y^* \quad (10'')$$

4. The last equation supplementing the basic model includes the function of private sector savings. Under a set savings parameter the function of private sector consumption may be derived:

$$C_p = (1-s)(y^* - \hat{T}),$$

where  $s$  is the ratio of private sector savings to disposable income.

Obviously, there are no significant differences between IMF and World Bank approaches regarding the external sector treatment. Major differences are as follows: the IMF uses the monetary approach explaining balance of payments imbalances, while the World Bank focuses on the real sector determining medium-term prospects for economic growth. The hypothesis of time constancy of investment growth/output growth ratio is based on a strongly restrictive assumption about the nature of the aggregate production function. Commonly, treatment of ICOR as a constant value is associated with the production function, with factors of production having constant weights, i. e. factor substitu-

tion is excluded. If factor substitution is assumed, ICOR will be a function of the relationship between factor labor productivity and capital productivity, provided that general factor productivity is constant.

Problems associated with exogenously set ICOR resemble the problems related to setting the velocity of currency circulation in the IMF model. Common in both cases is that *constancy* requirements are not absolute, provided that the direction and intensity of changes in constancy requirements can be grounded and predicted to a large extent. The theory of economic growth factors is much richer than ICOR. The effects of technical progress and human capital are as important as investment. Technically, the impact of these factors can be incorporated into ICOR. However, this requires precise evaluations and high degree of economic intuition.

Based on the World Bank approach the basic identity (5) of income can be rewritten as

$$\Delta K = (y^* - \hat{T} - C_p) + (\hat{T} - \hat{C}_g) + (Z - \bar{X}) \quad (19),$$

where internal investment is considered as a sum total of private and public sector savings plus the inflow (use) of external savings. Substituting the private sector consumption function (18) and the import demand function (10") in the latter equation, we obtain

$$\Delta K = s(y^* - \hat{T}) + (\hat{T} - \hat{C}_g) + (\alpha y^* - \bar{X}) \quad (20).$$

Transforming the latter equation in order to outline growth, an alternative equation on investment based on the basic equation on income can be derived:

$$\Delta K = (s + \alpha)y^* + (1 - s)\hat{T} - \hat{C}_g - X \quad (5').$$

This equation shows the positive relationship between income and investment (parameters  $\alpha$  and  $s$  are positive) through the aggregate demand curve under exogenously set changes in the price level. Income growth [ $y^*$ ] is accompanied both by increased domestic savings (under preset parameter  $s$ ) and greater use of external savings, insofar as the marginal propensity to import [ $\alpha$ ] is positively linked to income. In other words, savings growth (both internal and external) results in a proportional increase in investment.

In respect of supply, income is determined by equation (17) on the relationship between production and investment which can be transformed as

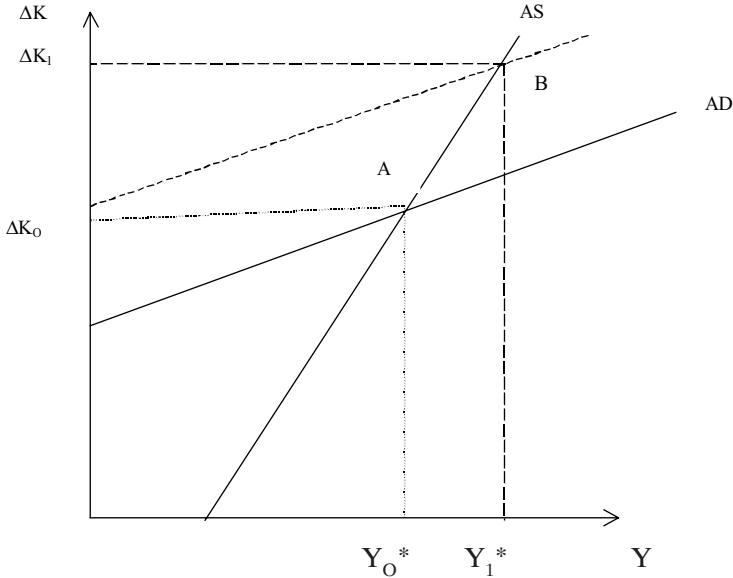
$$\Delta K = \rho y^* - \rho y_{-1} \quad (17').$$

Consequently, we obtain one more equation expressing the positive

relationship between income (production) and investment which can be graphically presented.

Chart 2

**PRODUCTION AND INVESTMENT ACCORDING TO THE WORLD BANK MODEL**



The slope of the line displaying aggregate supply ( $AS$ ) is determined by ICOR [ $\rho$ ] from equation (17'), while the slope of aggregate demand ( $AD$ ) is determined by the sum total of  $(s + \alpha)$  from equation (5'). As empirically obtained values of [ $\rho$ ], based on a number of cross-country studies, vary between four and seven, and parameters  $s$  and  $\alpha$  are positive but less than one, obviously the slope of the  $AS$  is larger than the slope of  $AD$ . The government can move  $AD$  implementing particular economic policy measures intended to change internal savings. In the reviewed model (equation 5') the government has at its disposal only tax revenues and public sector expenditure. If point  $A$  is in equilibrium corresponding to a particular investment volume ( $\Delta K_0$ ) under the targeted output volume ( $Y_0^*$ ), other conditions being equal, a reduction in public sector expenditure will shift  $AD$  upward left, and the new point of equilibrium ( $B$ ) will correspond to a higher output vol-



ume ( $Y_1^*$ ) and increased investment ( $\Delta K_I$ ). If the interest rate is also included in the model, corresponding to a much greater degree to reality, the government will have one more instrument to influence aggregate demand. The eventual inclusion of the exchange rate as an instrumental variable not only will move the aggregate demand curve up or down but it will also change the curve slope, as any exchange rate movement affects the marginal propensity to import ( $\alpha$ ). An increase in taxes prompts a growth in public sector savings and a fall in private sector savings. The general effect on aggregate demand will tend to decline, since the private sector reacts to the lower disposable income by reducing consumption.

The policy variable of income growth ( $\Delta Y^*$ ) can be coordinated with the policy variable of foreign exchange reserves growth ( $\Delta R^*$ ), provided that net capital flows are controlled or a trouble-free access to capital markets is assumed. In this case net capital flows may be treated as an instrumental variable.

$$\Delta \hat{F} = \bar{X} - \alpha y^* - \Delta R^* \quad (21).$$

The formulated model may be presented in accordance with the standard classification of variables.

**Table 2**

**STRUCTURE OF THE WORLD BANK BASIC MODEL**

Targets	Endogenous variables	Exogenous variables	Policy variables	Parameters
$\Delta y^*$	$Z$	$X$	$C_g$	$s$ – private sector savings to disposable income
$\Delta R^*$	$\Delta K$		$T$	$\alpha$ – marginal propensity to import
	$C_p$		$\Delta F$	$\rho$ (ICOR)

As it has been already mentioned, the World Bank approach draws its theoretical fundamentals from the two-gap growth model. Provided there are any constraints on foreign financing, the latter equation (21) will actually present limited growth opportunities determined by equations (5') and (17'). This group of models including constraints on net capital flows, are known in theory as two-gap models. In this respect RMSM-X model is basically used to estimate the implications on economic growth under alternative levels of foreign financing.

However, from a technical point of view, inclusion of constraints on

net capital flows makes the model overdetermined,<sup>13</sup> and the removal of this defect requires inclusion of an additional policy variable: the exchange rate. Similar to the IMF approach, import volumes depend not only on income and marginal propensity to import but also on exchange rate changes ( $\hat{\epsilon}$ ) and elasticity of imports regarding changes in relative prices.<sup>14</sup> Exports are no longer a purely exogenous variable and are also dependent on exchange rate movements and elasticity of exports to changes in relative prices.

$$Z = \alpha y^* - b\hat{\epsilon} \quad (22)$$

and

$$X = c\hat{\epsilon} \quad (23).$$

Therefore equation (21) describing net capital flows modifies into

$$\Delta F = -\alpha y^* + (b + c)\hat{\epsilon} - \Delta R^* \quad (24).$$

As a result, the model is entirely determined since exchange rate changes can accommodate the income growth target and constraints on foreign financing. Prior to the inclusion of the exchange rate (under restrictions on capital flows), the model contained only two endogenous variables ( $Z$  and  $C_p$ ) and three independent equations.

### 3. The IMF and World Bank Merged Model

Based on basic macroeconomic dependencies (equations 1 ÷ 5) and divergent approaches applied by the IMF and the World Bank in specifying particular macroeconomic models, *Khan, Montiel and Haque*<sup>15</sup> propose a model combining the advantages of both approaches. The key relationship between the external sector and monetary and credit aggregates is sustained, while the disadvantage associated with the lack of growth component and the impact of changes in relative prices is removed.

<sup>13</sup> Restriction on foreign financing (i.e. a deficit in respect of the external sector) results in overdetermination since internal savings can be obtained in two different ways. Under a set growth rate ICOR synonymously determines required investments. Provided the access to external savings is limited, internal savings appear as a residual value under already determined investment volume. However, there is no guarantee that the obtained internal savings correspond to those obtained from equation (18).

<sup>14</sup> As prices in the simplified model are assumed as constant, the change in the nominal exchange rate can also be interpreted as a change in the real exchange rate.

<sup>15</sup> See *Khan, M. S., P. Montiel and N. Haque (1990). Adjustment with Growth: Relating the Analytical Approaches of the IMF and the World Bank. Journal of Development Economics, #32, North-Holland, Khan, M. S., P. Montiel and N. Haque, eds. (1991) Macroeconomic Models for Adjustment in Developing Countries. IMF, Washington, D.C.*

The merged model includes three major segments.<sup>16</sup>

### *Prices and Output*

GDP growth is set through its link with investments (ICOR) based on equation (17):

$$\Delta y^* = \frac{\rho^{-1} \Delta K}{1 + \Delta P} \quad (17'')$$

where the nominal amount of investment is deflated by the increase in the general price level and GDP growth is a policy variable.

Using identity (1) describing budget constraints on the private sector, investment can be showed as:

$$\Delta K \equiv s(Y_{-1} + \Delta Y - \hat{T}) - \Delta M^d - \Delta F_p + \Delta \hat{D}_p \quad (1')$$

where private sector savings are showed as a function of disposable income.

Budget constraints on the public sector are set using the basic identity (2). The difference is that taxes [ $T$ ] and government spending in the basic model are considered as instrumental variables [ $C_g$ ].

$$(\hat{T} - \hat{C}_g) - \Delta F_g + \Delta D_g \equiv 0 \quad (2')$$

Similarly to the approach (6') used by the IMF, changes in the nominal amount of GDP include real and inflationary components with the real growth being a policy variable and not exogenously set as in the IMF approach:

$$\Delta Y \equiv P_{-1} \Delta y^* + \Delta P y_{-1} \quad (6'')$$

In the latter identity the change in the general price level is set similarly to equation (12), with the change in the internal price level considered as a policy variable:

$$\Delta P = (1 - \theta) \Delta P^*_d + \theta \Delta \hat{e} \quad (12')$$

### *Monetary Sector*

The velocity of currency circulation [ $v$ ] reflecting money demand is assumed as an exogenously set parameter used to relate monetary aggregates to the nominal GDP:

$$\Delta M^d = v \Delta Y \quad (7)$$

Money supply is obtained from the banking sector balance sheet (equation 4) under a targeted change in forex reserves and limited

<sup>16</sup> The name of variables and numbering of equations are retained with a view to following the economic logic in merging both models.

growth in credit to the private and public sectors.

$$\Delta M^s \equiv \Delta R^* + \Delta \hat{D}_p + \Delta \hat{D}_g \quad (4')$$

Money market equilibrium is set as an equation between money demand and money supply.

$$\Delta M^s = \Delta M^d = \Delta M \quad (8).$$

### *External Sector*

The purpose of changing forex reserves is described by the balance of payments as a balance between current and capital accounts:

$$\Delta R^* \equiv (X - Z) - (\Delta F_p + \Delta F_g) \quad (3').$$

Exports of goods and services are dependent on exchange rate changes the internal price level and a parameter reflecting export elasticity to changes in relative prices, while changes in net capital flows in the public and private sectors are exogenously set in units of foreign currency.

$$X = X_{-1} + (X_{-1} + c)\Delta\hat{e} - c\Delta P_d \quad (13)$$

$$\Delta F_p = \Delta \bar{F}_p (1 + \Delta\hat{e}) \quad (14')$$

$$\Delta F_g = \Delta \bar{F}_g (1 + \Delta\hat{e}) \quad (14'').$$

Imports depend on GDP growth (income) as well as on the exchange rate and relative prices:

$$Z = Z_{-1} + (Z_{-1} - b)\Delta\hat{e} + b\Delta P^*_{d} + \alpha\Delta y^* \quad (10'').$$

**Table 3**

### STRUCTURE OF THE IMF AND WORLD BANK MERGED MODEL

Targets	Endogenous variables	Exogenous variables	Policy variables	Parameters
$\Delta y^*$	$\Delta Y$	$X_{-1}$	$T$ (or $C_g$ )	$\rho$
$\Delta P_{d^*}$	$\Delta P$	$Z_{-1}$	$\Delta \hat{D}_p$	$\theta$
$\Delta R^*$	$\Delta M^s$	$\Delta \bar{F}_p$	$\Delta \hat{D}_g$	$\nu$
	$\Delta M^d$	$\Delta \bar{F}_g$	$\Delta \hat{e}$	$\alpha$
	$X$			$b$
	$Z$			$c$
	$\Delta F_p$			$s$
	$\Delta F_g$			
	$\Delta K$			
	$T$ (or $C_g$ )			

The merged model structure consists of 13 equations, including five identities. Given the seven parameters set (estimated), these equations synonymously determine the values of ten endogenous variables and three policy variables depending on eight exogenous and instrumental variables. This is the so-called *positive mode* to solving the system of equations used in building basic scenarios of the program which assumes stability in instrumental variables. The *programming mode* which is used in formulating the program's final version starts with setting policy variables (which actually transform into exogenous). In this case only two instrumental variables can be set at random, the remaining instrumental variables losing their independence, being determined by the model.

As it has been already emphasized, IMF and World Bank approaches have their own advantages and disadvantages. The attempts to build a merged macroeconomic model are intended to remove disadvantages while sustaining simplicity to a maximum degree. In the basic IMF model also known as 'financial programming,' variables concerning the real sector are determined outside the model, while in the World Bank model known as RMSM-X, inflation and changes in monetary aggregates do not have direct effect on growth. The merger of both approaches includes growth, inflation and forex reserves in the system of equations, formally transforming them into endogenous variables, with the government having at its disposal (in the form of instrumental variables) both fiscal and monetary variables. However, the merged model retains drawbacks and constraints typical of the model's two components. Some of these drawbacks, e.g. stability of the function of money demand and ICOR, have been already discussed above. Problems associated with the degree of conventionality and stability of other parameters should not be underestimated. In principle, stability of parameters in implementing any type of economic policy is a key factor for reliability and forecasting strength of any macromodel (*Lucas critique*). In addition to unavoidable problems associated with stability of parameters, at least three more principle issues deserve attention.

The *first* refers to financial aspects of the model. Monetary sector (even in its extended version, i.e. including both the central and commercial banks) is presented only through variables concerning the amount of money, credit and forex reserves. No other forms of financial assets are taken into account, and there is plenty of the financial sector of them in the economy. Therefore, the transmission mechanism of influence of the financial sector on the real sector is reduced to a

level drifting it far away from the real functioning of the economy. The lack of interest rates (an important element of the transmission mechanism) in the model is particularly sensitive among the set of instrumental variables.<sup>17</sup>

The *second issue* is associated with the assumption that prices continuously adjust thus maintaining money market equilibrium, that is at any moment money demand matches money supply. Unsoundness of this assumption is obvious as occurrence of lags in price adjustment is undoubtful.

The *third issue* stems from the fact that factors of production are not included in the function of growth. For instance, the lack of a wage level (change) is extremely sensible provided local currency devaluation is an important element of the implemented program. The objective, that is the desired change in the exchange rate, proves impossible to be realized using only fiscal and/or monetary instruments. This requires inclusion of additional equations establishing the relationship between inflation and monetary incomes (wages) to make indications of the employment level, an essential element of the potential GDP amount.

#### 4. Criticism of Applied Approaches

It can be definitely concluded that IMF and World Bank models and adjustment programs based on these models are often under the lash. The criticism sharpens in periods of international financial crises. A clear example of this was the Bretton-Woods financial system disruption in the early 70s. The same happened as the debt crisis burst out in the early 80s and the socialist economic system disrupted at the end of the decade. As a result the 'clients' of the IMF and World Bank dramatically increased. After the financial crises in Mexico (1995) and Asia (1997 – 1998), IMF and World Bank adjustment programs were much strongly criticized.

Most of the criticism has a populist character as it reflects the inconsistency between the public feeling and expectations, and the real results from implemented adjustment programs. It is absolutely natural for the public to expect high growth rates, low inflation, increased employment, social security, reduced taxes, etc. In the short run, realiza-

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<sup>17</sup>The lack of interest rates is even more surprising taking into account that one of the major and traditional elements in IMF adjustment programs is the provision of positive real interest rates used to influence the volume of internal savings.

tion of public expectations prove impossible but the above goals are always set in medium- and long-term programs. In a relatively short period adjustment programs can only overcome economic disequilibrium or at least reduce it. This can be achieved by:

- providing external financing;
- pursuing conservative policy in respect of internal demand;
- implementing structural reform.

These three elements constitute the core of any program, and the models and their specification for a particular country are rather a matter of technical skills.

Another critical trend concentrates on the theoretical ambiguity of the models. They cannot be *synonymously* associated with any modern trend in the economic theory. Undoubtedly, the Keynesian spirit is dominating but there are also elements of neoclassicism, monetarism and even the theory of rational expectations. Eclecticism of models causes some problems, insofar as the models are of structural type. This requires indisputable causality relationship between variables which is not always available. However, the drawbacks of the eclectic approach are offset by the goals set in programs. Macroeconomic models of the IMF and World Bank are not intended to approve or reject a particular economic theory. Therefore, no serious claims should be laid in respect of theoretical clearness.

Most often the models are criticized for insufficient specification of any individual case which results in identical recommendations both by type and 'dosage'. Unfortunately, it is impossible to check empirically the reliability of this hypothesis since no model specifications for other countries are available. Regarding the complete identity of recommendations, this could hardly be the case. Studies carried out by the IMF and independent organizations reveal<sup>18</sup> that 'dosage' depends both on the type and degree of disequilibrium in the economy. For instance, the Latin American crisis in the early 80's was characterized by huge fiscal deficits resulting in chronically high inflation, slowdown, fast devaluation of the national currency and balance of payments deficits. The measures which had been taken in these countries were quite different

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<sup>18</sup> See for example, *Dornbusch, R. Policies to Move from Stabilization to Growth*, 1991, World Bank Research Report; *Edwards, S. The IMF and the Developing Countries: A Critical Evaluation*, 1989, Carnegie-Rochester Conference Series on Public Policy, #31, Elsevier, North-Holland; *Dell, S. Stabilization: The Political Economy of Overkill*, 1982, World Development, Oxford University Press; *Mussa, M. and M. Savastano. The IMF Approach to Economic Stabilization*. IMF Working Paper, WP/99/104, July 1999.

from those initiated against the financial crisis in some Asian countries. In Asian countries the problems reflected mostly poor bank supervision under conditions of a significant foreign investment inflow which prompted a rapid increase in short-term liabilities and devaluation pressure.

In respect of the third important element in IMF and World Bank programs (structural reforms) macromodels face serious difficulties in choosing the most appropriate way of including the models in the system of equations. First of all the issue of the formal description of the models should be solved. Some of required structural changes (liberalization or fixing of the exchange rate, providing positive interest rates, maximum admissible current account deficits and/or budget deficit, etc.) are comparatively easy to be carried out as this is a matter of exogenous or endogenous setting. A number of structural changes (e.g. trade liberalization, improvement of bank supervision and accountability, establishment of market and nonmarket institutions, acceleration of privatization, etc.) are not subject to formal description. However, these changes have a significant impact on the economy also in the short run entailing their indirect inclusion in the models, which makes them highly vulnerable to criticism.

## 5. Evaluation of the Results from Implementation Adjustment Programs

The history of economic reform in Bulgaria is closely tied to the history of Bulgaria's relationships with the IMF and World Bank. Bulgaria has signed five standby agreements and one Extended Fund Facility with the IMF. The general feeling is that experience and results of implemented IMF programs (at least until 1997) are not encouraging. This is clearly evidenced by the fact that only two (the first and the last) of the five agreements were fully implemented. To this end, several important questions arise: the reason for the failure of most of the programs; if the reason for the failure of these programs was due to an inadequately chosen approach (model) or the model was good but inconsistently implemented, with governments systemically failing to fulfill undertaken commitments.

Special attention was paid to criticism that programs are stereotyped based on restrictive monetary and fiscal policies, inconsistent with the specificity of an individual country and disregarding growth problems and social problems associated with them. Regarding gener-



ally unsatisfactory results entailing the introduction of a currency board as an extreme measure to curb chronic inflation, it is quite easy to join the cohort of critics considering IMF models obsolete and inefficient.

In order to give adequate answers to the posed questions, it is necessary, though in brief, to review the major goals and results of all implemented programs.

However, the following specifications should be made prior to the review.

- *First*, it is quite clear that there is no perfect model. Any model is based on a number of assumptions associated with a particular economic theory. In this case the assumptions are based on the Keynesian concepts of the government role and position in economic development. Perhaps, this is the bone of contention as adherents of traditional Keynesian theory have been progressively losing ground in recent years.
- *Second*, IMF and World Bank programs are related to the Keynesian theory inasmuch as they seek to ensure government support in implementing required economic reforms. In this respect practical implementation of the programs proves impossible relying on monetary and fiscal policy instruments. As a rule (without any exceptions) countries requesting support from international financial institutions are underdeveloped, developing or transition economies with no experience in market economy and having no market-oriented institutions. No reliable statistical information is available on most of the countries. Under these conditions, design of macromodels taking into account fluctuations in the business cycle as a result of technological shocks or including variables reporting changes in preferences of economic agents and their rational expectations is absolutely impossible.
- *Third*, IMF and World Bank models are based on generally acknowledged and indisputable economic interdependencies. The models are deliberately simplified and based on a limited number of parameters, and rely to a great extent on instrumental and exogenous variables which should be treated as trends rather than as particular values.
- *Fourth*, IMF and the World Bank are institutions with a specific public goal: supporting balance of payments of countries experiencing serious temporary or chronic deficits and promoting economic growth by implementing specific projects. It is quite

natural to extend loans under terms and conditions ensuring loan repayment and avoiding recurrences. There is hardly a gloomier prospective for a country than to become a permanent 'client' of international financial institutions. Despite serious criticism there is no other financial organization to propose a better approach or more efficient programs. Recently there have been appeals to limit or even stop the IMF activity as the Fund's measures are always delayed and inadequately directed. It is often heard that it would be more healthy for countries experiencing financial difficulties to overcome these difficulties by borrowing funds from financial markets.

The efficiency of implemented standby programs may be evaluated by using various criteria and approaches:<sup>19</sup>

- The *before – after* approach used to evaluate country's major macroeconomic indicators prior to the launch of the program and those in the course of program implementation. However, the obvious simplicity of this approach is misleading as it assumes that all other parameters (i. e. macroeconomic variables beyond the scope of a particular program or set exogenously) stay unchanged. Since negative shocks can occur at any time (e.g. worsening terms of trade, increase in international financial market interest rates, unfavorable weather conditions), evaluations based on this approach may be (deliberately or not) intentional, in so far as all changes are associated with the implemented program. The problem with lags in program variables' reaction is also essential.
- The *with – without* approach based on comparing economic results of a particular country (or group of countries) implementing the program with results in another country (or group of countries) with similar problems which is not implementing such a program. This approach overcomes the disadvantage of the previous one where results from an implemented program are hard to be differentiated from autonomous and/or external factors. However, the problem with unequal starting conditions emerges, that is control country groups are not and may not be accidentally chosen, since countries seeking financial support

<sup>19</sup>This issue is thoroughly developed in: Haque, N., and M. Khan. *Do IMF-Supported Programs Work? A Survey of the Cross-Country Empirical Evidence*. IMF Working Paper, WP/98/169, Dec. 1998. Approaches for evaluating the efficiency of implemented programs described below are based on the cited paper.

are generally in worse economic state. This also creates conditions for biased evaluations as far as it proves difficult to filter out program results from those due to different **starting** conditions. In such comparisons differences in the effect and direction of exogenous factors should also be taken into account.

- The **generalized** evaluation approach includes comparison of countries or country groups implementing and not implementing programs after the starting conditions and divergent effect of external factors have been eliminated. This approach is complicated and its application limited as it is based on econometric techniques intended to limit the model to equations (similar to equation [11']) representing the reduced form of the model. The results from solution of policy variable equations are compared, provided the government reaction in the countries not implementing the program is known on the basis of the reduced form of the model.
- The **comparison of simulations** approach compares simulated macroeconomic indicators as a result of an implemented standby program with the simulations resulting from the implementation of another type of economic measures. This approach directly affects the quality of the applied model, since, unlike the previous comparison approaches, simulations are used instead of exact data considered as results from the implemented program. Difficulties in applying this approach are associated with the need for a well approbated econometric model suitable for simulation solutions, and the major problem relates to the well-known Lucas critique, postulating that parameters cannot stay stable under significant changes in the economic policy pursued.

Evaluation of results from particular IMF and World Bank-supported programs implemented in Bulgaria will be based on the first (before – after approach) and partly on the fourth (the comparison of simulations) approach. The latter requires a review of the validity of major assumptions and primarily of the correctness and stability of used parameters. Based on statistical data for the 1990 – 1998 period the following computations are made regarding:

- the stability of money demand function (velocity of currency circulation);
- the strength and stability of the relationship between import volumes and GDP;

- inflation dependence on changes in the exchange rate and the share of imported goods in the consumer basket;
- the validity of the hypothesis of a statistically important relationship between real effective exchange rate indices and export volumes;
- the accuracy of exogenous setting of GDP growth and net capital inflow;
- basic assumptions in compiling the state budget revenue side (buoyancy).

After reviewing the correctness of above computations, programs should be compared with obtained results. Estimations should be made of the extent to which discrepancies are due to incorrectly set exogenous values, the extent to which they are due to violating preset requirements (instrumental variables) controlled by the government, as well as of the extent to which these discrepancies reflect inherent and admissible errors typical of any model. Only after that it can be argued that the model is wrong.

Evaluating the results from the implemented standby program, it should be taken into account that programs do not coincide with calendar years which impedes the analysis of statistical data to a certain extent.

The **first** standby agreement with the IMF was one-year, covering the period between 15 March 1991 and 15 March 1992. The agreement provided for a purchase of SDR 279 million and SDR 60.6 million under the Compensatory and Contingency Financing Facility (CCFF) intended to compensate for the increased expenses on exports of energy inputs associated with the Persian crisis. As a result of nonfulfillment of the parameters under the agreement, the last tranche was not extended.

The **second** standby agreement was also one-year and provided for a purchase of SDR 155 million. The agreement became effective as of 17 April 1992. The last tranche under this agreement was not disbursed as well.

The **third** standby agreement (one-year) was signed on 11 April 1994, totaling SDR 69.7 million. In December 1994 the agreement was revised and extended by an additional SDR 69.7 million as a result of the agreement with the London Club creditors concluded in June 1994. The Systemic Transformation Facility (STF) of SDR 116.2 million concluded in April was also under the standby program implemented in this period. The last tranche of SDR 23.2 million was not disbursed.

The **fourth** agreement was signed on 19 July 1996 and provided for

a purchase of SDR 400 million for a period of 20 months (to 18 March 1998). The agreement was terminated after the disbursement of the first tranche of SDR 80 million.

The **fifth** standby agreement was signed on 11 April 1997 and provided for a purchase of SDR 371.9 million for a period of 14 months. The CCFF of SDR 107.6 million was also included in the fifth standby agreement.

The **last** standby agreement with the IMF was signed on 25 September 1998 for a three-year period. Financing under this agreement is expected to total SDR 627.6 million. As the new agreement is in progress, the results of its implementation have not been discussed.

Besides the agreements with the IMF between 1991 and 1998, the World Bank provided financing under special development projects.<sup>20</sup> Funds disbursed by year and project are as follows:<sup>21</sup>

Project	Effective as of	Completed on	Amount (million USD)
SAL I (Structural Adjustment Loan)	IX.1991	IX.1994	250
DDSR (Debt and Debt Servicing Loan)	IX.1994	XII.1994	125
ADP (Agricultural Development Loan)	VII.1995	VI.1998	50
PIEF (Private Investment and Export Finance)	I.1994	VI.1998	55
RL (Rehabilitation Loan)	X.1996	VII.1997	30
CIRL (Critical Imports Rehabilitation Loan)	VIII.1997	VI.1998	40
FESAL I (Financial and Enterprise Sector Adjustment Loan)	I.1998	IV.1998	100
TAL (Technical Assistance Loan)	I.1992	VI.1999	17
Telecommunications	XII.1993	VI.1999	30

<sup>20</sup> For a more detailed information about the World Bank projects in Bulgaria, see the website of the World Bank representation in Bulgaria: <http://www.worldbank.bg>.

<sup>21</sup> Besides these projects which have been finished, there are also programs underway, with funds under these programs still being utilized. Loans agreed under these programs total USD 582 million, including USD 321 million until the end of 1998.

**Table 4**

**EXOGENEOUS AND POLICY VARRIABLES IN STANDBY PROGRAMS**

Agreement	GDP growth (%)		Exports (billion USD)		Forex reserves (million USD)		BGN/USD exchange rate		Velocity of currency circulation		Inflation Dec. - Dec. (%)		
	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	
First	-11	-11.7	6.6	3.7	625	353.4	17	21.8	2.12	1.76	234	473.6	
Second	-4	-7.3	3.9	3.9	1350	944.8	23.7	24.5	1.39	1.59	44	79.4	
Third	-1*	-2	1.8	4.2	3.9	1089	1006.4	59.6	66.0	1.62	1.59	74	121.9
Fourth	0	-10.1	4.9	4.9	1327	488	150	487.4	1.83	1.33	105	310.8	
Fifth	-7.4	-6.9	5	4.9	1947	2483	1700	1776.5	3.56	2.83	566	578.4	

**Table 5**

**PERFORMANCE CRITERIA**

Agreement	Growth in banking system NDA (%)		Real growth in credit to government sector (%)		Real growth in credit to nongovernment sector (%)		Budget balance (% of GDP)		Growth in BNB NFA (million USD)	
	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
First	-103	-98	-65.0	-79.0	-48.4	-62.8	-3.5	-8.4	534	310.6
Second	-	-	3.0	6.5	-9.7	-25.8	-4.2	-5.2	-	-
Third	-27.4	-4.3	-24.0	-0.3	-24.1	-40.7	-6.3	-5.7	-600	-125.2
Fourth	54.1	139.4	-36.0	-22.6	-45.0	-45.4	-4.7	-10.2	-235	-620
Fifth	102.1	-24.8	-75.5	-73.2	-60.0	-32.2	-4.1	-2.9	620	1662

\* Net domestic assets.

\*\* Net foreign assets.

**Table 6**

**MAJOR ECONOMIC VARIABLES**

Agreement	BOP current account (% of GDP)		Real growth in wages (%)		Broad money growth (%)		Imports (billion USD)	
	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
First	-2	-1	-28.4	-56.2	24.1	24.7	8	3.8
Second	-1.4	-4.2	-1	18.9	33.9	50.1	4.3	4.2
Third	-4	-0.2	-18	-30.8	49.6	78.1	4.3	3.9
Fourth	3.1	0.8	-13.5	-17.6	40.6	124.5	4.5	4.7
Fifth	0.8	4.2	-23.5	-16.8	245.4	359.3	4.8	4.5

Table 7

## EFFECTIVENESS OF IMPLEMENTING PROGRAMS

Agreement	Targets		Exogeneous variables			Policy variables		Endogeneous variables		
	Inflation	Forex reserves	GDP growth	Exports	Velocity	CGS*	Exchange rate	Imports	M3	CNS**
First	×	×	√	×	×	×	×	×	√	×
Second	×	×	×	√	×	×	√	√	×	×
Third	×	√	×	×	√	×	×	×	×	×
Fourth	×	×	×	√	×	×	×	√	×	√
Fifth	√	√	√	√	×	√	√	√	×	×

\*\* Credits to the government sector.

\*\* Credits to the nongovernment sector.

× – no effect from the program implementation.

√ – effect from program implementation.

Statistical data displayed in Tables 4 + 8 summarizes Bulgaria's experience in implementing standby programs. All agreements implemented in Bulgaria are reviewed in chronological order with the exception of the last three-year agreement concluded in September 1998 which has not been completed yet. Since post-1989 transition to a market economy, 1994 and 1995 were the only two years when Bulgaria did not sign agreements with international financial institutions, and in both cases the lack of financial support resulted in forex and financial crises. Forex and financial crises burst out in the spring of 1994 and the autumn of 1996 and the government had to seek emergency support, signing imprecise agreements unable to settle the problems. Moreover, stopped financial support even worsened the existing problems. To this end, it should be reminded that only the fifth agreement has been completed, that is the total amount of funds provided under the agreement has been disbursed to Bulgaria. The remaining agreements were untimely terminated, as it was found during the regular quarterly reviews that Bulgaria failed to fulfill its commitments under the agreement, formulated as performance criteria. The fourth agreement was not launched practically, since it was terminated four months after its signing, followed by a severe financial crisis. This evidenced again the crucial importance of external financing for Bulgaria's economy.

Table 4 displays exogenous and policy variables comparing the targets set in the programs and actual results. It is easy to note that targets and exogenously set values of major economic variables significantly

diverge with few exceptions. This fact is of great importance as in this case we are interested primarily in the principal ability of models to generate forecasts during transition normally characterized by unstable macroeconomic conditions rather than in the discrepancy between projected and actual values. To this end, results summarized in Table 7 are indicative of the fact that preset goals were achieved only under the fifth standby agreement, that is performance criteria were strictly followed and exogenously set variables adequately selected.

Information contained in Table 8 is of particular interest as it displays the effects of implemented programs both in the current and subsequent periods (after completion of the program). This evaluation approach proves very important because standby programs are generally intended to settle macroeconomic imbalances in the long run, not only for the period of their implementation. Data suggests that an adequately designed program has also a favorable effect in the next period, while the programs which failed (clearly pronounced in the fourth standby agreement) additionally worsen macroeconomic conditions.

The analysis of compliance with the performance criteria evidences the reasons behind the failure of all standby programs (except for the last program). Even in cases of adequately selected policy and exogenous variables, nonfulfillment of undertaken commitments condemned these programs to failure. In most cases failures are associated with the program's (model) approach stating that it is unsuitable for the specific Bulgarian conditions. However, data in Table 5 shows a different picture: due to various reasons (most often political, associated with pending elections and the 'need' for saving the electorate the social implications of reform) governments systemically escaped from their responsibilities. Unfortunately, a number of important economic prerequisites (structural reform, legislation, institutional changes, etc.) which have no direct quantitative indicators but are crucially important for the implementation of the program cannot be included in the published tables. As a rule governments avoided painful decisions, thus reducing Bulgaria's chances for a faster completion of the delayed transition.



Table 8

**MAJOR MACROECONOMIC VARIABLES BEFORE, DURING AND AFTER IMPLEMENTATION OF ADJUSTMENT PROGRAMS**

	First, 1991			Second, 1992			Third, 1994			Fourth, 1996			Fifth, 1997		
	Before	Programs	After	Before	Programs	After	Before	Programs	After	Before	Programs	After	Before	Programs	After
Growth (%)	-11.8	-11.0	-7.3	-11.7	-4	-1.5	-1.5	-1 ē -2	2.1	2.1	0	-6.9	-10.1	-6.9	3.5
Inflation (%)	64.5	234	79.4	473.6	44	63.8	63.8	74	32.9	32.9	105	578.4	310.8	566	1
Forex reserves (million USD)	125	625	945	353.4	1350	655.3	655.3	1089	1241	1241	1327	2483	488	1947	3056
Exports* (billion USD)	3.91	6.6	3.9	3.7	3.9	3.73	3.73	4.2	5.3	5.3	4.9	4.9	4.9	5	4.2
Imports* (billion USD)	4.85	8.0	4.2	3.8	4.3	4.61	4.61	4.3	5.2	5.2	4.5	4.5	4.7	4.8	4.6
Current account (% of GDP)	-7.7	-2	-4.2	-1	-1.4	-8.7	-8.7	-4	2.1	2.1	3.1	4.2	0.8	0.8	-1
Budget balance (% of GDP)	-8.5	-3.5	-5.2	-8.4	-4.2	-10.9	-10.9	-6.3	-6.4	-6.4	-4.7	-2.9	-10.2	-4.1	0.9
Exchange rate (BGL/USD)	2.8	17	24.5	21.8	23.7	24.5	24.5	59.6	70.7	70.7	150	1776.5	487.4	1700	1675.1
Real wage															
(real growth, %)	0.9	-28.4	18.9	-56.2	-1	1.1	1.1	-18	-5.5	-5.5	-13.5	-16.8	-17.6	-23.5	20.2
Broad money/GDP	1.22	0.47	0.62	0.57	0.72	0.78	0.78	0.61	0.66	0.66	0.55	0.35	0.75	0.28	30.5

\* Exports and imports for 1990 are recalculated at the exchange rate of 4.875 per 1 transferrable rouble.

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