

**Institut für Höhere Studien (IHS), Wien
Institute for Advanced Studies, Vienna**

Reihe Osteuropa / East European Series

No. 38

Revision of an Econometric Model for Slovakia

Michal Bencik

**Bestellen Sie jetzt: Codex. Die neue
Publikationsreihe über die Rechtslage
in den Reformstaaten Ungarn,
Polen, Slowenien, Tschechien
und Slowakei.**

Ja, senden Sie mir ein Codex-Jahresabonnement:

☐ Zwei Länderanalysen: öS 7.480,- (inkl. MWSt)
☐ Alle vier Länderanalysen (Ungarn, Polen, Slowenien, Tschechien und Slowakei): öS 11.000,- (inkl. MWSt)

☐ Ungarn ☐ Polen ☐ Slowenien ☐ Tschechien und Slowakei

☐ Eine Länderanalyse: öS 4.200,- (inkl. MWSt)
☐ Drei Länderanalysen: öS 8.800,- (inkl. MWSt)

Name: _____

Adresse: _____

Kupon einsenden an: Bank Austria
 Auslandsgeschäftsstelle 2 (6529)
 Postfach 35
 A-1011 Wien

Bank Austria

Revision of an Econometric Model for Slovakia

Michal Bencik

Reihe Osteuropa / East European Series No. 38

September 1996

Michal Bencik
Institute of Economics
Slovak Academy of Sciences
Sancova 56
811 05 Bratislava
SLOVAKIA
Phone: +42/7/495 453
Fax: +42/7/495 106
e-mail: bencik@eu.savba.sk

**Institut für Höhere Studien (IHS), Wien
Institute for Advanced Studies, Vienna**

The Institute for Advanced Studies in Vienna is an independent center of postgraduate training and research in the social sciences. The publication of working papers does not imply a transfer of copyright. The authors are fully responsible for the content.

Abstract

In the first part the original version of a demand-oriented model of a country in transition is briefly presented. It consists of a demand block, an income block and a monetary block. The second part is concerned about the innovations, made in this version. Most important is the attempt to reflect the structural change by means of a generalized production function in intensive form. After characterizing the model, the author turns to policy evaluation. The model implies that investment crowds out labor quite strongly. Thus, the use of government transfers for labor beside transfers for investment is considered and some equations are modified. A "direct" and a grid search for optimal policy are presented. Finally, the results for practical decision making are summarized, finding transfers for labor efficient in fighting unemployment and ensuring output growth.

Keywords

Econometric model, labor productivity, fiscal policy

JEL-Classifications

E17

1. Introduction

Since establishment of systems of national accounts economics has a powerful tool for analysing the phenomena in national economies and has made a great step from a speculative science to a exact one. Soon after appearance of the appropriate data, first econometric models were constructed. They provided new insight into functioning of the economy and gave comprehensive explanation of impact of exogenous changes. Thus, it has been natural to use the mathematical models of economies, especially econometric ones to policy analysis.

This work tries to apply these methods to the case of Slovakia. The basis of the used model is the work by Palenik et al. (1995a). The author makes some changes in the structure of the model and presents the implications of the model to the economic policy.

In the first part the original model is briefly presented. Its system features are analyzed and the suggestions for improvements are discussed. The second part is concerned about the innovations, made in this version. The new equations, their theoretical underpinnings and their impacts to the structure of the model are discussed. After characterizing the model, the author turns to policy evaluation. Two approaches to search for optimal policy are presented. Finally, the results for practical decision making are summarized.

This work was written at Institute for advanced studies in Vienna. I would like to thank to Professors Andreas Woergoetter, Robert Kunst and Associate Professor Bernhard Boehm for their advices.

Some parts of the work are worked out like contributions to a broader discussion. The author will be grateful for any feedback.

2. General characteristics of the original model

The original model is based on keynesian approaches and stresses the importance of the aggregate demand. It reflects beside the standard economic theory also some specific features of an economy in transition as the slovakian. The model allows to analyse these main economic variables and relations:

- gross domestic product and its components
- wages, income and consumer prices
- interest rates and money supply

The statistical analysis uncovered some characteristic features of transition economy that turn out to be important for effective macroeconomic policy:

- prices influence wages, incomes private consumption and GDP very strongly,
- wages and incomes did not follow the drop in GDP during transition. This implies that the link between productivity and wages is weak and that the multiplication effects will also be weak.

Relations between monetary variables change so quickly, that it is very difficult if possible to model them. According to this version they haven't regulated the real economy in that extent as they should yet.

The model yielded rather high ex ante forecasts (annual output growth rate 5% to 10%). Possible reasons were bad predictions of exogenous variables, omitting capacity constraint and impact of monetary variables. Despite of this by variation of exogenous variables it proved to have an appropriate comparative statics as shown in Palenik et al. (1995b).

This work showed that it is possible to evaluate the tools of economic policy by means of econometric modelling and that this model could give appropriate answers to relevant questions after some refinement.

2.1 Block of aggregate demand

Private consumption, 1984 prices.

where

$$YRD_t = YD_t / PU_t \quad (1)$$

$$RIR_t = IR_t - [(PU_t / PU_{t-4}) - 1] 100 \quad (2)$$

$$C_t = 0.54600 + 0.48793(YRD_t - YRD_{t-1}) + 0.79191YRD_{t-1} + 0.18145C_{t-1} \\
\begin{matrix} (8.52) & (10.82) & (2.48) \\ -0.06053RIR_t - 3.54482T1 + 3.73542UC_t \\ (2.43) & (4.70) & (10.08) \\ R^2 & 0.9844 & DW & 2.08 \end{matrix}$$

The basic idea behind the consumption model is the Houthakker-Taylor model. In this model, real disposable YD income is the most important variable. In our equation appears also a modifying factor, the real interest rate RIR. All variables in this equation are deflated using the consumer price index.

The gross fixed investment, 1984 prices.

$$I_t = -10.47309 + 0.34906(Y_t - Y_{t-1}) + 0.35823Y_{t-1} + 0.53608I_{t-1} \\
\begin{matrix} (3.72) & (5.71) & (5.73) \\ -4.11820T1 + 0.86224T4 + 3.50224UI_t \\ (6.94) & (1.73) & (7.98) \\ R^2 & 0.9691 & DW & 2.02 \end{matrix}$$

The level of investment is determined by demand for means of production. The exploratory variables GDP increasement in current quarter and lagged GDP correspond to this phenomenon. As investment depends upon the stock of means of production under construction, the lagged value of the investment was introduced into the model. Seasonal

dummies T1 and T4 reflect strong seasonal pattern in the dependent variable.

Exports of goods and services, 1984 prices.

$$EGS_t = \exp \{ 0.22471 + 0.47989 \ln MW_t - 0.56110 \ln [PEGS_t / (PMW_t IRE_t)] - \\ (2.03) \quad (2.62) \\ - 0.11908 T1 + 0.11663 T4 + 0.15330 UEGS_t \} \\ (3.45) \quad (3.20) \quad (4.70) \\ R^2 = 0.8339 \quad DW = 1.70$$

This behavioral equation describes a demand function of the rest of the world for slovak exports of goods and services. As follows from its specification, exports of goods and services depend upon volume of world imports, approximated by MW and upon exports deflator relative to world prices, augmented by the exchange rate SK:USD. Seasonal oscillations are covered by the dummies T1 and T4.

Imports of goods and services, 1984 prices.

$$MGS_t = \exp (0.16724 + 0.86617 \ln Y_t + 0.64462 \ln (PMGS_t / PY_t) - \\ (4.90) \quad (3.08) \\ - 0.12193 * T1 + 0.17567 T4 + 0.27488 UMGS_t) \\ (3.46) \quad (5.14) \quad (6.24) \\ R^2 = 0.9163 \quad DW = 2.01$$

This variable is driven by domestic demand for foreign goods and services approximated by volume of GDP. The volume of imports is modified by the ratio of its price index PMGS and GDP deflator PY. Seasonal pattern of dependent variable is reflected by the dummies T1 and T4 again¹.

Trade balance, 1984 prices.

$$SGS_t = EGS_t - MGS_t$$

The trade balance is computed as a difference between the exports of goods and services and imports of goods and services.

¹The last three equations have quite high standard error of regression. However, this is often the case in modelling both investment and foreign trade.

Gross domestic product, 1984 prices.

$$Y_t = C_t + I_t + G_t + SGS_t + DJ_t$$

The GDP is calculated by summing up the private consumption C, gross fixed investment I, government consumption G, trade balance SGS and increase of stocks and inventories DJ.

Consumer price index, January 1984=1.

$$PU_t = \exp \left[0.272080 \underset{(9.13)}{\ln PMGS_t} + 0.07857 \underset{(3.49)}{\ln (YD_t / YP_t)} + 0.13129 \underset{(2.88)}{\ln PU_{t-1}} \right. \\ \left. \exp \left(0.16897 \underset{(16.32)}{UNTS_t} + UPU_t \right) \right]$$

$$R^2 = 0.9969 \qquad DW = 1.67$$

This equation measures inflation by means of consumer prices of goods and services. The exploratory variables are imports price index PMGS, the ratio between personal disposable income and GDP YD:YP and dummy UNTS, reflecting the tax reform in the beginning of 1993. As the prices were controlled by the state in 1990, the equation was estimated from 16 observations from 1991 to 1994.

Private consumption deflator, 1984=1.

$$PC_t = PU_t * QPC_t$$

This identity calculates the dependent variable from the consumer price index for goods and services PU using exogenous factor QPC.

GDP components, current prices

$$CP_t = C_t * PC_t$$

$$IP_t = I_t * PI_t$$

$$EGSP_t = EGS_t * PEGS_t$$

$$MGSP_t = MGS_t * PMGS_t$$

Private consumption, investment, exports of goods and services, imports of goods and services, government consumption and increasement of stocks and inventories in current prices are computed from their values in 1984 prices by means of corresponding deflators.

GDP deflator

$$PY_t = \frac{YP_t}{Y_t}$$

This variable is set equal to the ratio between GDP in current and fixed (1984) prices.

2.2 Employment, wages and income

Nominal monthly wage rate.

$$\begin{aligned} \Delta \ln W_t = & 0.196142 + 0.304064 \Delta \ln PL_{t-1} - 0.114131 T1 + 0.0448848 T2 \\ & (3.26) \quad (3.58) \quad (7.61) \quad (3.26) \\ & + 0.111268 + T4 - 0.177303 \ln W_{t-1} + 0.140978 \ln PU_{t-1} \\ & (9.12) \quad (2.88) \quad (2.83) \\ R^2 = & 0.9776 \quad DW = 2.16 \end{aligned}$$

$$\ln W_t = \ln W_{t-1} + \Delta \ln W_t$$

$$W_t = e^{\ln W_t}$$

$$\Delta \ln PL_t = \ln \left(\frac{\frac{Y_t}{L_t}}{\frac{Y_{t-1}}{L_{t-1}}} \right)$$

The wages are in the long run driven by the consumer prices with corresponding elasticity lower than unity. In the short run they are also affected by the labour productivity and seasonal dummies. The labour productivity is computed from GDP in fixed prices and employment.

Employment, millions of persons

$$\begin{aligned} \ln L_t = & 0.59955 - 0.2606 \Delta \ln W_{t-1} + 0.28372 \ln W_{t-1} - 0.48344 \ln (1.0463 PU_{t-1}) \\ & (13.97) \quad (5.08) \quad (4.12) \quad (4.08) \\ & + 0.14295 \Delta \ln Y_{t-1} + 0.0045377 \ln YZ1_{t-1} + 0.02514 U492 \\ & (2.29) \quad (2.15) \quad (1.96) \\ R^2 = & 0.8553 \quad DW = 2.17 \end{aligned}$$

$$L_t = e^{\ln L_t}$$

Employment is determined by nominal wage, real GDP and dummy reflecting the outlying observation corresponding to the split of Czecho-Slovakia. The long run determinants are wages and consumer prices (the negative impact of wages is caused most likely by labour supply aspects) and profits of non-financial organizations.

As the parameter corresponding to the lagged logarithm of dependent variable was not significantly different from -1, the lagged logarithm was added to both sides of equation to get better fit.

Because of possible shortcomings this equation will be replaced in the next version.

Labour supply, million persons.

$$\begin{aligned} \ln LS_t = & -0.162964 + 0.874414 \ln NP_{t-1} + 0.269687 \Delta \ln L_{t-2} + 0.030615 U393 \\ & \quad (-0.64) \quad (3.93) \quad (2.98) \quad (2.69) \\ & + 0.0437561 \Delta \ln WR_{t-1} + 0.0465513 \Delta \ln C_{t-2} \\ & \quad (2.11) \quad (2.06) \\ R^2 = & 0.8911 \quad DW = 1.91 \\ LS_t = & e^{\ln LS_t} \end{aligned}$$

The specification was modified similarly as the preceding equation. In the long run it is explored by the number of inhabitants in productive age, in the short run by the real wage, the lagged private consumption and employment. It is assumed that households augment the labour supply according to their consumption customs and labour demand after some time. This equation also contains a dummy corresponding to an outlier.

Other income of the inhabitants

$$YPO_t = QYPO_t \cdot YW_t$$

In our model, this variable is computed from wage income by means of exogenous factor QYPO, as the legislative changed often and a behavioral equation did not give satisfying results.

Social income.

$$\begin{aligned} \Delta \ln FC_t = & 2.02620 - 1.29749 \ln FC_{t-1} + 0.663986 \cdot \\ & \quad (5.19) \quad (4.95) \quad (4.25) \\ & \cdot \ln(1.0463 PU_{t-1}) + 0.34546 \ln W_{t-1} + 0.0404316 T4 - 0.10424 U193 \\ & \quad (1.78) \quad (1.19) \quad (1.49) \\ R^2 = & 0.7452 \quad DW = 2.01 \\ \ln FC_t = & \ln FC_{t-1} + \Delta \ln FC_t \\ FC_t = & e^{\ln FC_t} \end{aligned}$$

The long run determinants of the social income (transfers received by the inhabitants) are the consumer prices PU and nominal wage rate W. In the case of increasing prices, the real volume of transfer will drop as the corresponding elasticity is lower than 1. The seasonal oscillations explains dummy T4. The dummy U193 reacts to the legislative change due to the split of Czecho-Slovakia.

Identical relations in the wage block.

$$\begin{aligned}\Delta \ln C_t &= \ln \left(\frac{C_t}{C_{t-1}} \right) \\ LU_t &= LS_t - L_t \\ WR_t &= \frac{W_t}{PU_t} \\ YW_t &= 3 \times W_t \times YW_t \\ TW_t &= QTW_t \times YW_t \\ YD_t &= YW_t + FC_t + YPO_t - TW_t \\ YRD_t &= \frac{YD_t}{PU_t}\end{aligned}$$

Following transformations are done by identities:

- quarterly wage income YW is computed as a product of employment L and monthly wage W multiplied by three,
- income taxes TW are computed as a product of wage income YW and tax rate QYPO,
- disposable income YD is calculated by summing up wage, social and other incomes YW, FC, YPO and subtracting taxes TW,
- real disposable income YRD and real wage WR are computed from nominal variables by division by the consumer price index PU,
- number of unemployeds LU is computed from labour supply L subtracting employment L and
- the growth rate of the private consumption C is computed from this series.

2.3 Monetary block

Average deposit rate

$$\begin{aligned}R_t &= 1.031836 + 0.0055964 IRU_{t-1} + 0.029642 PU_t - 0.00036594 M2_{t-2} \\ &\quad (98.06) \quad (4.62) \quad (3.87) \quad (4.09) \\ R^2 &= 0.9428 \quad DW = 2.06602 \\ IR &= (R-1) \cdot 100\end{aligned}$$

The first equation describes the development of reciprocal discount factor R as a function of lagged value of discount rate IRU, consumer price index PU and lagged money supply M2. The second equation transforms the independent variable of the first equation in per cent p.a.

Money supply.

$$M2_t = -856.94323 + 3.3087802M0_t + 694.2065R_{t-4} + 135.23763IRE + 17.5838T_4$$

(4.38) (2.79) (3.66) (4.47) (2.11)
 $R^2 = 0.9092$ $DW = 1.92619$

Liquid liabilities M2 are function of notes and coins M0, the interest rate R and SK/USD exchange rate index IRE. This equation contains seasonal dummy T4 as well. The relations of monetary variables in our economy were different from the standard case during the transition. Thus an approach computing money supply from notes and coins and various deposits was used as an alternative to equations of this type, shown in Palenik et al. (1994).

- * * * -

The control variables are exogenous formally, but in reality they are set according to values of other variables. This phenomenon has to be reflected in ex ante forecasts.

With progress of economic transformation monetary variables are more and more used.

3. Innovations of the econometric model

3.1 Labour productivity

This variable was in the former version defined by an identity, dividing the demand determined gross domestic product by the labour demand. The labour demand, also the number of employees in the economy was influenced by wages, consumer prices and GDP. It incorporated thus some relation between labour input and production output and could be seen as a generalised inverse production function. However, the wage parameter did not obey the constraints of the standard economic theory, mirroring many systematic changes in this area. Also the impact of GDP on labour was small and the impact of capacity was fully omitted.

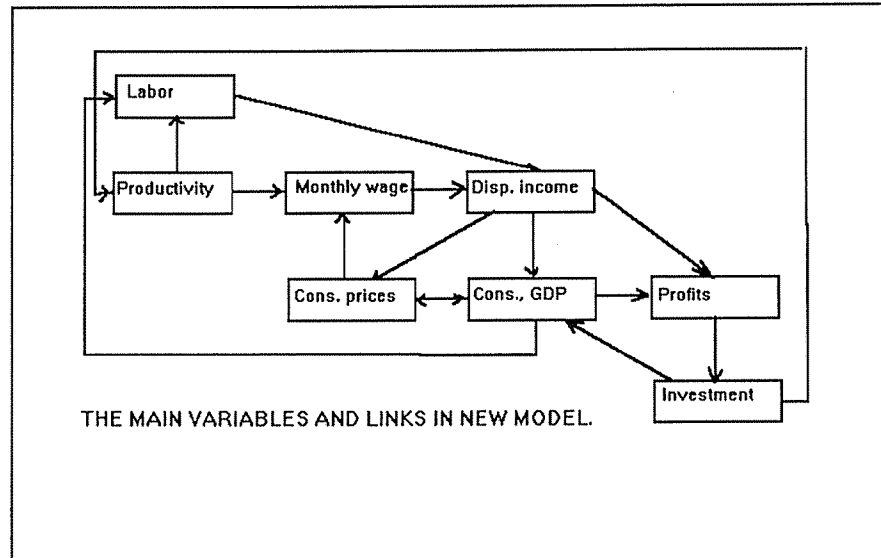
Because of these drawbacks it seems to be reasonable to search for another specification that determines the labour demand better and takes the capital input into account. This specification should correspond to the fact that the labour forces are underutilized because of wrong capital structure and allow to study impacts of fixed capital formation.

After some experiments with data following structure of the model seems to be optimal: GDP, employment and income are interdependently set by

- block for components of GDP relating these to the income,
- block for labour and other income relating this to employment and productivity (later determines wage rate),
- production function in intensive form reflecting technology and
- identity computing labour from GDP and labour productivity.

This construction reflect that GDP is influenced both by the demand and supply factors. We can also expect it to react in the proper way to investment changes. Both crowding out labour by capital and bringing new labour into production by increasing investment demand and wage by rising productivity are possible.

The newly introduced productivity function is similar to a generalized version of Solow's Ak model, described for instance in Barro and Sala-i-Martin (where the wearing out of capital is neglected and other influences are introduced). The technical progress is labour augmenting and this is also reasonable in the long run. On the contrary to Solow,



there is also a interaction with demand in our model so that the properties of the Ak model cannot be automatically transferred to this one. The equation is estimated in increasement form, using an approximation for increasement of capital-labour ratio. Although its drawbacks. this is the best specification one can get from Slovak data.

The identity for labour productivity is thus replaced by behavioral equation for absolute increase of productivity DPL relating it to ratio of investment and employment DVK, time trend TIME, its past value PL and dummies:

$$DPL = 6.721972 + .179721108 * DVK + (-.33238501) * PL(-1) + .078054306 * TIME(-1) - 1.3499825 * T4K + 1.4637572 * U392$$

REGRESS : dependent variable is DPL

Using 1991Q4 -1994Q4

Variable	Coefficient	Std Err	T-stat	Signf
^CONST	6.72197	4.70059	1.43003	.196
DVK	.179721	.912379E-01	1.96981	.090
PL(-1)	-.332385	.200934	-1.65420	.142
TIME(-1)	.780543E-01	.498903E-01	1.56452	.162
T4K	-1.34998	.511234	-2.64063	.033
U392	1.46376	.680695	2.15039	.069

Equation Summary			
No. of Observations =	13	R2=	.8427 (adj)= .7303
Sum of Sq. Resid. =	2.66963	Std. Error of Reg.=	.617556
Log(likelihood) =	-8.15663	Durbin-Watson	= 1.44824
Schwarz Criterion =	-15.8515	F (5, 7)	= 7.49742
Akaike Criterion =	-14.1566	Significance	= .009864

This function assumes that every new capital starts working just after the end of investment process. The time trend should rather reflect the assumption that the amount of really productive capital rises linearly in the short run. (In Slovakia a big share of capital is morally

worn out and not usable for modern production.) The author is aware that this assumption does not hold in the long run, but until there is no suitable information concerning really productive capacities this seems to be a possible and rather simple approximation.

As the time series for fixed investment showed strong seasonal pattern after 1990, variable T4K was included into equation. Variable U392 reflects the increase in third quarter 1992 only (possibly because of elections).

3.2 Gross fixed investment

The amount of gross fixed investment was in the model determined by a generalized a dynamic investment norm, e. g. it was assumed that certain share of GDP will be used for investment. As it did not contain interest rate, the model could not take the regulatory impact of this variable on the real sector. this could be one reason, why the standard forecast was rather overestimated.

Slovak statistical office provides the quarterly and annual series of gross fixed investment and yearly figures about its resources. Structure of resources for investment is quite interesting in this context. at about 55 % was covered by own resources, 14 % by resources from abroad, 11 % from subsidies, 12 % by bank loans and 8 % by loans from business partners. The fact that the latter two figures are comparable tells much about efficiency of our banking system. According to statistical office staff, this structure is quite stable last years.

From real fixed investment are subtracted investment expenditures (mainly subsidies) deflated by the investment deflator. The rest is explained by the following behavioral equation taking the upper resources into account. Similar factors were used in paper Bencik - Palenik in 1992.

In our specification were used

- increasement of logarithm of private share of investment DLIPR on the left hand side
- lagged value of private share of investment LIPR
- lagged value of profits of non-financial organizations deflated by GDP deflator LYZP
- lagged value of increasement of logarithm of interest rate DLIR
- dummy for fourth quarter T4
- dummy for dow values in 1994 U94

REGRESS : dependent variable is DLIPR

Using 1990Q3 -1994Q3

Variable	Coefficient	Std Err	T-stat	Signf
-----	-----	-----	-----	-----
^CONST	-.509656	.447255	-1.13952	.279
LIPR(-1)	-.873626	.108042	-8.08595	.000
LYZP(-1)	.318131	.529016E-01	6.01364	.000
T4	.127107	.767581E-01	1.65595	.126
DLIR(-1)	-.458412	.173711	-2.63893	.023
U94	-.443633	.988724E-01	-4.48693	.001

----- Equation Summary -----			
No. of Observations =	17	R2=	.8975 (adj)= .8509
Sum of Sq. Resid. =	.171598	Std. Error of Reg.=	.124899
Log(likelihood) =	14.9425	Durbin-Watson =	2.01417
Schwarz Criterion =	6.44283	F (5, 11) =	19.2678
Akaike Criterion =	8.94247	Significance =	.000042

In this equation, profits were used as part of own resources, they influence investment in the long run, elasticity is at about one half. Interest rate describes partly the easiness of obtaining money, although there was some credit rationing. It affects investment only in the short run. The need for U94 is most likely due to the preliminary data. The author is aware of the fact that interest rate for loans should be used instead of that for deposits. However, banks tried to get a premium for old bad debts with the interest in some periods and so the deposit rate is better indicator for availability of money.

3.3 Consumer price index

In the previous version, consumer prices were described by modified unit labour costs, import prices and other variables. As the left hand side variable and some right hand side variables contained strong trend pattern, an equation in increasements was estimated.

The equation contains some variables in the form of increasement of logarithm:

- the consumer price index PU on the left hand side
- the deflator of imports of goods and services PMGS
- unit labour costs ULC (wage income : real GDP)
- lagged value of consumer price index.

It contains also dummy U193 reflecting establishment of VAT instead of revenue tax and split of CSFR.

REGRESS : dependent variable is DLPU

Using 1991Q2 -1994Q3

Variable	Coefficient	Std Err	T-stat	Signf
^CONST	.115923E-01	.450831E-02	2.57131	.030
DLPU(-1)	.158570	.395484E-01	4.00953	.003
DLULC	.798265E-01	.304725E-01	2.61962	.028
DLPMGS	.227892	.856351E-01	2.66120	.026
U193	.104171	.129381E-01	8.05149	.000

```

----- Equation Summary -----
No. of Obs. = 14 R2= .911 (adj)= .871 Durbins H= -.76853
Sum of Sq. Resid. = .105216E-02 Std. Error of Reg.= .108123E-01
Log(likelihood) = 46.6066 Durbin-Watson = 2.31399
Schwarz Criterion = 40.0090 F ( 4, 9) = 22.9798
Akaike Criterion = 41.6066 Significance = .000096

```

As all attempts to introduce the lagged logarithm of CPI in the equation failed, series of logarithm of the CPI seems to have a unit root. The parameter at unit labour cost is relative small, it shows that wages were not the main factor driving inflation. Despite of that, large amount of inflation is imported.

3.4 Nominal interest rate from deposits (per annum)

According to the economic theory this variable should be correlated with inflation, not with price index as it is in the old version. On the other side, inflation rate changes should be fully reflected in interest rate changes in the long run. Original assumption according to standard theory was that deposits bearing interest according to the current rate and divided by price index should be stationary or somewhat rising. Such artificial variable should enter the equation for $\ln(1+r)$ instead of an error correction term. To justify this we have to interpret the interest rate as nominal rate of change of deposited money. In reality such variable has a significant downward trend and one crown deposited at the end of 1989 has only half its value at the end of 1994. This result is supported by the fact that from 1989 till 1994 there were no positive real interest rates. However, this variable turned out to be statistically significant in the equation.

Equation for $\ln(1+r)$ contains beside the artificial variable LH logarithm of inflation rate LINFL, logarithm of discount rate LIRU, its increasement DLIRU and dummies for first quarter 1991 and 1992. The construction of variables become clear from the listing:

```
For 1989
rc=1
pu=1.0463
For other periods
rc=rc(-1)*(r**0.25)
Prefix l stands for natural logarithms.
lh=lrc(-1)-lpu(-1)
```

REGRESS : dependent variable is LR

Using 1990Q3 -1994Q4

Variable	Coefficient	Std Err	T-stat	Signf
^CONST	-.448204E-01	.132746E-01	-3.37639	.006
LH	-.435917E-01	.109551E-01	-3.97913	.002
LINFL	.231054E-01	.511074E-02	4.52094	.001
U191	.133288E-01	.438496E-02	3.03965	.011
U192	.110785E-01	.271251E-02	4.08422	.002
DLIRU	.987815E-02	.560508E-02	1.76235	.106
LIRU(-1)	.393607E-01	.872019E-02	4.51375	.001

```
----- Equation Summary -----
No. of Observations = 18      R2= .9862      (adj)= .9787
Sum of Sq. Resid. = .731613E-04  Std. Error of Reg.= .257896E-02
Log(likelihood) = 86.1780      Durbin-Watson = 2.18292
Schwarz Criterion = 76.0617    F ( 6, 11) = 130.963
Akaike Criterion = 79.1780     Significance = .000000
```

The need for dummies caused liberalisation of prices initially not covered by the interest rates. Discount rate is seen as an instrument and is defined in per cent.

3.5 Social income of inhabitants

The behavioral equation in previous version did not give satisfactory results and had some theoretical drawbacks. The social net changed since 1989 drastically. This makes econometric modelling of this variable very difficult. The equation was thus replaced by an identity computing social income from wage income and an exogenous quotient.

$$FC = QFC * YW$$

3.6 Profits of non-financial organizations

This variable will be no more exogenous. If we subtract the wage income from GDP, resulting series shows similar trend as profit. But as both profits and wages are components of GDP computed by income method, regression is not used to avoid tautology. It will be explained by an identity using the upper variables, volume of VAT and an exogenous difference. The author is aware that linking this identity and the equation for investment causes problems. As the depreciations rise, the profits and investment should fall and this is counterfactual. These equations will be used until the series of depreciations in comparable prices will be known; then both equations will be modified.

$$YZ = YP - YW - TI - DIFYZ$$

3.7 Volume of VAT

Volume of VAT TI is computed from private consumption in current prices CP and an exogenous quotient QTI.

$$TI = QTI * CP$$

3.8 The aspects of institutional and structural change in the model

The behaviour of the economic agents depends upon their institutional environment. Its pattern may be in post-socialist countries different from countries with stable market economy. The analysis of the time series of macroeconomic variables confirmed some phenomena pointed out analysing the previous version and discovered some new ones. The institutional and structural changes were mirrored in some behavioral equations that are discussed below.

In traditional Keynesian economics, being the underlying theory of most econometric models, the multiplier effect is of importance. It is based on assumption that the output is very tightly linked with disposable income. In post-socialist countries, however, this might not be the case. The wages and personal income did not follow the drop in the GDP proportional. On the other hand, in the case of Slovakia, in periods with rising labour productivity this was not fully reflected in real wages. On the other hand, propensity to consume is low because consumption did not follow drop in real wages as well. This implies that the multiplier is near

to one. This may have changed in 1995. If the propensity of consume rose, the multiplier becomes bigger.

Investment is in standard theory adjusting the capital stock to the needs of the firms. The demand for capital stock itself is explained by an inverse production function or at least a capital-output ratio relationship. This bases on the assumption that certain technology is in use. In post-communist countries this would imply nearly impossibility of transition, because the net investment should be always negative when output is declining. There is also the problem that technology is changing quite rapidly in post-communist countries. Because of these facts, The investment function stresses the financial aspects of investment process and explains investment activity by the disposable own and foreign resources. As the biggest share is financed by own resources and series of depreciations is not available yet, the volume of profits of non-financial organisation is used as a proxy.

A relation like production function does not appear in econometric macromodels of stable economy usually. Output is determined by demand, supply side aspects are reflected by the investment function and/or labour demand function. In our case, however, the investment depends mainly upon disposable resources. Labour demand cannot be linked to output by stable relation as many structural changes occur. These problems can be (partially) solved by an intensive production function or alike relationship. A vintage production function would be ideal, offering to reflect lower efficiency of old capital stock and the impact of restructuralization. However, hardly any statistical office in post-communist country is able to construct the needed series. At this stage, when the stock of productive capital stock is not known, it must be constructed in form of increasements with investment as main exploratory variable. This relation is not stable, being only a crude approximation of real situation, but it is surely worth to have at least this in the model.

Interestingly, productivity increases can have negative effects as well. If investment and productivity will rise sharply without export expansion, large parts of labour source (20 - 30 per cent) will be crowded out from the production process. The output will rise quite slowly because of stagnating personal income in this case.

A monetary block is usually part of the standard model. It is linked with the real sector by investment function, sometimes consumption function and foreign trade. In the case of post-communist countries the situation is not stable yet. On the other hand, decisions of enterprises are influenced by the state and the rest of former hierarchical structures. Credit is often used to finance inventories. In this situation, the traditional monetary variables as money aggregates prove to be insignificant. Only nominal interest rate remained in the investment function. As there is credit rationing in the post-communist countries, its appearance in the equation should be interpreted so that in the periods with high interest rates investment is low because enterprises cannot effort the credit even in the presence of expectations that prices will rise.

The specific conditions of transition economy influenced the form of equations for consumer prices and for interest rate as well. The elasticity of prices to unit labour cost turned to be far smaller than one, that is usual in standard models. This confirms the assumption that at least in some countries (Slovakia) prices rise because of monopolistic structures and devaluations, not because of wages. The short run elasticity of interest rate to inflation rate is far smaller

than one. This could be explained by strong habit of inhabitants to save in banks, that behave in a monopolistic manner.

With the end of communism a class of small entrepreneurs appeared. Thus beside the wage income and the social income there is a third part of personal income, containing mainly the income of this class. This income is computed from wage income by a quotient and this quotient reflects the evolution of the small entrepreneurship. It is symptomatic, that the ex ante forecasts are very sensitive to changes of this exogenous variable. Small entrepreneurs may contribute to the output growth significantly.

Finally, with the abolition of iron curtain some post-communist economies become very open relative to the previous situation. Output growth is both empirically and in models very sensitive to the exports. In fact, taking part in international division of labour could be the main factor in fighting the recession of our countries.

4. Applications of the econometric model

4.1 Computation of standard forecast and its interpretation

First step to obtain forecasts was to construct forecasts of exogenous variables. Most of them were extrapolated in time. Variables in current prices (government consumption, exogenous difference used in profits equation) were assumed to rise 10% per year. World prices were assumed to rise 5% per year. The coefficient measuring the ratio between wage income and other personal income was fitted with logarithmic curve. Policy variables such as discount rate were set equal to the last observation.

These values together with values of endogenous variables from within sample simulation were inserted into the equation and the system was solved by a gradient method. In this way, the values for the period of years 1995 to 1997 were obtained.

The new structure of the model had a strong influence on the values of ex ante forecast. The labour productivity rose quite steadily. As demand did not follow these increases, the employment dropped somewhat or stagnated in the end of the forecasting period. The monthly wage rose as well, but the personal disposable income stagnated. The decrease of employed labour compensated the increase in wage, especially at the beginning of the forecasting period. The output stagnated in 1995, then it rose moderately. The profits and investment rose quite slowly, but steadily. The growth of prices was quite slow in comparison to the sample period, it did not exceed 8% per year. The interest rate was stabilized at 8.5% per year.

These forecasts stand in contradiction to the preliminary data for 1995, that indicate the rise in output more than 7%. Thus this forecasts have worse fit than that from the old version, indicating rise in output 5% to 10%, accelerating in the forecast period. The analysis of the forecasts helps to rise questions concerning the most important assumption of the model and possibly explaining the lack of accuracy.

The most striking phenomenon in the forecast is that the capital crowds out the labour from production process. This might be the case in the long run. in the frame of one or two years one has to consider that some investments are done to rise the quality of the output to the internationally accepted level and trigger some exports. Thus the structural aspects should be present not at the supply side only, but also on the demand side. The reality is that the production process even attracts new labour because of rising demand. The biggest difference is in the net exports, where the model forecasts more or less negative values but in reality net exports were positive in 1995. It will be very difficult, however, to incorporate structural change into equation for exports. There were too many exogenous influences (split of Czecho-Slovakia, abolition of arms industry, import quotas in EC).

Another part of the investment is due to the replacement of physically and morally worn out capital stock. This should be reflected but could not because of lack of appropriate data.

The older version showed the weak link between personal income and consumption already. This could change in 1995 when the output rose significantly first time in the transition process. The propensity to consume may be asymmetric; the consumption may react stronger (in absolute terms) to rising income than to falling income. Unfortunately, the data needed to prove this hypothesis can be hardly obtained.

Analysing similar forecast from the original version, it was mentioned that the high growth rate may result from the overestimated value of the coefficient QYPO. This coefficient is measuring the ratio between other incomes (mainly incomes from entrepreneurs) to wage income. If this ratio is rising over time, the personal income rises faster than wage income and this could be the case now. May be that the original extrapolation of QYPO as linear function of time was right and in this forecast it is underestimated. Unfortunately, there is lacking data in 1995 again.

The author thinks, that this version going more in depth is of bigger value than the original one despite of its drawbacks. It failed to predict because of phenomena that were exogenous and/or unobservable in the past. Believing that the structure of the model is at least partially correct, the author carried out some experiments with the model. The objective was to find an optimal economic policy. The experiments are described below.

4.2 Searching for optimal economic policy using the model

Economic policy is the way of using various economic variables as tools to obtain certain objectives. The four usual objectives of economic policy are high growth of output, balanced state budget, active trade balance and low unemployment. In the case of post-communist countries one has to take the long run structural development and also political progress into account. Good political climate helps to achieve social piece. If this is lacking, government is forced to various short run measures resulting in sub-optimal path in the medium and long run.

The set of tools for economic policy is very wide and complex. It contains fiscal policy, concerning about state budget receipts and expenditures and monetary policy, controlling the amount of money in the economy and interest rates. All state expenditures must be in some way financed, thus the both regions of policy are often used simultaneously. As the monetary relations are quite unreliable and unstable in economies in transition, we concentrate to fiscal policy. As stated for example in Dornbusch and Fischer, expansionary monetary policy can lead to stagflation, but the author thinks that this is not the typical problem of post-communist countries. The stagflation here is caused by qualitative properties of the output and by monopolistic structure of the economy that in fact cannot appear in market economies. It has thus different nature here. It could feed inflation but there is no evidence for this in the data for Slovak republic. Thus, monetary policy is not considered in the experiments, or, the scenarios are assumed to be neutral from this point of view.

Two ways of searching for the values of the policy variables for year 1995 were used. Direct search for the values was examined first and then a grid search was carried out. To reduce the number of objectives, the budget balance was explicitly taken into account. The budget receipts are assumed to consist from wage tax, VAT and an exogenous rest. The expenditures were government consumption, the investment transfers and the rest. Investment expenditures of the budget were set equal to the latter for simplicity, consistently with the equation for investment. The rests were assumed to grow 10% per year in 1995.

In first experiment certain target values were set, a set of tools was established and the model was solved for the values of the tool variables. The tool variables in were government consumption (in fixed and current prices), investment transfers and the rate of value added tax. Output (from the standard forecast) increased by 500 billions Sk per quarter and consumer prices (unchanged) were assumed to be targets and were given exogenously.

The used method allows for equations in non-normalized form and/or implicit form and the only formal condition is that the number of equations and endogenous variables must be equal. Thus the targets were simply erased from the list of endogenous variables and the tools were added. The number of variables increased by two. Two equations were added: an identity multiplying government consumption by the corresponding deflator and an implicit equation setting government deficit to zero.

The deviations of results of the modified model from the standard forecasts had expected signs. The employment, disposable income, consumption and investment were higher, net exports decreased. The real government consumption dropped sharply and the both investment transfers and tax rate rose sharply. The magnitudes show that this is not very effective policy mix; it can be caused by the wrong prediction for the rest sums of state receipts and expenditures. However, more likely is that it does not solve the main problem, crowding out of labour by investment. The other drawback is that higher rate for VAT will increase prices and this is neglected in this version.

A policy avoiding this crowding out would be more appropriate. Also a new method is needed, because the upper one does not guarantee feasibility of values of tool variables and it is difficult to look for model improvements.

There are examples for using econometric models for policy optimization (Bohm 1992). Usually simplified versions (linearized) are used as set of constraints and objective functions in a multi-criterial programming problem. However, the author decided to use a two dimensional discrete search and analyze the results manually.

In the second experiment a set of combinations of values of tool variables was examined and the variant optimizing targets was selected. The purpose was to examine a policy supporting both capital and labour, the first for restructuring the economy and the second to avoid crowding out, stimulate demand and fight unemployment. These measures should not be financed from indirect taxes feeding inflation, but rather from legal person's income tax. As the elasticity of investment in respect to profits is less than one, part of profits could be collected by taxes and redistributed in form of investment transfers.

Employment will be supported by transfers to the employers, covering the minimal wage of the additional employees. The minimal wage roughly corresponds to thousand crowns in 1984 prices. Government expenditures are in billions crowns and employment is in millions persons. If the government spent one unit (one billion) of transfers it would correspond to one unit employment (one million people), divided by price index. On the other hand, government consumption was assumed to be fix at the level from standard forecast and was not varied. To widen the financing possibilities, the budget deficit was set not to zero, but to 2.5% of GDP in current prices.

Following changes were carried out in the model:

- the term +FL/PU, taking the transfers for labour FL into account, was added to the equation for employment (thus it was assumed that all offered subsidies will be used),
- in the profits equation a term -TP was added, reflecting the additional profits tax TP,
- in the budget balance, TP and 0.025YP were added to the receipts and FL to the expenditures,
- as there were no target values more, output and prices become endogenous, as well as additional tax TP,
- equation for government consumption was erased,
- government consumption, investment transfers and labour transfers become exogenous.

Computations were performed within two nested numeric loops. In the first one, investment transfers varied stepwise from 2 to 4.8 by 0.7 (billions Sk). In the fourth quarter it was increased by 1 billion, mirroring the seasonal pattern from the past. In the second one transfers for labour varied from 0 to 0.28 by 0.07 (Billions Sk). The border values and step were chosen to hold the grid fine enough and the computation time feasible.

Twenty five sets of endogenous variables for 1995 were obtained. Most of them indicated higher growth than the benchmark solution, that with the lowest values and nearest to the standard forecast. Standard forecast could not be used, because the rest terms in the budget balance implied an additional tax even with the lowest expenditures. However, with rising volume of transfers their efficiency dropped and the negative effects (high additional tax and negative net exports in current prices) rose. The optimal (or Pareto-optimal) solution achieves quite high output growth, lowering the taxes relative to the benchmark variant and worsening net exports only moderate.

Benchmark variant:

Constant FL = .0000000

	Y	FI	L	SGSP
1995Q1	42.9786	2.00000	1.75584	.329326
1995Q2	43.8950	2.00000	1.75412	-.354277
1995Q3	44.1676	2.00000	1.73256	-.973360
1995Q4	47.6143	3.00000	1.93838	-8.96756

	TP	PU	PL	YRD
1995Q1	10.3193	2.92209	24.4775	20.2840
1995Q2	7.86460	2.98098	25.0240	21.5643
1995Q3	6.89514	3.03371	25.4926	21.4260
1995Q4	3.38376	3.12711	24.5640	29.3108

Optimal variant:

Constant FL = .2800000

	Y	FI	L	SGSP
1995Q1	43.2501	2.00000	1.86722	-.169586
1995Q2	44.4031	2.00000	1.87632	-1.36894
1995Q3	44.8160	2.00000	1.86092	-2.26605
1995Q4	48.3559	3.00000	2.07258	-10.7860

	TP	PU	PL	YRD
1995Q1	9.65286	2.93500	24.4100	21.4759
1995Q2	6.73842	2.99634	24.9054	22.9433
1995Q3	5.50714	3.04998	25.3325	22.8891
1995Q4	1.60344	3.14271	24.3793	31.1917

Variants with similar growth:

I. Constant FL = .2100000

	Y	FI	L	SGSP
1995Q1	43.3836	2.70000	1.84603	-.321225
1995Q2	44.4822	2.70000	1.85137	-1.43676
1995Q3	44.8708	2.70000	1.83400	-2.27653
1995Q4	48.3823	3.70000	2.04328	-10.7110

	TP	PU	PL	YRD
1995Q1	10.4564	2.93160	24.4498	21.2567
1995Q2	7.63959	2.99224	24.9734	22.6767
1995Q3	6.46662	3.04558	25.4218	22.6000
1995Q4	2.65638	3.13838	24.4805	30.8049

II. Constant FL = .7000000E-01

		Y	FI	L	SGSP
1995Q1	.	43.4483	3.40000	1.79672	-.346898
1995Q2	.	44.4323	3.40000	1.79545	-1.24784
1995Q3	.	44.7605	3.40000	1.77449	-1.95919
1995Q4	.	48.2196	4.40000	1.97981	-10.1738
		TP	PU	PL	YRD
1995Q1	.	11.4289	2.92493	24.5084	20.7362
1995Q2	.	8.82682	2.98421	25.0747	22.0600
1995Q3	.	7.77937	3.03699	25.5564	21.9386
1995Q4	.	4.16319	3.13001	24.6339	29.9384

Variant with the highest growth:

Constant FL = .2800000

		Y	FI	L	SGSP
1995Q1	.	44.0546	4.80000	1.89337	-1.27086
1995Q2	.	45.2252	4.80000	1.89807	-2.64780
1995Q3	.	45.6801	4.80000	1.88086	-3.59150
1995Q4	.	49.1989	5.80000	2.08874	-12.2913
		TP	PU	PL	YRD
1995Q1	.	12.2053	2.93394	24.5028	21.7846
1995Q2	.	9.22433	2.99480	25.0615	23.2468
1995Q3	.	7.96642	3.04807	25.5339	23.1855
1995Q4	.	4.04688	3.14044	24.6046	31.5118

It is worth to note that output is in 1984 prices but the net exports and additional tax are in current prices. Thus if the policy maker strongly prefers output growth, he might choose the maximal value of both investment and labour transfers as well. This policy mix turned out to be quite effective.

Both upper optimal solutions are corner solutions. This means either that the bounds for the maximal values of transfers must be determined in another way, or that the range of variation of tool variables was too small. If the optimum lied inside the range of variation, the solution could show the really optimal values of the tool variables. In this case, however, we can only analyze the direction.

Results of the grid search can be generalized in following way:

- The transfers for labour are at small values more effective than investment transfers. They effectively avoid crowding out of labour that is the main burden of harmonic growth. They have positive impact on output, employment, can be financed without

increasing taxes (or even reducing taxes) but worsen net exports moderately and feed inflation to a small extent.

- Prices are determined mainly by exogenous import prices, they are affected by the wages and demand quite little.
- There is a trade off between labour transfers and investment transfers concerning output growth. Higher investment transfers and lower labour transfers could possibly hurt net exports less in the long run, but the unemployment would rise overproportionally and volume of taxes would have to be increased (variants I and II). On the other hand, they support the needed technical change and productivity growth.
- In the case of high value of investment transfers (4.8 bln Sk) their efficiency to rise output drops.

5. Conclusion

This work presents an improved version of the econometric model of Slovak economy. Technological changes are taken into account, investment function is reformulated and linked with income distribution.

The new version yielded forecasts feasible in the long run, although it failed to predict real paths. The main reason were lacking data and changing relations in 1995. Link between technical change and demand and consumption of fixed capital will have to be taken into account in future versions.

After introducing the most important taxes, budget expenditures and establishing condition for state budget two approaches to search for optimal policy are presented. Investment transfer alone have in this model structure only limited efficiency because capital tends to crowd labour from production process. This makes non-investment transfers necessary, tat can be financed even whiteout increasing volume of taxes. However, a worsening of net exports has to be expected.

References

- Barro, R. and Sala-i-Martin, X.: *Economic Growth*, New York etc., McGraw Hill, 1995.
- Bencik, M.- Palenik, V.: *Makroekonomický model SR I*, Bratislava, Institute of Economics SAS, 1993.
- Boehm, B. et al.: *Interaktive Optimierung der Wirtschaftspolitik*, Wien, Institut für Ökonometrie, Operations Research und Systemtheorie TU Wien, 1988.
- Dornbusch, R. - Fischer, S.: *Macroeconomics*, sixth edition, New York etc., McGraw Hill, 1994.
- Hall, R. E. - Taylor, J. B.: *Macroeconomics*, 2nd edition, Norton and company, 1988.
- Palenik, V. et al.: *Analyza hospodárskej politiky SR a simulácia alternatívnych opatrení (z vyhodnotením očakávaných výsledkov)*, 2. etapa riešenia, Bratislava, Institute of Economics SAS, 1994.
- Palenik, V. et al.: *Dlhodobá stratégia ekonomického rozvoja Slovenskej republiky (Základné problémy a návrh ich riešenia)*. *Ekonometrický model ekonomiky Slovenska*, Bratislava, Economic Institute SAS, 1995a.
- Palenik, V. et al.: *Makroekonomický model SR*, 3. etapa riešenia, Bratislava, Institute of Economics SAS, 1995b.
- Palenik, V., Bencik, M.: *Simulation des alternatives choisies de la politique économique de la République Slovaque*. In: *Econometrics of Transition, Integration and Development (Proceedings)*, vol.2, Warsaw, 1995.
- Ramanathan, R.: *Introductory Econometrics with Applications*, third edition, Fort Worth etc., The Dryden Press, 1995.

List of Variables²

Symbol	Definition
<i>C</i>	Private consumption, bln. Sk, 1984 prices
<i>CP</i>	Private consumption, bln. Sk, current prices
<i>DIFF</i>	Exogenous additive term in budget expenditures
<i>DIFFP</i>	Exogenous additive term in budget receipts
<i>DIFYZ</i>	Exogenous additive term in equation for profit
<i>DJ</i>	Increase of stocks and inventories, bln. Sk, 1984 prices
<i>DJP</i>	Increase of stocks and inventories, bln Sk, current prices
<i>DVK</i>	Investment-labour ratio
<i>EGS</i>	Exports of goods and services, bln. Sk, 1984 prices
<i>EGSP</i>	Exports of goods and services, bln Sk, current prices
<i>F</i>	Expenditures of state budget, bln.Sk
<i>FC</i>	Social benefits, bln Sk
<i>FI</i>	Investment expenditures of the state budget (mainly subsidies and transfers)
<i>FL</i>	Transfers supporting labor, bln.Sk
<i>F</i>	Receipts of state budget, bln.sk
<i>G</i>	Government consumption, bln Sk, 1984 prices
<i>GP</i>	government consumption, bln Sk, current prices
<i>I</i>	Gross fixed investment, bln Sk, 1984 prices
<i>IP</i>	Gross fixed investment, bln Sk, current prices
<i>IPR</i>	Share of investment covered by private resources
<i>IR</i>	Nominal interest rate, deposits, %
<i>IRE</i>	Index of exchange rate, Sk/USD, 1984=1.
<i>IRU</i>	Discount rate, %
<i>L</i>	Employment total, mil. persons
<i>LS</i>	Labour source, mil. persons
<i>LU</i>	Number of unemployds, thousands persons
<i>M0</i>	Currency outside banks, bln Sk
<i>M2</i>	Supply of money, bln Sk
<i>MGS</i>	Imports of goods and services, bln Sk, 1984 prices
<i>MGSP</i>	Imports of goods and services, bln Sk, current prices
<i>MW</i>	World imports, bln USD, 1984 prices
<i>NP</i>	Number of inhabitants in productive age, mil. persons
<i>NPP</i>	Number of inhabitants in post-productive age, mil. persons
<i>PC</i>	Private consumption deflator, 1984=1.
<i>PEGS</i>	Deflator of exports of goods and services, 1984=1.
<i>PI</i>	Deflator of gross fixed investment, 1984=1.
<i>PL</i>	Labour productivity
<i>PMGS</i>	Deflator of imports of goods and services, 1984=1.
<i>PU</i>	Consumer price index, jan.1984=1.

²Some variables appear with praefix L for natural logarithm and DL for its diference, mainly in computer outputs.

<i>PMW</i>	World exports price index, 1984=1.
<i>PY</i>	GDP deflator, 1984=1.
<i>QPCR</i>	Ratio between private consumption deflator and consumer price index
<i>QTI</i>	Tax rate for VAT
<i>QTW</i>	Tax rate for personal income
<i>R</i>	Nominal interest rate, deposits, $1+r$
<i>RIR</i>	Real interest rate, deposits, %
<i>SGS</i>	Trade balance, bln Sk, 1984 prices
<i>SGSP</i>	Trade balance, bln Sk, current prices
<i>TI</i>	Volume of VAT, bln.Sk
<i>TP</i>	Additional tax (profit tax), bln.Sk
<i>TW</i>	Financial payments - taxes and duties of households, bln Sk
<i>U193</i>	Dummy variable, 1. quarter 1993=1
<i>U392</i>	Dummy variable, 3. quarter 1992=1
<i>U393</i>	Dummy variable, 3. quarter 1993=1
<i>U492</i>	Dummy variable, 4. quarter 1992=1
<i>Ui</i>	Dummies corresponding to exogenous shocks, $i=C, EGS, I, MGS, PU$
<i>U94</i>	Dummy, 2. and 3. quarter 1994=1
<i>UNTS</i>	Dummy variable corresponding to the abolition of revenue tax and establishment of VAT and consumption taxes
<i>W</i>	Average monthly nominal wage, thousands Sk
<i>WR</i>	Average monthly real wage, thousands Sk
<i>Y</i>	Gross domestic product, bln Sk, 1984 prices
<i>YD</i>	Disposable income of households, bln Sk
<i>YP</i>	Gross domestic product, bln Sk, current prices
<i>YPO</i>	Other income of households, bln Sk
<i>YRD</i>	Real disposable income of households, bln Sk
<i>YW</i>	Working income, bln Sk (mainly wage income)
<i>YZ</i>	Profits of non-financial organisations, bln Sk
<i>YZP</i>	Profits deflated with GDP deflator

Institut für Höhere Studien
Institute for Advanced Studies

Stumpergasse 56

A-1060 Vienna

Austria

Phone: +43-1-599 91-145

Fax: +43-1-599 91-163