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

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Analysis and Econometric Modelling of the Fiscal Sector in the Slovak Republic

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Abstract

For the modern history of the SR, the state budget data from the period of CSFR are not relevant according to the existence of two republic budgets with strong mutual relations and two-way flows. In 1996, a new budget composition based on foreign experiences was introduced. The first two parts of the study contain analyses of the revenue and expenditure side during the period 1993–1997. The third part presents an econometric submodel of the fiscal sector of the SR which consists of 15 equations; 6 of them dealing with the tax revenue items of the state budget (taxes on income of natural persons, taxes on income of legal entities, value added tax, excise taxes, customs duty, and import surcharge) are of the stochastic type. This submodel will be incorporated into the quarterly econometric model of the Slovak economy.

Keywords

State budget, revenue and expenditure, regression equation, econometric model

JEL-Classifications

C32, C35, C51, E62

Comments

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Contents

Introductory Remarks

A deeper analysis of the revenue and expenditure side of the state budget (SB) of the Slovak Republic (SR) is not an easy matter. There are several reasons for such a statement:

- the whole history of the actual state budget in fact refers to the last 5 years. For the modern history of the SR, data from the period of CSFR are not relevant according to the existence of federal and two republic budgets with strong mutual relations and two-way flows.

- for 1993, also the revenue and expenditur related to old-age, health and sickness insurance including unemployment benefits were a part of the SB. Since 1994, these financial flows have been budgeted separately.

- in the budget for 1996 (thus, during the year 1995), a new budget composition based on the foreign experiences (especially of France) was introduced which was mainly related to the changes in the structure of the expenditure side of the budget.

- the current expenditure structure, as it is shown in table 2, is unfortunately based on aggregates which were subject to methodological changes not only in 1996 (with regard to the introduction of the new budget composition) but also in 1995.

- since the beginning of 1993, a new tax system has come into force (VAT instead of turnover tax and other changes); its introduction was marked by different subject and object problems which caused significant failures in the tax income.

- during 1993–1995, the clearing with the Czech Republic (CR) acted in a non-system way which once appeared on the expenditure side and next time on the revenue side.

Some of the above mentioned facts supported our idea on the partial correction of data. It is true that for doing corrections we do not always have precise data sources (because they do not exist at all), however, we have corrected the revenue and expenditure of SB for 1993 by the influence of old-age and other insurance.

We would like to say at the beginning that in the following we will almost exclusively deal with the state budget. This means that in the current research phase we do not take into account the existence of the budget of municipalities, state funds and we also leave aside the creation and use of budgets of the Social Insurance Company, Health Insurance Companies and the National Labour Office.

1. Analysis of the State Budget of the SR in Particular Years (1993–1997)

The state budget for 1993 and its utilisation from an analytical point of view are very "unfavourable". The reasons result from the introductory remarks. Data for this year are presented in table 1 and 2 in two rows. The first row contains data as they have been published by the Ministry of Finance. The second row is a result of our effort to recalculate the particular data in order to comply with the 1994 methodology and by this approach to obtain the consistent time series to be appropriate also for other types of analyses (e.g. by using mathematical, statistical, and econometric methods).

The development of the Slovak economy in 1993 was significantly influenced by the establishment of the independent SR, by the process of formation of new relations to the CR as well as by the continuous recession in the world economy. The state budget of the SR for 1993 was adopted as balanced while its revenue and expenditure were presupposed up to an amount of 158.2 billion SKK (table 1 and 2). The remainder of SB in 1993 was caused by the assumed revenue up to an amount of 7.9 billion SKK being unfulfilled as well as by the exceeding of expenditure by 15.2 billion SKK.

Thus, the state budget management concluded with the remainder of 23 billion SKK. The settlement of the clearing balance between the CR and SR improved the result of budget management by 5.8 billion SKK. The actual balance (after excluding the influence of clearing) would be 28.8 billion SKK, which represented 7.8% of GDP generated in 1993. The deepening of the economic decline and the introduction of the new tax system, which due to the insufficient tax discipline caused an estimated failure in revenue by more than 18 billion SKK, negatively influenced the fulfilment of the SB in 1993.

The SB in 1994 was laid out as imbalanced by amount of 14.6 billion SKK with the initially presupposed revenue amounting to 124.5 billion SKK (after the consequent adjustment it was 134.7 billion SKK) and expenditure of 138.5 billion SKK (adjusted to 149.3 billion SKK). The crucial change in the structure of revenue and expenditure of the SB occurred in the area of funding old-age, health and sickness insurance and unemployment benefits, which were ensured since 1 January 1994 by the National Insurance Company and the Employment Fund. The SB concluded with a deficit amounting to 22.9 billion SKK. In 1994, the SR found itself in a positive position within the clearing settlement with the CR, which from the budget standpoint meant that the result was deteriorated by the debit of expenditure side of the SB by 14.0 billion SKK. Without this influence, the actually reported deficit of the SB in 1994 would represent 8.9 billion SKK only (i.e. only 61% from the planned 14.6 billion SKK). The higher fulfilment of revenue of the modified SB were mainly due to a higher revenue from taxes (exceeding by 5.3 billion SKK), especially taxes on income of natural persons and legal entities as well as excise taxes (VAT was fulfilled only to 91%). In addition to clearing and as the current expenditure was

used only to the 97.7% from the SB, the capital expenditure of budgetary and subsidised organisations contributed to the exceeding of the modified expenditure of the SB only. The total evaluation of the budget management in 1994 seems favourable because if we take into account that in addition to clearing (which is substantially the repayment of the principal) also the debt amounting to 7.2 billion SKK (total 21.2 billion SKK) has been paid and thus, the fiscal deficit has only been 1.7 billion SKK.

In 1995, the SB was adopted as imbalanced with total assumed revenue of 146.4 billion SKK and expenditure amounting to 167.4 billion SKK, thus, with the anticipated deficit of 21 billion SKK. However, the actual SB concluded with the balance being only 8.3 billion SKK and after the repayment of principal had been taken into account, even a surplus of the fiscal round amounting to 1.5 billion SKK had been reached. The budget revenue exceeded against the assumptions by 16.7 billion SKK, which was caused especially by the exceeding of the revenue from VAT (by 9.1 billion SKK, i.e. by 21% against the budget proposal), taxes on income of natural persons, import taxes and import surcharge as well as the non-tax revenue. Those in comparison with the plan were higher by 8.4 billion SKK, which with the relatively low basis (11.8 billion SKK) represented the fulfilment on 171.1%. In the revenue structure, only in the case of excise taxes the budget intentions had not been fulfilled. The use of expenditure exceeded against the assumptions only by 4 billion SKK, mainly in the part of capital expenditure, due to which the expenditure of the SB reached 171.4 billion SKK. The budget management in 1995 also showed that in comparison with the quite successful year 1994 it was still a lot to be improved and that the balanced fiscal round was not an unrealistic aim for the Ministry of Finance of the SR. However, on the other hand works on the preparation of the 1996 budget already started. And here the quality of the 1994 and 1995 development did not appear at all.

The adopted SB for 1996 counted with a deficit higher than the deficits planned and actually reached so far. The planned revenue being 165.5 billion SKK was by 13% higher in comparison with the plan for 1995; expenditure amounting to 192.4 billion SKK was higher by 14.9%. Unfortunately, reality ended absolutely differently. It was not the case of the aims not being fulfilled, the revenue was even higher by 0.8 billion SKK and expenditure lower by 0.5 billion. From the SB gross balance standpoint, a better result had been reached by 1.3 billion SKK as compared to plan. The problem is to be seen in the fact that in comparison with the reality of 1995, the revenue was higher by only 3.2 billion SKK, i.e. by 2%, but the expenditure exceeded the reality of 1995 by 20.5 billion SKK, which was a 12% increase. From the SB revenue structure standpoint, three main taxes failed (VAT, excise taxes, and the tax on income of legal entities) in the range of 7–14% which together represented lower revenue by 12.8 billion SKK. This is to be understood as the second negative feature of the SB in 1996 because the high revenue fulfilment in all other items (mainly in non-tax revenue, which against intentions was higher by 9.1 billion SKK, i.e. by 82.4%) was sufficient only for the coverage of the above mentioned unfulfilment. On the SB expenditure side in 1996, the overflow of capital

expenditure occurred by 3.6 billion SKK, which, however, was sufficiently counterweighted by the lower utilisation of current expenditure and lower repayment of principal against the plan. The principal repayment reached 18 billion SKK, which oscillated around 10% of the SB revenue or expenditure, and at the end it meant that the fiscal deficit ended at the level of 7.6 billion SKK.

From the adopted and utilised budget point of view, the year 1997 may be evaluated as a „continuation from 1996 with the augmentation of its negative tendencies“. The adopted budget was deficit with the remainder of 36.9 billion SKK and the fiscal balance being 11.7 billion SKK. The total revenue was assumed in the amount of 171.1 billion SKK and had to be fulfilled by revenue from taxes being more than 90%. The total expenditure was budgeted to 208 billion SKK while 76.1% had to be used for current expenditure, 10.3% for capital expenditure, and the rest for the principal repayment and other small items. The budgeted revenue and expenditure were identically overdrawn by 9.7 billion SKK (more precisely expenditure by 9.8), thus, in the area of balances the intentions were more or less kept, however, with an absolutely different structure of the revenue and expenditure side as compared to the adopted budget.

On the revenue side, the tax revenue fulfilment to a great extent was not maintained. Their total amount was only 145.5 billion SKK, which by 9.1 billion SKK was lower than the plan (while the total revenue exceeding was 9.7 billion SKK). The actual SB revenue fulfilment thus in 1997 had an absolutely different structure as compared to the assumptions. Revenue from taxes covered only 80% from the total revenue. For instance, tax on income of legal entities was budgeted up to 40.5 billion SKK, the withdraw was 23.4 billion SKK, so the fulfilment of this tax item was only 57.7%, and the SB actually sought sources "wherever it was possible". Hence, on the revenue side a high item marked as "grants" amounting to 14.4 billion SKK appeared, which was mainly fulfilled by the transfer of sources from the State Fund on the Road Management into the SB revenue (Chapter MDP and T) to an amount of 13.7 billion SKK, which were intended for the construction of highways. This item (grants) has immediately been mirrored also on the expenditure side in the part of capital expenditure (because there originally it has been stated systemically and non-systemically).

What we would like to point out by the previous remarks is the fact that such interventions on the SB configuration make the work harder to everybody who consequently wants to evaluate the SB development within the context of the adopted aims. The above mentioned „gross interference into the budget matter-of-fact creation“ almost eliminates the whatever direct use of statistical methods based on the comparison of the development of particular items in time.

2. Analysis of the Development of Particular State Budget Revenue and Expenditure Items During 1993–1997

There is no doubt about the fact that the creation of SB generally is a very demanding work. This is especially true for countries which currently are involved in a transformation process because already the sole concept of transformation implies that nearly everything of the economy is in move. It is not realistic to expect the fluent or stable development of data characterising the particular areas also of our economy. The new tools of the economic, fiscal, and monetary policy are introduced, some of them with the stable message, some with temporary character only, and it is not always sure whether the reactions of economic subjects as a whole will be in line with the economic theory. The development of particular SB items in the SR during the recent five years has fully confirmed it.

2.1 Revenue

If we have a look on the part of the table 1 "budget fulfilment", we shall see that at the level of total revenue the intentions have always be maintained, in the best year in 1995 even up to 111.4%. However, the particular revenue items evidenced much more variability with the often occurrence of "red numbers" witnessing the unfulfilment of the original intentions. It is especially true for VAT and excise taxes, where the budget exceeding has succeeded only once, but it also concerns the tax on income of legal entities, which has absolutely fallen for the third time in 1997. In 1997, the revenue from this tax was lower as in 1995 by 10.3 billion SKK and the budget intentions were fulfilled with 57.7% only. The opposite development appears with the tax on income of natural persons, which by its annual growth rates around 30% each year contributes to the budget each year with the average amount of 5 billion SKK higher as compared to the previous year. A similar positive development is registered with other tax income.

Table 1: State budget revenue

Year	Total revenue	Tax income	of which : VAT	Excise taxes	Tax on income of legal entities	Tax on income of nat. persons	Import taxes	Other tax income	Non-tax income	Repay. of credits, loans and a sale of shares	Other: Clearing grants, credits received
Absolute values, bill. SKK											
1993[1]	**150,3**	**127,3**	27,5	15,4	20,5	4,6	4,5	54,8	**13,0**	**4,2**	**5,8**
1993[2]	**109,7**	**86,7**	27,5	15,4	20,5	4,6	4,5	14,2	**13,0**	**4,2**	**5,8**
1994	**139,1**	**110,6**	36,9	21,0	28,4	11,3	4,9	8,0	**24,8**	**3,8**	**0,0**
1995	**163,1**	**136,5**	52,3	20,0	33,7	15,8	5,4	9,3	**20,2**	**3,7**	**2,8**
1996	**166,3**	**140,1**	48,6	21,6	32,3	20,4	5,9	11,2	**20,2**	**2,5**	**3,5**
1997	**180,8**	**145,5**	54,9	21,9	23,4	25,6	5,3	14,5	**14,1**	**1,2**	**19,9**
Growth rates in %											
1994[3]	**26,9**	**27,6**	34,4	36,1	38,3	147,0	10,6	-43,8	**90,6**	**-9,5**	
1995	**17,2**	**23,5**	41,8	-5,0	18,5	39,4	10,4	17,0	**-18,5**	**-3,7**	
1996	**2,0**	**2,6**	-7,1	8,4	-4,0	29,1	8,8	20,5	**0,3**	**-32,4**	
1997	**8,7**	**3,9**	12,9	1,1	-27,7	25,7	-11,2	29,3	**-30,3**	**-50,1**	
Shares in GDP											
1993[1]	**0,407**	**0,345**	0,074	0,042	0,056	0,012	0,012	0,148	**0,035**	**0,011**	**0,016**
1993[2]	**0,297**	**0,235**	0,074	0,042	0,056	0,012	0,012	0,038	**0,035**	**0,011**	**0,016**
1994	**0,316**	**0,251**	0,084	0,048	0,065	0,026	0,011	0,018	**0,056**	**0,009**	**0,000**
1995	**0,316**	**0,264**	0,101	0,039	0,065	0,031	0,011	0,018	**0,039**	**0,007**	**0,005**
1996	**0,289**	**0,243**	0,084	0,038	0,056	0,035	0,010	0,019	**0,035**	**0,004**	**0,006**
1997	**0,277**	**0,223**	0,084	0,033	0,036	0,039	0,008	0,022	**0,022**	**0,002**	**0,031**
Shares in total revenue											
1993[1]	**1,000**	**0,847**	0,183	0,103	0,137	0,031	0,030	0,365	**0,086**	**0,028**	**0,039**
1993[2]	**1,000**	**0,790**	0,250	0,141	0,187	0,042	0,041	0,129	**0,118**	**0,039**	**0,053**
1994	**1,000**	**0,795**	0,265	0,151	0,204	0,081	0,035	0,057	**0,178**	**0,027**	**0,000**
1995	**1,000**	**0,837**	0,321	0,122	0,206	0,097	0,033	0,057	**0,124**	**0,023**	**0,017**
1996	**1,000**	**0,842**	0,292	0,130	0,194	0,123	0,036	0,067	**0,122**	**0,015**	**0,021**
1997	**1,000**	**0,805**	0,303	0,121	0,129	0,142	0,029	0,080	**0,078**	**0,007**	**0,110**
Shares in tax income											
1993[1]		**1,000**	0,216	0,121	0,161	0,036	0,035	0,431			
1993[2]		**1,000**	0,317	0,178	0,237	0,053	0,051	0,164			
1994		**1,000**	0,334	0,190	0,257	0,103	0,045	0,072			
1995		**1,000**	0,383	0,146	0,247	0,116	0,040	0,068			
1996		**1,000**	0,347	0,154	0,231	0,146	0,042	0,080			
1997		**1,000**	0,377	0,150	0,161	0,176	0,036	0,100			
Budget, bill. SKK											
1993[1]	**158,2**	**145,7**	30,5	20,1	32,4	5,4	4,1	53,2	**4,7**	**7,8**	
1993[2]	**107,1**	**94,7**	30,5	20,1	32,4	5,4	4,1	2,2	**4,7**	**7,8**	
1994	**134,7**	**105,3**	40,6	20,8	26,7	9,0	4,4	3,8	**23,0**	**6,4**	
1995	**146,4**	**129,8**	43,2	25,4	33,0	14,8	4,8	8,6	**11,8**	**4,8**	
1996	**165,5**	**145,1**	54,7	23,3	37,3	17,7	4,4	7,7	**11,1**	**6,3**	**3,0**
1997	**171,1**	**154,6**	55,0	24,0	40,5	22,4	5,8	6,9	**12,1**	**4,4**	
Budget fulfilment, in %											
1993	**95,0**	**87,4**	90,1	76,8	63,4	85,0	108,6	103,0	**276,3**	**54,2**	
1993	**102,4**	**91,5**	90,1	76,8	63,4	85,0	108,6	644,1	**276,3**	**54,2**	
1994	**103,3**	**105,0**	90,9	101,1	106,4	126,0	112,0	209,5	**107,6**	**59,8**	
1995	**111,4**	**105,2**	121,1	78,6	102,0	106,8	113,3	108,3	**171,1**	**76,7**	
1996	**100,5**	**96,6**	88,9	92,9	86,7	115,3	134,5	145,8	**182,4**	**39,5**	**115,5**
1997	**105,7**	**94,1**	99,8	91,1	57,7	114,5	90,6	210,3	**116,6**	**28,2**	

Remarks: [1] Original data

[2] Data net of revenue and expenditure on old-age, health and sickness insurance and employment

[3] Growth rate in comparison with adjusted year 1993

Table 2: State budget expenditure

Year	Total expen-diture	Current expen-diture	of which:		Capital expen-diture	Loans, partic. in equity + principal repayment	of which:	Clearing	SB balance	Fiscal remainder of SB
			Current exp. on public consump. of the popul. and gov.	Current transfers			Principal repay-ment			
Absolute values, bill. SKK										
1993[1]	173,4	149,1	133,7	15,4	12,2	12,0	12,0	0,0	-23,0	-16,8
1993[2]	132,7	108,5	93,0	15,4	12,2	12,0	12,0	0,0	-23,0	-16,8
1994	162,0	128,8	108,2	20,6	12,0	7,2	7,2	14,0	-22,9	-1,6
1995	171,4	143,8	104,4	39,4	15,2	12,5	12,5	0,0	-8,3	1,5
1996	191,9	148,4	78,6	69,8	25,5	18,0	18,0	0,0	-25,6	-7,6
1997	217,8	154,1	82,9	71,2	34,3	29,5	25,0	0,0	-37,0	-12,0
Growth rates in %										
1994[3]	22,1	18,8	16,4	33,6	-1,9	-40,2	-40,2			
1995	5,8	11,6	-3,5	91,4	26,6	74,1	74,1			
1996	11,9	3,2	-24,7	77,4	68,3	43,4	43,4			
1997	13,5	3,8	5,4	2,0	34,3	64,1	39,1			
Shares in GDP										
1993[1]	0,470	0,404	0,362	0,042	0,033	0,033	0,033	0,000	-0,062	-0,045
1993[2]	0,359	0,294	0,252	0,042	0,033	0,033	0,033	0,000	-0,062	-0,045
1994	0,368	0,292	0,246	0,047	0,027	0,016	0,016	0,032	-0,052	-0,004
1995	0,332	0,278	0,202	0,076	0,029	0,024	0,024	0,000	-0,016	0,003
1996	0,333	0,258	0,137	0,121	0,044	0,031	0,031	0,000	-0,044	-0,013
1997	0,333	0,236	0,127	0,109	0,052	0,045	0,038	0,000	-0,057	-0,018
Shares in total expenditure										
1993[1]	1,000	0,860	0,771	0,089	0,070	0,069	0,069	0,000		
1993[2]	1,000	0,817	0,701	0,116	0,092	0,091	0,091	0,000		
1994	1,000	0,795	0,668	0,127	0,074	0,044	0,044	0,087		
1995	1,000	0,839	0,609	0,230	0,088	0,073	0,073	0,000		
1996	1,000	0,774	0,410	0,364	0,133	0,094	0,094	0,000		
1997	1,000	0,708	0,381	0,327	0,157	0,135	0,115	0,000		
Shares in current expenditure										
1993[1]		1,000	0,897	0,103						
1993[2]		1,000	0,857	0,142						
1994		1,000	0,840	0,160						
1995		1,000	0,726	0,274						
1996		1,000	0,530	0,470						
1997		1,000	0,538	0,462						
Budget, bill. SKK										
1993[1]	158,2	138,5			11,9	7,8	7,8		0,0	7,8
1993[2]	107,1	87,4			11,9	7,8	7,8		0,0	7,8

1994	149,3	131,8	112,3	19,5	9,7	7,8	7,8		-14,6	-6,8
1995	167,4	142,8	104,2	38,6	11,4	13,2	13,2		-21,0	-7,8
1996	192,4	151,2	78,5	72,8	21,9	19,4	19,4		-26,9	-7,5
1997	208,0	158,2	84,4	73,8	21,4	28,4	25,2		-36,9	-11,7
Budget fulfilment, in %										
1993	109,6	107,7			102,6	154,2	154,2			
1993	123,9	124,1			102,6	154,2	154,2			
1994	108,5	97,7	96,4	105,5	123,4	92,2	92,2			
1995	102,4	100,7	100,2	102,0	132,9	94,8	94,8			
1996	99,7	98,2	100,1	95,9	116,5	92,5	92,5			
1997	104,7	97,4	98,2	96,5	160,1	103,7	99,1			

Remarks: [1] Original data

[2] Data net of revenue and expenditure on old-age, health and sickness insurance and employment

[3] Growth rate in comparison with adjusted year 1993

Despite having tried to construct an alibi for the authors of the SB in case it failed, regarding the budget creation we have to state that almost for 3-4 years in succession the same situation has been repeating itself. The point is that each year the same items in the budget proposal are overvalued and tax authorities are not able to obtain this revenue and, conversely, other tax items seem as not to be trustful, however, they always bring a surprise. Maybe these four years of experiences might already appear in the more balanced fulfilment of the SB.

All mentioned tendencies in the SB creation and fulfilment over the last four years are unambiguously expressed by the development of shares of particular SB revenue items in GDP. The share of total SB revenue in GDP has rapidly decreased within the last two years– from 31.7% to 27.7%, i.e. by 4 percentage points, while the entire decrease was on the debit of tax income. Within the tax items, VAT has the highest share. Except for the „good" year 1995, the share of VAT in GDP is kept at the level of 8.4%.

From the revenue structure standpoint, the tax income always kept its dominant position, only in the previous year this position was slightly modified by the already mentioned grant (the transfer from the Fund on the Road Management Support). If we, however, go deeper into the total or tax income structures, we shall find out that VAT and excise taxes fully stagnate and that several partial measures on their strengthening (since 1994) have not found an echo in the really higher revenue from these taxes. Import taxes, except for the previous year, hold the level of 4% from tax income. The increase of the revenue from import taxes in 1996 and its decrease in 1997 mainly relates to the development of our import. It can be said that import taxes copy the development of the import growth rate but with regard to the fact that in this case the high correlation is to be assumed, it cannot be said that it has been confirmed. The import of goods and services nominally increased in 1996 by 25.9% but import taxes only by 8.8%; in 1997 the import was higher (only) by 3.5% but the import taxes fell by 11.2%. It seems that on our state border it would be possible to help the SB revenue side quite significantly. Another area which asks for improvement is the tax on income of legal entities. Four years ago, its share in the total or tax income of the SB was 2.5 times higher in comparison with the tax on income of natural persons; in 1997, it only represented 90% from the tax on income of natural persons.

2.2 Expenditure

During the last four years the expenditure side of the SB has registered a step-by-step increase of the growth rate at the actually reached amounts and a similar oscillation in the fulfilment of budget intentions as in revenue. First of all, we shall focus on the basic breakdown of expenditure, i.e. on current expenditure and capital expenditure.

The current expenditure of SB has stagnated during recent years. The growth rates during the last two years only reached 3-4% per year, and from the budget fulfilment point of view they implied a saving regime. The consequences of this development appear in all derived

indicators. The share of total expenditure in GDP is maintained for three years in succession at the level of 33.3% but the share of current expenditure in GDP has fallen by more than 4%, and the share of current expenditure in the total SB expenditure has fallen by 13%.

This development has reciprocally appeared in the other main expenditure item – in capital expenditure. The SB expenditure development in this area from each standpoint is enormously expansive. The fact that the budget intentions were exceeded by 16%, 23%, 33%, and in the previous year even by 60% was expressed by the growth rates of capital expenditure actually reached in the last three years: 27%, 68% and 34%. Despite the acceptation of all arguments and high stochasticity, uncertainty, and conditionality of investment processes, this part of SB is the most visible demonstration of the particular bodies not being able to manage the budget process (or not being able to respect the agreed aims). We would like to highlight the deepness of this statement with the help of the contents of particular items. Substantially, the wages in public sector are broken through budget measures each year, the requisite transfers to all insurance companies are not paid, and the expenditure is cut in the education, health and culture sector and elsewhere. After the introduction of the new budget composition in 1996, the current expenditure further used to be broken down into current expenditure on the public consumption of the population and government and on current transfers. With regard to the change in the aggregation formula, the analysis of the development of these aggregates is not an appropriate form of view on the SB expenditure development. Hence, a development of particular current and other expenditure items is presented in table 3 in a more detailed breakdown. If we do not take into account the development in 1993 (a different methodology), we shall find out that some items have been subject to great variations during this short four-years´ time period. In the row „interest“, a value close to 12 billion SKK appears for the last three years.

2.3 Clearing Problem in Trade with the CR within the Calculation of Principal Repayment

In 1993–1996, an agreement on the direct clearing of the mutual trade between the SR and CR was valid by which the balance accumulated during the year was settled as of 31 December either on the revenue or on the expenditure side of SB. According to the available sources in:

- 1993, 5.8 billion SKK were included into revenue;
- 1994, 14.0 billion SKK were included into expenditure;
- 1995, 2.8 billion SKK were included into revenue.

Table 3: Development of expenditure of the state budget of the SR (billion SKK)

Economic breakdown of expenditure	1993	1994	1995	1996	1997
Total expenditure	173.4	162	171.4	191.9	217.8
Current expenditure	149.1	128.8	143.8	148.4	154.1
of which :					
– wages	16.4	17.4	19.3	21.3	23.8
– premiums	.	14.6	12	8.2	19.5
– expenditure on goods and services	40.1	43.2	61.1	66.3	39.8
– subsidies into business enterprise sector	15.2	14	14.3	13.7	14.8
– subsidies into the budget of municipalities	1.1	0.8	0.9	0.9	1.1
– contributions to the state funds	1.6	2.5	3.3	4.1	8.5
– social benefits	61.1*	19.4	21	21.8	25.4
– interest	11.7	16.7	11.6	12.1	11.6
Capital expenditure	12.2	12.0	15.2	25.5	34.3
of which:					
– inv. subsidies into enterprise sect.	3.1	2.3	2.4	3.1	3.5
– inv. subsidies to municipalities	0.4	0.2	0.3	0.3	0.7
Participation in equity and loans	12	21.2	12.5	18	29.5
of which:					
– provision of loans					4.5
– principal repayment	12	21.2	12.5	18	25.0

*including social security, health and old-age benefits

It has not always been dealt unambiguously with the above mentioned sums. An unambiguous situation is given within the evaluation of the SB fulfilment in 1994 when the 14.0 billion SKK is understood as a part of the principal repayment amounting to 21.2 billion SKK.

However, the opposite payment flows in 1993 and 1995 were not treated in this way. In the sole material which was at our disposal (the proposal on the updating of the financial policy strategy for 1998–2000, with the prospect to 2002, January 1998, table annex F7), the principal repayment is presented in 1993 as 5.9 billion SKK but in the same material, a sum of 12 billion SKK is indirectly stated in table F1. In our opinion it was a gross principal repayment which must be decreased by the value of revenue from clearing. A similar situation also repeats in 1995 when the reported principal repayment of 12.5 billion SKK is to be decreased by 2.8 billion SKK (with regard to clearing, the SB did not pay, but the opposite is true, it received the mentioned sum into the budget fulfilment).

3. Modelling of the Relations in the Field of Revenue and Expenditure of the State Budget of the SR

3.1 General Remarks

Despite the fact that the construction of macro-economic models of the econometric type has almost a 30-years´ tradition in the Slovak Republic, the econometric modelling of the more detailed revenue and expenditure breakdown of the SB has no history at all. There are several reasons for it. Firstly, in the past, there was no interest from central bodies on modelling and forecasting the indicators in the field of state finance because a hard (decisive) budgeting of particular Ministries of Finance (MF) was valid; in the former CSFR, three MF and three mutually related budgets existed. At the same time, this was the second reason because there was no effort from econometric-modelling staff to start an analysis of the complicated relations in the area of three state budgets. The third reason was the lack of statistical data; only main aggregates – revenue, expenditure, and possibly the balance of the state budget – were published.

After the establishment of the independent SR in 1993, a demand for predictions of the revenue and expenditure state budget side in a detailed breakdown has increased from the MF SR because also the MF SR has suffered (and still is suffering) by a lack of history, a lack of long-term experience in the preparation of the state budget proposal of the independent country its economy being based on the market principles. Within the creation of the main documents (state budget and the monetary programme), the MF SR but also the National Bank of Slovakia (NBS) in addition to the macroeconomic indicators (GDP, inflation, unemployment, state budget balance, trade balance, or current account remainders), which represent the basic framework of the above mentioned documents, also need the deeper broken prognoses of the state budget revenue and expenditure side. Despite the effort of prognostic and econometric experts, this demand has not yet been satisfied. The main reason is constituted by the fact that only short-time series are available. The significance of the problem with time series is held in the fact that no data on the state budget structure of the Slovak Republic have existed before 1993 in such a way that being compatible with 1993 data and after the adjustment (according to the way how we have adjusted the data for 1993) they would extend the particular time series by several time periods before 1993.

It seems, however, that after five years of independence of the Slovak Republic, relatively homogenous time series are to be gathered which are interesting for modelling especially in the quarterly disaggregation. Nowadays (i.e. May 1998), time series with a length of 20 quarters are at our disposal, which quite successfully can be used within the regression analysis.

There is another aspect which brakes (or does not support) the development of the modelling presentation of the disaggregated fiscal sector and that is the lack of appropriate relevant sources in the foreign literature. However, if something has appeared, the described model relations depending on the degree of the development of economy are either very sophisticated (e.g. several different taxes within the New Zealand model [7]) or, conversely, very simple (e.g. Polish model [22], Sri Lankan Model [19]).

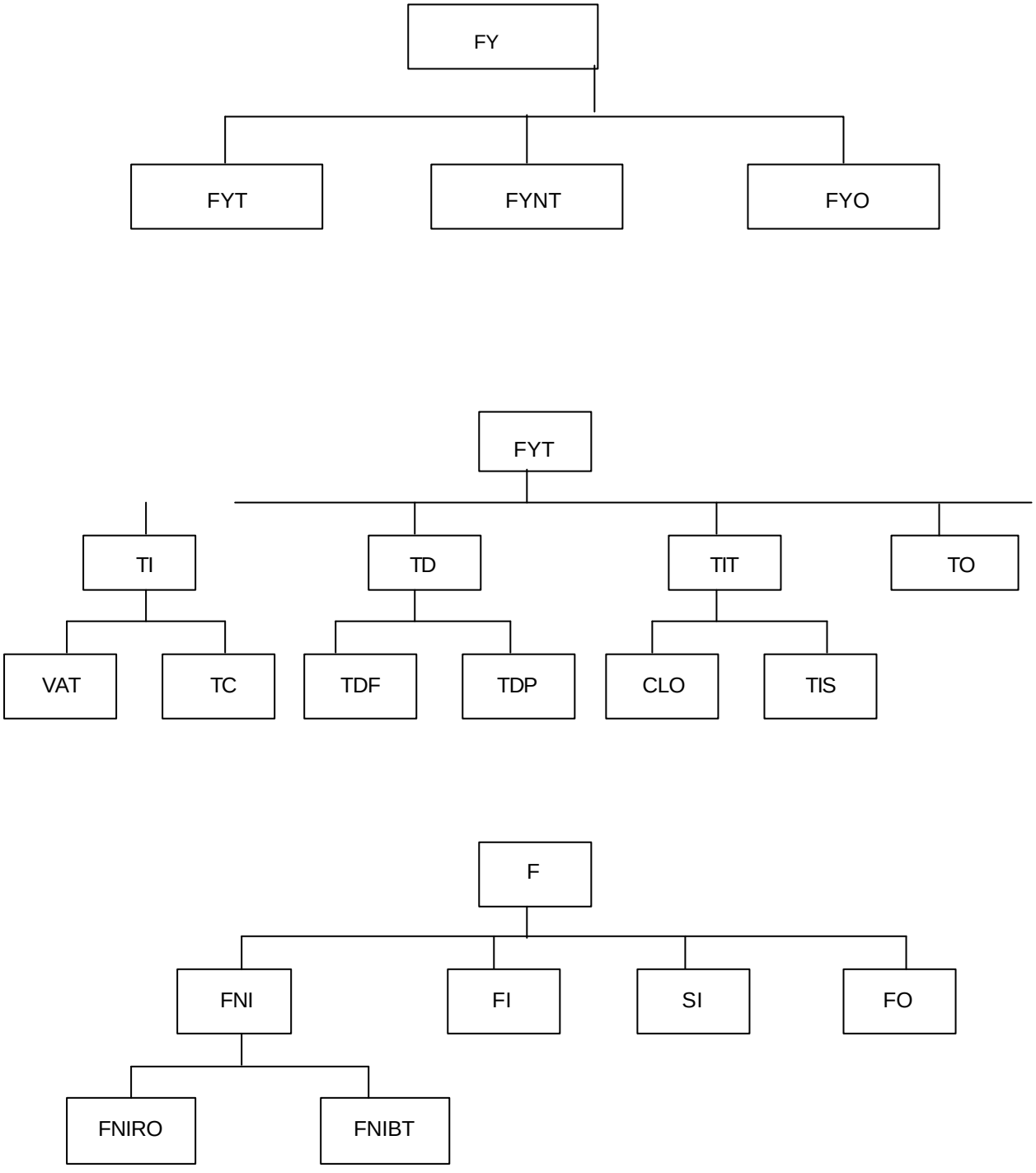
3.2 List and the Specification of Variables

The breakdown used in table 1 and 2 as well as in the appendix table is not coincidental. This breakdown copies the main items of the state budget revenue and expenditure structure in such a way as they are traced by the MF SR and at the same time it aggregates small, less important items on the revenue and expenditure side always into one variable (which consequently has an exogenous character).

For the purposes of the regression analysis, we shall introduce the following break-down and specification of variables in the field of state budget revenue and expenditure.

FY	- total revenue
FYT	- tax income
VAT	- value added tax
TC	- excise taxes
TDP	- tax on income of legal entities
TDF	- tax on income of natural persons
TD	- tax on income
TI	- indirect taxes
TIT	- international trade taxes
CLO	- import taxes (customs duty)
TIS	- revenue from import surcharge
TO	- other tax income
FYNT	- non-tax income
FYO	- other income
F	- total expenditure
FNI	- current expenditure
FNIRO	- current expenditure on the public consumption of population and government
FNIBT	- current transfers
FI	- capital expenditure
SI	- principal repayment
FO	- other expenditure
SG	- state budget balance (gross)
FD	- fiscal deficit (SG + SI)

Picture 1: Structure of the state budget revenue and expenditure



3.3 Modelling the State Budget Revenue Items

In the following, we shall explore the dependence between each selected state budget revenue group and the selected exogenous variables. Theoretically, the number of exogenous variables is in our case limited by 19 variables (20 quarters – constant value). The general form of equations for revenue items is:

$SBR_i = f_i\ (EV_j,\ SBR_{i,t-1},\ US_k,\ USBR_i)$ i = 1, 2,...

where

SBR_i – SB revenue in the category (item, group) i,

where i - VAT, TC, TDP, TDF, TD, TI, TIT, CLO, TIS, TO

EV_j – basic explanatory variables (j = 1, 2, ... V).

The influence of all basic explanatory variables within the additional attempts to estimate the regression equations has also been investigated with the time lag t-1, t-2, and t-3.

US_k – seasonal filters (k=1, 2, 3, 4)

$USBR_i$ – dummy variable for the explanation of the extreme shifts in the development of the endogenous variable which does not correspond with the development of exogenous variables.

From the mathematical standpoint, the above-mentioned general specification of equation may directly be expressed in the linear or non-linear (power) form; the following equations may be formulated for the SBR:

$$SBR = a + \sum_{j=1}^{V}(b_j * EV_j) + \sum_{k=1}^{3}(c_k * US_k) + d * SBR_{t-1}$$ resp.

$$SBR = a * \prod_{j=1}^{V} EV_j^{b_j} * e^{\sum_{k=1}^{3}(c_k * US_k)} * SBR_{t-1}^{d}$$

$$\ln SBR = \ln a + \sum_{j=1}^{V}(b_j * \ln EV_j) + \sum_{k=1}^{3}(c_k * US_k) + d * \ln SBR_{t-1}$$

3.3.1 Taxes on Income of natural persons (TDF)

These taxes should furthermore also be divided into taxes on income from dependent activity and taxes on income of self-employed persons and small traders. Within the current phase of the data base and fiscal submodel building-up, we shall work at this level only with the aggregate being the total taxes on income of natural persons.

The deterministic relationship between these taxes and revenue may be expressed as follows:

$$TDF = (YW + YO + YSP) * Q\,TDF \qquad (1)$$

where

YW – income from wages of the population

YO – other income of the population

YSP – gross operating surplus of entrepreneurs – natural persons

QTDF – share of taxes on income of natural persons in the sum of three mentioned components of the total income of the population

The deterministic identity (1) is the basis for regression modelling of the correlation between the TDF and revenue items of the population, thus, the initial consideration may be expressed as follows:

$$TDF = f(YW, YO, YSP, TDF_{-1}, US_k, UTDF) \qquad (2)$$

where in addition to income, which represents the tax basis for the TDF, we can state the inertia level and have to find out the seasonal variation influence ($US_k, k = 1, 2, 3, 4$).

The extremely high fluctuations in the development of TDF, which are not to be explained by the set of the previous variables, are to be eliminated by the zero-unit dummy variable. The influence of particular revenue items on the development of TDF may either be completely different (as expressed by equation (2)) or all three items, which conclusively express the total income of the population less the social income, can be aggregated and we can trace their joint influence on the tax payments. This second approach is applied in equation (1), where only one joint share QTDF appears. For illustration, two initial equations are shown below (Student t-statistics are mentioned under estimated parameters, the last two statistical characteristics represent the Durbin-Watson index of auto-correlation of residuals (DW) and the coefficient of determination (R^2)):

$$TDF = -4.1252 + 0.1218 * YW + 0.0818 * YO + 0.0382 * YSP \quad (3)$$
$$(5.0) \quad (2.6) \quad (0.77) \quad (0.57)$$

$DW = 1.06, \quad R^2 = 0.91$

$$TDF = -1.6782 + 0.0658 * YW - 0.0075 * YO + 0.0514 * YSP + 0.5106 * TDF_{-1} \quad (4)$$
$$(1.51) \quad (1.46) \quad (0.08) \quad (0.90) \quad (2.71)$$

$DW = 2.09, \quad R^2 = 0.9359$

The shortcomings of equation (3) reside in the statistical insignificance of the variables YO and YSP and in the mutual auto-correlation of residuals (a low DW index). In equation (4), all main explanatory variables are insignificant, even the other income parameter YO is negative.

The step-by-step experiments were further focused on:

- testing the influence of the seasonal fluctuations expressed by the so-called seasonal filters, i.e. (0-1) zero-unit dummy variables
- merging the influence of two and/or all three revenue items into one variable
- finding the dummy variable which at least partially is able to explain the fluctuations in the development of the TDF tax on which the other exogenous variables are to be considered as explanatorily insufficient.

The result of these efforts is the final form of the equation for TDF, which in a linear form is presented as follows:

$$TDF = -0.9875 + 0.0381 * (YW + YO) + 0.0614 * YSP + 0.4150 * TDF_{-1} + 0.2672 * US2$$
$$(5.02) \quad (6.75) \quad (5.82) \quad (8.58) \quad (4.73)$$

$$- 0.6522 * US3 + 0.4367 * UTDF \quad (5)$$
$$(9.37) \quad (8.21)$$

$DW = 2.26, \quad R^2 = 0.9977$

As for the non-linear form, the results of this equation are also very acceptable.

$$\ln TDF = -2.2578 + 0.5995 * \ln (YW + YO) + 0.2132 * \ln YSP + 0.4232 * \ln TDF_{-1}$$
$$(4.57) \quad (3.77) \quad (2.25) \quad (6.98)$$

$$+ 0.0692 * US2 - 0.1599 * US3 + 0.1456 * UTDF \qquad (6)$$
$$(3.08) \quad (6.12) \quad (6.83)$$

$DW = 2.15, \quad R^2 = 0.9935$

Both equations (5) and (6) have been estimated from the short-time series (1994Q1-1997Q4) and are equivalent from the statistical parameter significance standpoint as well as from the entire equation quality standpoint. As in the equations (3) and (4) only the income variable YW was significant, the variable YO was merged to it by using the conditional least squares method and a combined variable (YW + YO), together with YSP, seasonal filters and a dummy variable, explains the taxes on income of natural persons (TDF) at the sufficient level.

3.3.2 Taxes on Income of Legal Entities (TDP)

It is not easy even to find a direct deterministic (normative) correlation for this tax. The equation and the dependence on YSP – gross operating surplus can be stated which is logical and economically interpretable, however, under the conditions of the Slovak economy it is, unfortunately, absolutely insignificant. The gross operating surplus, i.e. the entrepreneurial profit does not have any influence on the level of tax on income of legal entities (TDP). The relation between TDP and the gross domestic product, expressed by the following equation, leads to another possibility:

$$TDP = GDP * QTDP \qquad (7)$$

The effort to present the regression relation between TDP and other exogenous variables has led us to the expanded specification of the equation (7) in the following form:

$$TDP = f(GDP, YSP, TDP_{-1}, US_k, T, UTDP) \qquad (8)$$

This equation has been estimated in the linear and non-linear form by using several shifts within the influence of GDP on the TDP. The T variable expresses the time trend (1993Q1=1), which should be (regarding the development of TDP until now) a negative parameter.

In the given phase, two equations (in linear and non-linear form) are sufficient.

$$TDP = - 10.3329 + 0.2029 * GDP_{-3} + 0.2939 * TDP_{-1} - 0.7461 * T + 3.8306 * UTDP \qquad (9)$$
$$(1.85) \quad (2.76) \quad (2.18) \quad (2.58) \quad (5.43)$$

DW = 1.92, R^2 = 0.7081

$$\ln TDP = 0.4699 * \ln GDP_{-1} - 0.3194 * US4 - 0.0171 * T + 0.8448 * UTDP \quad (10)$$
(24.20) (3.46) (2.37) (7.27)

DW = 1.95, R^2 = 0.8274

According to the estimated equations (9) and (10), the taxes on income of legal entities depend on GDP but absolutely not on the gross operating surplus. Owing to their declining tendency during the last years, the negative time series has caught on by a very acceptable way because it is not desirable to estimate the negative correlation between the GDP and these taxes.

3.3.3 Value Added Tax (VAT)

As it already results from its name, this tax (VAT) directly depends on the value added, i.e. GDP, and this is the way how one has to proceed in the modelling of this item. The deterministic relationship may be expressed in the following form:

$$VAT = GDP * QVAT,$$

where QVAT is the share of VAT in the GDP.

Another possibility is to express this relationship by a regression function by which we can explore the influence of more factors on the development of VAT, e.g.

$$VAT = f(GDP, MGS, -EGS, T, US_k, VAT_{-1}, UVAT) \quad (11)$$

The experiments have shown that the multi-collinearity of exogenous variables has an unfavourable impact on the estimation of the parameters of equation (11), therefore we have modified it by merging the exogenous variables and by using the conditional OLS method. The final estimated forms of this equation, which have the chance of being fully used within the model, are:

a) in linear form

$$VAT = \underset{(5.47)}{3.7105} + \underset{(4.41)}{0.0332} * Y\_VAT_{-1} + \underset{(4.27)}{0.3166} * VAT_{-1} - \underset{(4.74)}{1.9912} * US1 +$$

$$+ \underset{(4.10)}{1.5885} * US4 + \underset{(10.41)}{2.9538} * UVAT \qquad (12)$$

$DW = 1.96, \quad R^2 = 0.9598$

b) in lin-log form

$$\ln VAT = \underset{(11.05)}{0.3589} * \ln Y\_VAT_{-1} + \underset{(3.60)}{0.2211} * VAT_{-1} + \underset{(2.64)}{0.1487} * US2 + \underset{(3.21)}{0.1623} * US3 +$$

$$+ \underset{(5.72)}{0.2902} * US4 + \underset{(8.11)}{0.2567} * UVAT \qquad (13)$$

$DW = 1.93, \quad R^2 = 0.9480$

where Y_VAT = GDP + MGS - EGS, i.e. on the side of revenue from this tax we do not have a separately expressed positive influence of import and a negative impact of export on this tax but only the impact of their balance together with GDP. Both equations are equivalent except for that in the linear form the equation also contains a constant value. Regarding the VAT unfulfilment in the period of its introduction, i.e. in the 1. quarter 1993, the above-mentioned equations have been estimated on data beginning in the 2. quarter 1993.

3.3.4 Excise Taxes (TC)

This tax is fulfilled at the moment of the consumption of certain selected goods whose consumption is, in addition to VAT, also burdened by the excise tax. From the macro-economic point of view, this tax mainly depends on the final consumption of households (C), however, it also depends on the final consumption of government (G).

The deterministic presentation of these links may be as follows:

$$TC = C * QTC, \text{ or} \qquad (14)$$

$$TC = (C + G) * QTC, \text{ or} \qquad (15)$$

$$TC = C * QTCC + Q * QTCG \qquad (16)$$

While the first two links are simple, the third makes some troubles. When presenting these links by a regression relationship, it is also possible to explore the impacts of the time shifts in the influence of variables C and G on taxes TC.

It is interesting that a sole estimation of parameters separately for the variable C and separately for G has not led to statistically significant results.

Firstly, it has appeared that it is better to cut the time horizon for the estimation of parameters by 1 or 5 quarters while during the time period from the 1st quarter 1993 until the 1st quarter 1994 a great imbalance in the revenue from this tax has occurred.

At the end, various experiments have shown that the most appropriate way is to trace the influence of the total final consumption (C+G) on the revenue from tax TC because the separate tracing of the impact of variables C and G has not led to acceptable results.

$$TC = 3.7480 + 0.0212 * (C + G) - 1.6195 * US1 - 0.8658 * US2 + 0.98014 * UTC \quad (17)$$
(9.79) (5.45) (10.11) (5.81) (5.74)

$DW = 1.91, \quad R^2 = 0.9282$

$$\ln TC = 0.3850 * \ln (C + G) - 0.3412 * US1 - 0.1638 * US2 + 0.2307 * UTC \quad (18)$$
(125.44) (13.08) (6.79) (8.26)

$DW = 1.94, \; R^2 = 0.9526$

These equations have been estimated on the basis of time series cut by one time period, i.e. 1993Q2 – 1997Q4. If we, however, leave out the whole year 1993 as well as the first quarter 1994, we shall receive a much more satisfactory estimation of the equation with a substantially „poorer“ dummy variable.

$$TC = 0.0231 * (C + G) + 0.2523 * TC_{-1} + 1.7278 * US2 + 2.5119 * US3 + 2.3666 * US4$$
(4.66) (3.07) (7.71) (12.34) (12.01)

$$+ 0.9288 * U97q3 \quad (19)$$
(3.02)

$DW = 2.03, \quad R^2 = 0.9619$

In addition to the dependence of excise taxes on the variables C and G this equation expresses also their inertia (TC_{-1}) and a significant impact of three seasonal filters with one

sole non-zero value of the dummy variable. The equation gives the best presumptions for including into the broadly framed set of equations.

3.3.5 Import Taxes – Customs Duty (CLO)

The name of this tax already implies that it mainly depends on one macroeconomic value, i.e. on the import of goods and services. Regarding the different tax ratio at particular goods and services, the most appropriate way would be to trace the influence of particular goods or commodity groups with its individual custom ratio. In the macroeconomic model, which the following equation should be a part of, it is not appropriate to go into a deep commodity disaggregation. Thus, we use the following deterministic relationship as a starting point:

$$CLO = MGS * QCLO \quad (\text{resp. } CLO = MG * QCLO) \tag{20}$$

where MG is imports of goods,

which, by applying the regression analysis, is to be expanded by the impact of other exogenous variables, e.g. RE – exchange rate and its modifications, the impact of inertia etc. The general form of the regression equation for the variable CLO may be written as follows:

$$CLO = f\,[MGS\,(MG),\ RE\,(IRE, USD),\ CLO_{-1},\ US_k] \tag{21}$$

Several equivalent equations which differ in application of the MGS and/or MG variables, the RE variable in its different modifications as well as in using different seasonal filters, are at our disposal to be chosen for the inclusion into the model. All equations are highly equivalent in linear as well as in power form. Similarly as in the previous cases, we shall present two best estimations:

$$CLO = 0.0070 * MG + 0.0319 * RE + 0.1215 * US3 + 0.2638 * US4 + 0.3146 * UCLO \tag{22}$$
$$(5.15) \quad (8.38) \quad (2.38) \quad (5.04) \quad (5.37)$$

$DW = 2.19, \quad R^2 = 0.8766$

$$\ln CLO = 0.4778 * \ln MG - 0.5608 * \ln RE + 0.1327 * US3 + 0.2143 * US4 + 0.2941 * UCLO \tag{23}$$
$$(6.69) \quad (6.06) \quad (3.32) \quad (5.21) \quad (6.37)$$

$DW = 1.84, \quad R^2 = 0.9005$

Despite the fact that these two equations have absolutely the same specification, they also comprise one substantial difference being the different parameter sign at the RE variable (exchange rate). The logical consideration, but mainly the macroeconomic theoretical principles, says that preferably the negative parameter of the variable RE should be accepted, i.e. the devaluation decreases the import and thus, in parallel, it also decreases the custom revenue.

3.3.6 Import Surcharge (TIS)

As a special type of tax from the international trade standpoint, the import surcharge has been applied in the recent time period (1994-95 and 1997-98) in Slovakia. Its development is regulated by different rules as in the case of custom, thus, to merge them into one item for the purposes of the regression analysis is not very appropriate. The basic idea was that this item would act as an exogenous factor. However, at the end we tried to estimate the regression relationship between the revenue from this tax and factors which influence this revenue, i.e. import of goods (MG) and the level of the import surcharge (IS). The estimation of the regression relationship is also influenced by the time period during the import surcharge has functioned, as mentioned above. From the practical point of view and owing to the current situation, it would be better to build this item as exogenous into the system of revenue equations of the state budget tax block within the macromodel. Whereas the results of the regression analysis are not fully unusable, we shall present at least one equation:

$$\underset{\quad}{TIS} = \underset{(2.83)}{-1.2393} + \underset{(3.12)}{0.0144} * MG + \underset{(7.18)}{0.1058} * IS + \underset{(1.93)}{0.1941} * US3 + \underset{(26.57)}{3.9113} * UTIS \qquad (24)$$

$DW = 2.79, \quad R^2 = 0.9914$

The equation (24) has two minor shortcomings. Firstly, it is the lower significance of the seasonal filter parameter US3 (the sole parameter in the equation which witnesses the seasonal variation and the coincidence within the import surcharge development), secondly, it is the high value of the Durbin-Watson coefficient of auto-correlation of residuals (DW). This problem is a result of real short-term time series (12 quarters).

3.3.7 Complementary Equations of the Revenue Part of the State Budget Block

As results from the chapter 3.2, the above-mentioned regression equations which explain the development of particular tax items with regard to the development of relevant macro-economic indicators may be complemented into the framed system by identities which close the entire revenue part of the state budget block and at the same time ensure that it would not develop expansively (i.e. that it would not explode). Direct taxes (taxes on income) are defined as:

$$TD = TDF + TDP \quad (25)$$

Indirect taxes are to be obtained as a sum:

$$TI = VAT + TC \quad (26)$$

and taxes from the international trade are obtainable according to the following equation:

$$TIT = CLO + TIS \quad (27)$$

This allows us to compile the total tax income:

$$FYT = TD + TI + TIT + TO \quad (28)$$

where TO is other tax income stated exogenously.

We have tried to explain the non-tax income by a regression equation, however, from the exogenous variable standpoint, a very weak supply is at our disposal. Therefore, it seems to us that the best way, owing to the current situation, is to use the non-linear identity:

$$FYNT = FYT * QFYNT \quad (29)$$

where the QFYNT expresses the ratio between the state budget non-tax and tax income.

The whole system of equations of the state budget revenue part should be covered by the equation for the definition of the total state budget revenue:

$$FY = FYT + FYNT + FYO \quad (30)$$

where FYO is other state budget revenue stated exogenously.

3.4 Modelling the State Budget Expenditure Items

The philosophy of our approach on the modelling of the state budget revenue and expenditure parts resides in the fact that the SB deficit (within the gross deficit methodology marked as SG, within the net fiscal deficit methodology marked as FD = SG + SI) is stated exogenously, i.e. it represents the leading parameter of government. This approach, in connection with equation (30) from the previous part, directly allows to define the total SB expenditure:

$$F = FY - SG \quad (31)$$

or based on the methodology valid as of 1998:

$$F = FY - SG - SI = FY - FD \quad (32)$$

The next procedure, i.e. the separation of particular SB expenditure items, is opposite as compared to the revenue block. In the revenue block, the direction was from the basic items up to higher aggregates while regarding the expenditure, the aggregate is broken down into minor items. In the part 2.2, we have mentioned that it is very hard to create a disaggregated and at the same time a consistent set of the SB expenditure items for the time period being the last five years. Due to this fact, in the current research phase we have decided to maintain the gross disaggregation level and the total SB expenditure (F) is broken down into three items. The basic equation

$$F = FNI + FI + FO \quad (33)$$

should work in the reverse form

$$FI = F - FNI - FO \quad (34)$$

where FO – other expenditure – is stated exogenously and current expenditure (FNI) is modelled by the two non-linear identities for current expenditure on the public consumption of the population and government (FNIRO) and for current transfers (FNIBT).

$$FNIRO = F * QFNIRO \quad (35)$$

$$FNIBT = F * QFNIBT \quad (36)$$

In both of these last equations, the variable shares QFNIRO and QFNIBT play the role of the government regulation values.

4. Conclusions

This study consists of two separate and in a logical way mutually linked parts. From the verbal analysis of the status, relations, and development tendencies in the state budget revenue and expenditure area (chapter 1 and 2), the study comes into the econometric
(i.e. economic-statistical-mathematical) sphere in order to formulate and quantify the relations and the basic correlation between the particular state budget revenue and expenditure categories and other macro-economic variables. These relations may either be deterministic or stochastic. The short-term time series from the SB area handicap the latter (stochastic)

relations, which, however, from the modelling standpoint are more interesting while they reflect the actual stochastic character of processes especially in the SB revenue area.

The theoretical and methodological knowledge from the economic literature yields to the relatively clear idea on the influence of what macro-economic variables must be tested from the development of a particular tax income standpoint. In the economic literature also we can find the examples of concrete applications in some countries. We have to be, however, aware of the fact that if we want to estimate an usable regression model, then all theoretical knowledge, together with the high quality methods for the estimation of the regression relations, needs one more partner– the statistical data sources which truthfully reflect the actually running processes in the area of the real economy and in the financial and monetary sector.

We have succeeded in the estimation of some regression relations in the SB revenue area which are acceptable from the quality of the statistical tests standpoint as well as owing to the economical interpretation of these relations. Despite that, in the course of forthcoming research it would be necessary to re-estimate these relations and if these relations are to be used within the prognostic-simulation experiments, one firstly has to take into account the above mentioned weaknesses, i.e. the range and the quality of the data base, and, secondly, the possible application of more sophisticated econometric procedures for the estimation of parameters of the given regression models.

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APPENDIX

State Budget Revenue and Expenditure, cumulated by quarters, mill. SKK

		Revenue												Expenditure							
				of which:							Other:					of which:				of wh.:	
		Total revenue	Tax income	VAT	Excise taxes	Tax on income of legal entities	Tax on income of nat. persons	Import taxes	Other tax income	Non-tax income	Rep. of credits, loans and a sale of shares	Clear-ing, grants, credits recei-ved	SB balance	Fiscal remai-n-der of SB	Total expen-diture	Current expen-diture	Current exp. on public cons. of the pop. and gov.	Current trans-fers	Capital expen-diture	Loans,part. in equity, princ. repay-ment	Princ. repay-ment	Clear-ing
93[1]	**1.Q.**	**19 107**	**16 567**	2 648	1 577	3 205	1 024	930	7 183	**2 540**	**0**		**-11 032**	-10 499	**30 139**	**27 698**	23 894	3 804	**1 908**	**533**	533	
	2.Q.	**48 374**	**38 938**	10 130	5 750	8 782	1 976	1 725	10 575	**7 849**	**1 587**		**-14 822**	-13 256	**63 196**	**56 521**	49 268	7 253	**5 109**	**1 566**	1 566	
	3.Q.	**77 834**	**63 653**	19 292	10 653	15 244	3 065	2 864	12 535	**11 149**	**3 032**		**-15 899**	-8 417	**93 733**	**78 311**	67 910	10 401	**7 940**	**7 482**	7 482	
	4.Q.	**109 680**	**86 666**	27 467	15 442	20 542	4 591	4 453	14 171	**12 987**	**4 226**	**5 801**	**-23 011**	-16 782	**132 691**	**108 456**	93 040	15 416	**12 205**	**12 030**	12 030	
94	**1.Q.**	**32 527**	**25 799**	9 321	4 864	6 099	2 005	1 057	2 453	**5 799**	**929**		**-5 955**	1 042	**38 482**	**30 035**	25 978	4 057	**1 450**	**2 723**	2 723	**4 274**
	2.Q.	**67 771**	**54 356**	16 680	9 379	16 359	5 379	2 060	4 499	**11 305**	**2 110**		**-10 512**	3 210	**78 283**	**59 531**	49 945	9 586	**5 030**	**3 142**	3 142	**10 580**
	3.Q.	**101 171**	**80 731**	25 540	14 977	22 988	8 124	3 428	5 674	**17 399**	**3 041**		**-17 192**	3 959	**118 363**	**89 310**	75 154	14 156	**7 902**	**5 626**	5 626	**15 525**
	4.Q.	**139 148**	**110 566**	36 902	21 023	28 416	11 338	4 926	7 961	**24 756**	**3 826**		**-22 854**	-1 633	**162 002**	**128 809**	108 237	20 572	**11 972**	**7 190**	7 190	**14 031**
95	**1.Q.**	**33 222**	**29 821**	8 510	3 141	9 744	3 795	1 146	3 485	**2 757**	**644**		**1 258**	8 253	**31 964**	**23 159**	14 376	8 783	**1 810**	**2 817**	2 817	**4 178**
	2.Q.	**75 414**	**66 096**	24 572	7 882	18 200	7 693	2 526	5 223	**7 993**	**1 325**		**97**	7 995	**75 317**	**62 514**	44 250	18 264	**4 905**	**4 772**	4 772	**3 126**
	3.Q.	**114 350**	**99 579**	38 368	13 709	24 956	11 351	3 882	7 313	**11 628**	**3 143**		**-2 877**	7 236	**117 227**	**98 696**	70 847	27 849	**8 418**	**8 241**	8 241	**1 872**
	4.Q.	**163 138**	**136 513**	52 314	19 966	33 667	15 808	5 440	9 318	**20 185**	**3 683**	**2 757**	**-8 299**	1 460	**171 437**	**143 766**	104 398	39 368	**15 155**	**12 516**	12 516	**0**
96	**1.Q.**	**40 393**	**33 401**	9 373	4 174	9 758	4 670	1 367	4 059	**3 139**	**703**	**3 151**	**-3 500**	2 855	**43 893**	**34 821**	15 716	19 105	**2 717**	**6 355**	6 355	
	2.Q.	**79 525**	**67 633**	20 914	9 376	18 528	9 921	2 829	6 065	**7 356**	**1 385**	**3 151**	**-6 128**	2 388	**85 653**	**69 063**	33 843	35 220	**8 074**	**8 516**	8 516	
	3.Q.	**119 642**	**102 856**	33 479	15 509	26 351	14 718	4 263	8 536	**11 545**	**2 090**	**3 151**	**-13 430**	537	**133 072**	**104 409**	53 425	50 984	**14 696**	**13 967**	13 967	
	4.Q.	**166 330**	**140 129**	48 608	21 641	32 334	20 404	5 917	11 225	**20 247**	**2 488**	**3 466**	**-25 559**	-7 607	**191 889**	**148 427**	78 607	69 820	**25 510**	**17 952**	17 952	

97	**1.Q.**	**39 923**	**33 411**	12 830	4 248	6 570	5 761	1 322	2 680	**2 884**	**659**	**2 969**	**-3 451**	-529	**43 374**	**35 394**	16 705	18 689	**4 984**	**2 996**	2 922	
	2.Q.	**78 499**	**64 616**	26 133	9 752	9 612	12 522	2 758	3 839	**6 630**	**975**	**6 279**	**-13 209**	-5 457	**91 708**	**72 341**	35 863	36 478	**11 125**	**8 243**	7 752	
	3.Q.	**125 153**	**101 943**	39 487	15 459	16 477	18 488	3 962	8 070	**8 778**	**1 010**	**13 423**	**-27 968**	-6 375	**153 121**	**111 838**	57 822	54 016	**18 684**	**22 599**	21 593	
	4.Q.	**180 826**	**145 528**	54 877	21 872	23 372	25 642	5 252	14 513	**14 112**	**1 241**	**19 945**	**-36 999**	-12 022	**217 825**	**154 113**	82 887	71 226	**34 260**	**29 452**	24 977	

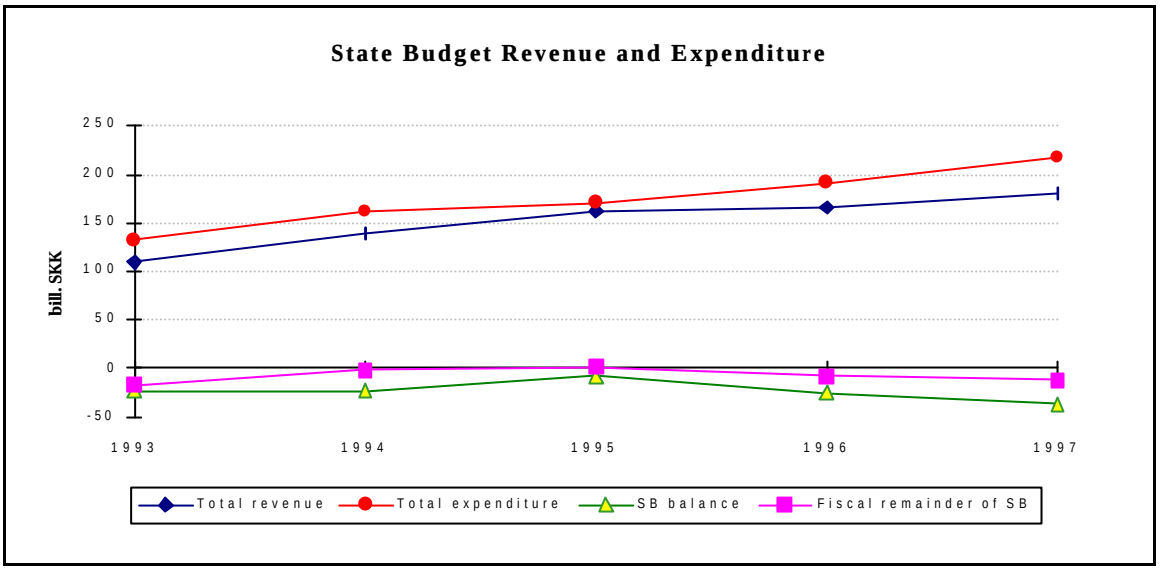
Remark: 1 Data net of revenue and expenditure on old-age, health and sickness insurance and employment

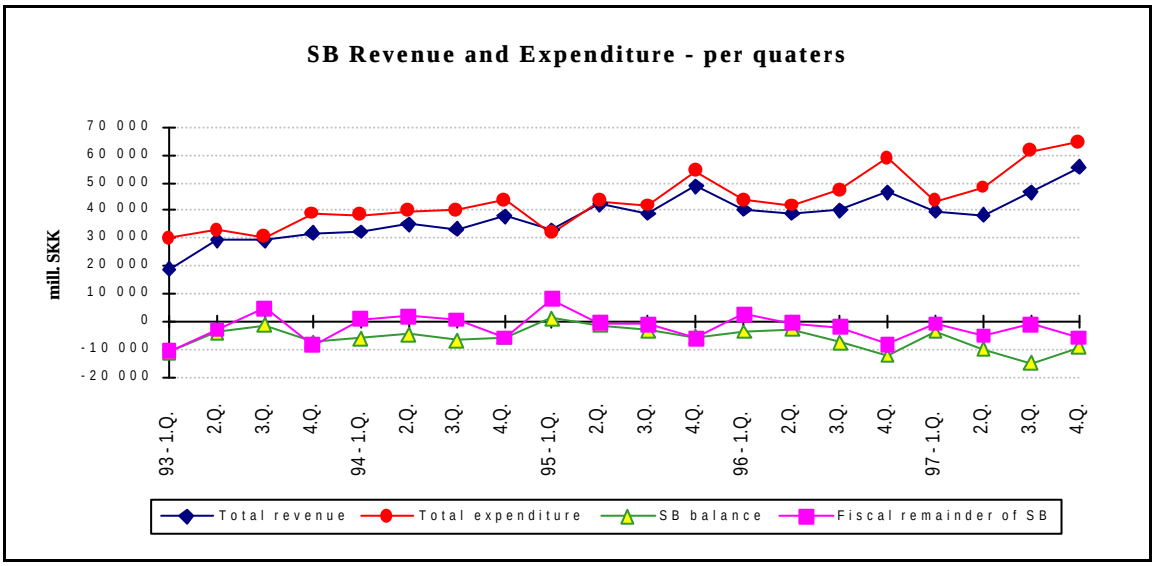
State Budget Revenue and Expenditure, per quarters, mill. SKK

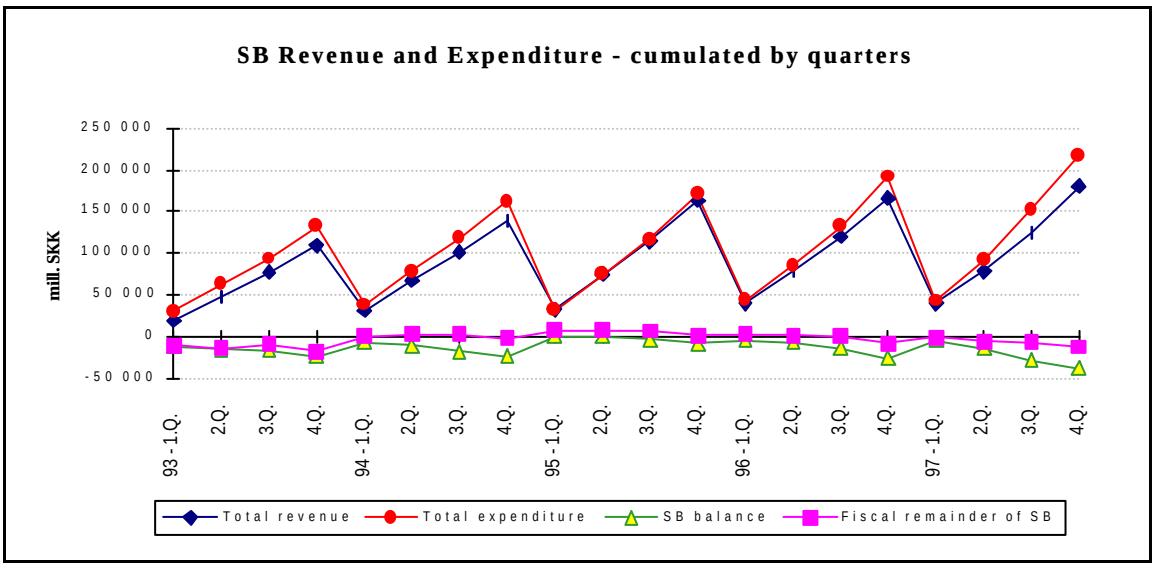
		Revenue												Expenditure							
				of which:							Other:					of which:				of wh.:	
		Total revenue	Tax income	VAT	Excise taxes	Tax on income of legal entities	Tax on income of nat. persons	Import taxes	Other tax income	Non-tax income	Rep. of credits, loans and a sale of shares	Clearing, grants, credits received	SB balance	Fiscal remainder of SB	Total expenditure	Current expenditure	Current exp. on public cons. of the pop. and gov.	Current transfers	Capital expenditure	Loans,part. in equity, princ. repay-ment	Princ. repay-ment	Clearing
93[1]	**1.Q.**	**19 107**	**16 567**	2 648	1 577	3 205	1 024	930	7 183	**2 540**	**0**	**0**	**-11 032**	-10 499	**30 139**	**27 698**	23 894	3 804	**1 908**	**533**	533	**0**
	2.Q.	**29 267**	**22 371**	7 482	4 173	5 577	952	795	3 392	**5 309**	**1 587**	**0**	**-3 790**	-2 757	**33 057**	**28 823**	25 374	3 449	**3 201**	**1 033**	1 033	**0**
	3.Q.	**29 460**	**24 715**	9 162	4 903	6 462	1 089	1 139	1 960	**3 300**	**1 445**	**0**	**-1 077**	4 839	**30 537**	**21 790**	18 642	3 148	**2 831**	**5 916**	5 916	**0**
	4.Q.	**31 846**	**23 013**	8 175	4 789	5 298	1 526	1 589	1 636	**1 838**	**1 194**	**5 801**	**-7 112**	-8 365	**38 958**	**30 145**	25 130	5 015	**4 265**	**4 548**	4 548	**0**
94	**1.Q.**	**32 527**	**25 799**	9 321	4 864	6 099	2 005	1 057	2 453	**5 799**	**929**	**0**	**-5 955**	1 042	**38 482**	**30 035**	25 978	4 057	**1 450**	**2 723**	2 723	**4 274**
	2.Q.	**35 244**	**28 557**	7 359	4 515	10 260	3 374	1 003	2 046	**5 506**	**1 181**	**0**	**-4 557**	2 168	**39 801**	**29 496**	23 967	5 529	**3 580**	**419**	419	**6 306**
	3.Q.	**33 400**	**26 375**	8 860	5 598	6 629	2 745	1 368	1 175	**6 094**	**931**	**0**	**-6 680**	749	**40 080**	**29 779**	25 209	4 570	**2 872**	**2 484**	2 484	**4 945**
	4.Q.	**37 977**	**29 835**	11 362	6 046	5 428	3 214	1 498	2 287	**7 357**	**785**	**0**	**-5 662**	-5 592	**43 639**	**39 499**	33 083	6 416	**4 070**	**1 564**	1 564	**-1 494**
95	**1.Q.**	**33 222**	**29 821**	8 510	3 141	9 744	3 795	1 146	3 485	**2 757**	**644**	**0**	**1 258**	8 253	**31 964**	**23 159**	14 376	8 783	**1 810**	**2 817**	2 817	**4 178**
	2.Q.	**42 192**	**36 275**	16 062	4 741	8 456	3 898	1 380	1 738	**5 236**	**681**	**0**	**-1 161**	-258	**43 353**	**39 355**	29 874	9 481	**3 095**	**1 955**	1 955	**-1 052**
	3.Q.	**38 936**	**33 483**	13 796	5 827	6 756	3 658	1 356	2 090	**3 635**	**1 818**	**0**	**-2 974**	-759	**41 910**	**36 182**	26 597	9 585	**3 513**	**3 469**	3 469	**-1 254**
	4.Q.	**48 788**	**36 934**	13 946	6 257	8 711	4 457	1 558	2 005	**8 557**	**540**	**2 757**	**-5 422**	-5 776	**54 210**	**45 070**	33 551	11 519	**6 737**	**4 275**	4 275	**-1 872**
96	**1.Q.**	**40 393**	**33 401**	9 373	4 174	9 758	4 670	1 367	4 059	**3 139**	**703**	**3 151**	**-3 500**	2 855	**43 893**	**34 821**	15 716	19 105	**2 717**	**6 355**	6 355	**0**
	2.Q.	**39 132**	**34 232**	11 541	5 202	8 770	5 251	1 462	2 006	**4 217**	**682**	**0**	**-2 628**	-467	**41 760**	**34 242**	18 127	16 115	**5 357**	**2 161**	2 161	**0**
	3.Q.	**40 117**	**35 223**	12 565	6 133	7 823	4 797	1 434	2 471	**4 189**	**705**	**0**	**-7 302**	-1 851	**47 419**	**35 346**	19 582	15 764	**6 622**	**5 451**	5 451	**0**
	4.Q.	**46 688**	**37 273**	15 129	6 132	5 983	5 686	1 654	2 689	**8 702**	**398**	**315**	**-12 129**	-8 144	**58 817**	**44 018**	25 182	18 836	**10 814**	**3 985**	3 985	**0**

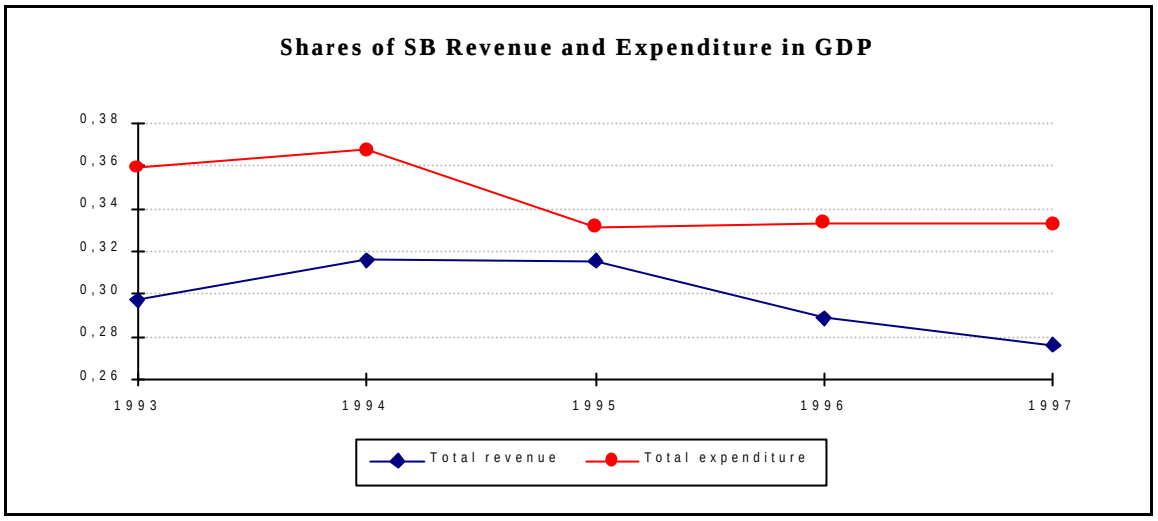
97	**1.Q.**	**39 923**	**33 411**	12 830	4 248	6 570	5 761	1 322	2 680	**2 884**	**659**	**2 969**	**-3 451**	-529	**43 374**	**35 394**	16 705	18 689	**4 984**	**2 996**	2 922	**0**
	2.Q.	**38 576**	**31 205**	13 303	5 504	3 042	6 761	1 436	1 159	**3 746**	**316**	**3 310**	**-9 758**	-4 928	**48 334**	**36 947**	19 158	17 789	**6 141**	**5 247**	4 830	**0**
	3.Q.	**46 654**	**37 327**	13 354	5 707	6 865	5 966	1 204	4 231	**2 148**	**35**	**7 144**	**-14 759**	-918	**61 413**	**39 497**	21 959	17 538	**7 559**	**14 356**	13 841	**0**
	4.Q.	**55 673**	**43 585**	15 390	6 413	6 895	7 154	1 290	6 443	**5 335**	**232**	**6 522**	**-9 031**	-5 647	**64 704**	**42 275**	25 065	17 210	**15 576**	**6 853**	3 384	**0**

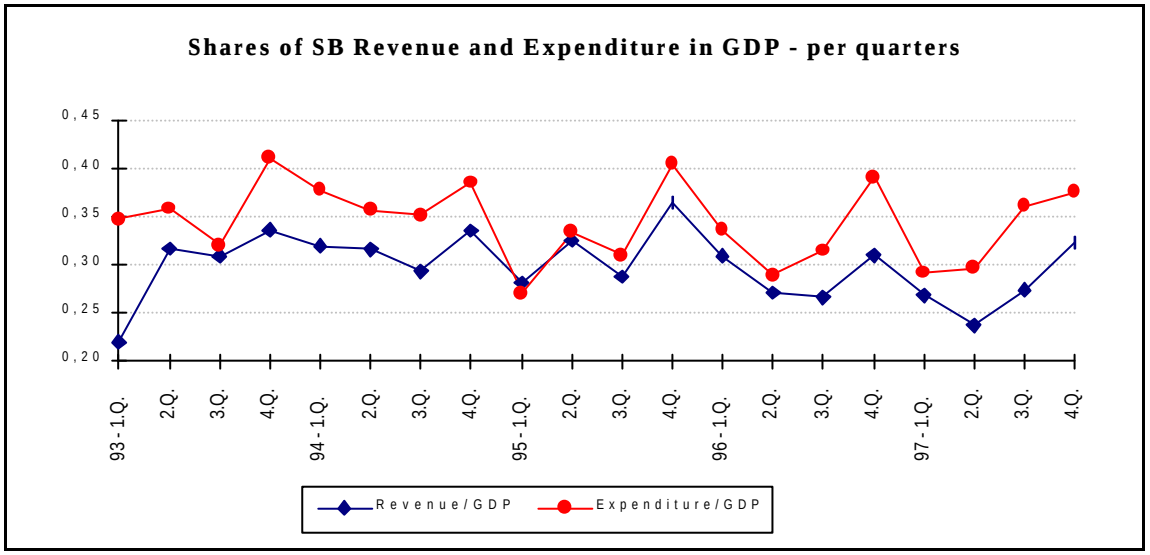
Remark: [1] Data net of revenue and expenditure on old-age, health and sickness insurance and employment

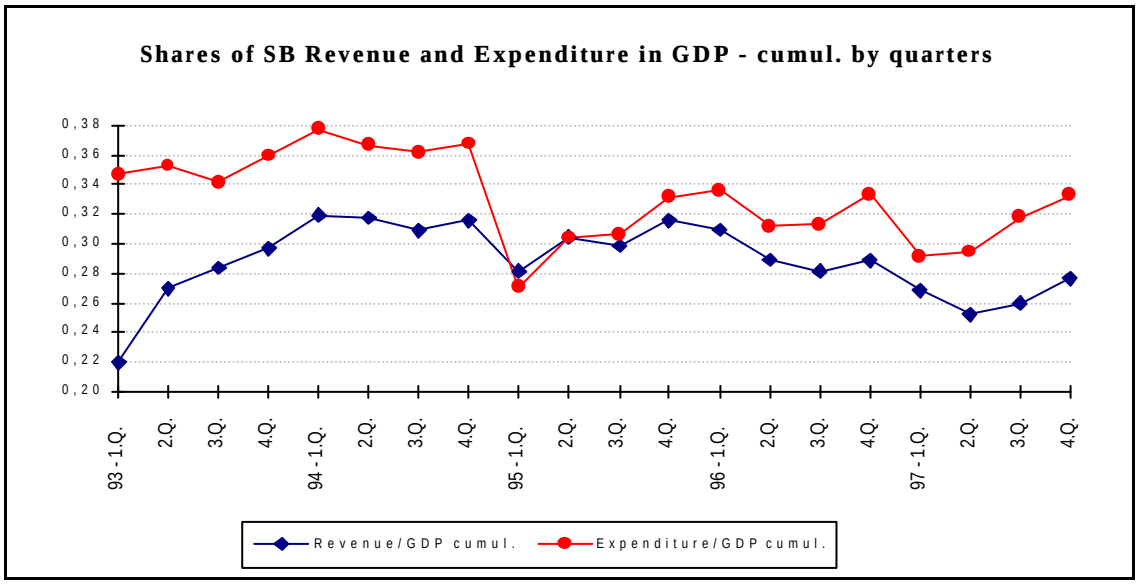

State Budget Revenue and Expenditure
bill. SKK
250
200
150
100
50
0
-50
1993
1994
1995
1996
1997
Total revenue
Total expenditure
SB balance
Fiscal remainder of SB

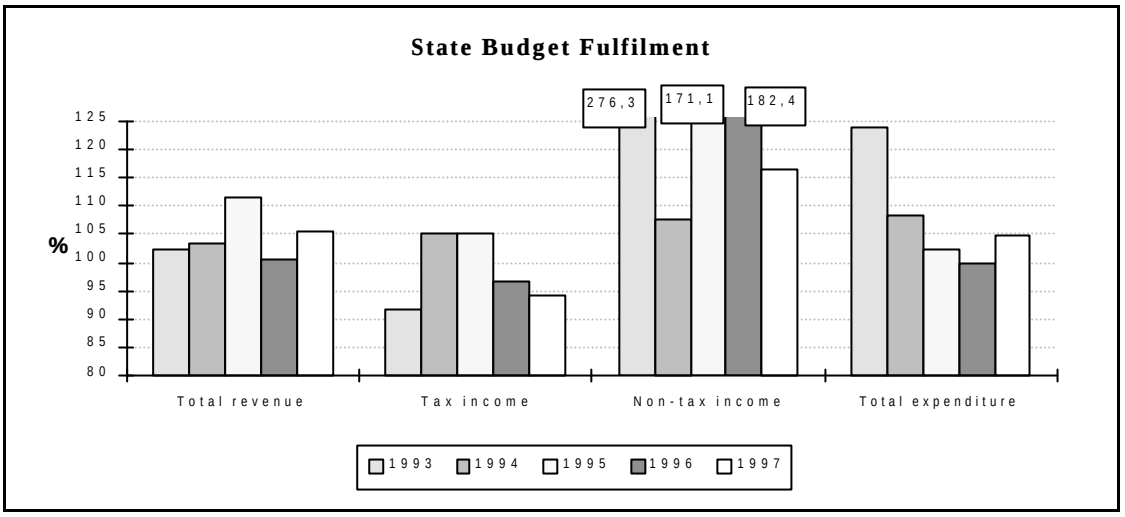

SB Revenue and Expenditure - per quaters
mill. SKK
70 000
60 000
50 000
40 000
30 000
20 000
10 000
0
-10 000
-20 000
93 - 1.Q.
2.Q.
3.Q.
4.Q.
94 - 1.Q.
95 - 1.Q.
96 - 1.Q.
97 - 1.Q.
Total revenue
Total expenditure
SB balance
Fiscal remainder of SB

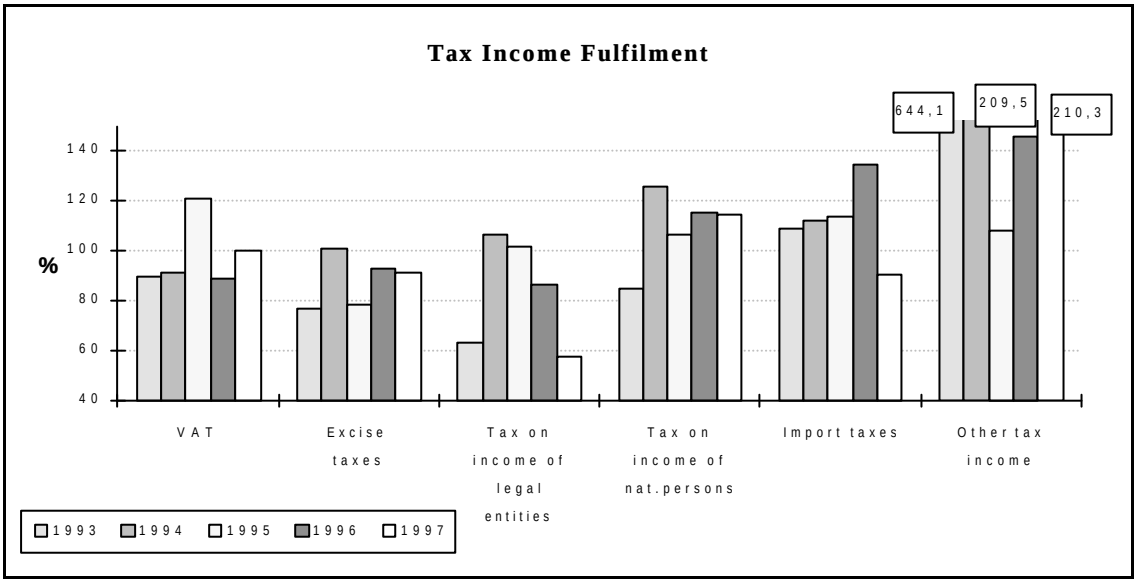

SB Revenue and Expenditure - cumulated by quarters
mill. SKK
250 000
200 000
150 000
100 000
50 000
0
-50 000
93 - 1.Q.
2.Q.
3.Q.
4.Q.
94 - 1.Q.
95 - 1.Q.
96 - 1.Q.
97 - 1.Q.
Total revenue
Total expenditure
SB balance
Fiscal remainder of SB

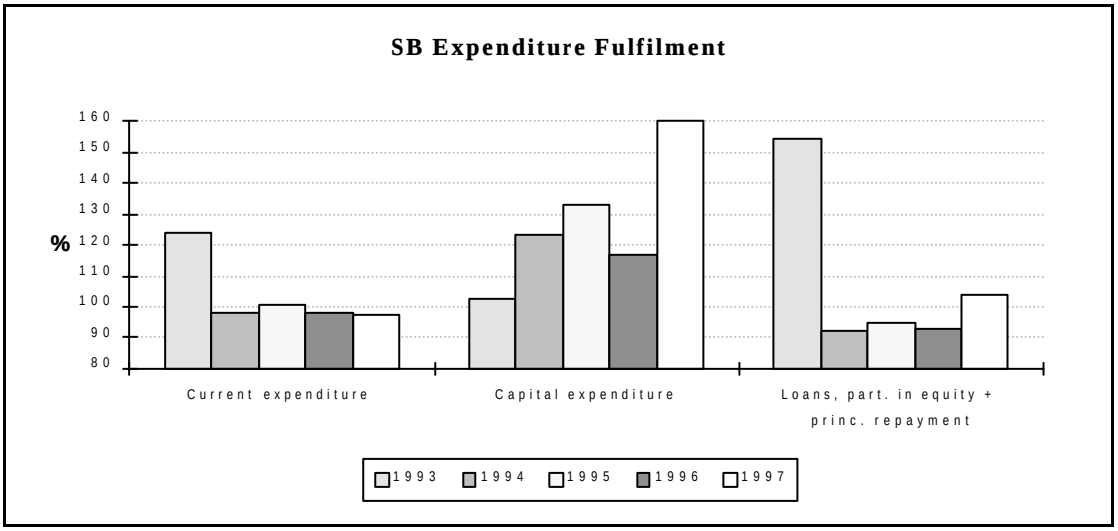

Shares of SB Revenue and Expenditure in GDP
0,38
0,36
0,34
0,32
0,30
0,28
0,26
1993
1994
1995
1996
1997
Total revenue
Total expenditure


Shares of SB Revenue and Expenditure in GDP - per quarters
0,45
0,40
0,35
0,30
0,25
0,20
93 - 1.Q.
2.Q.
3.Q.
4.Q.
94 - 1.Q.
95 - 1.Q.
96 - 1.Q.
97 - 1.Q.
Revenue/GDP
Expenditure/GDP

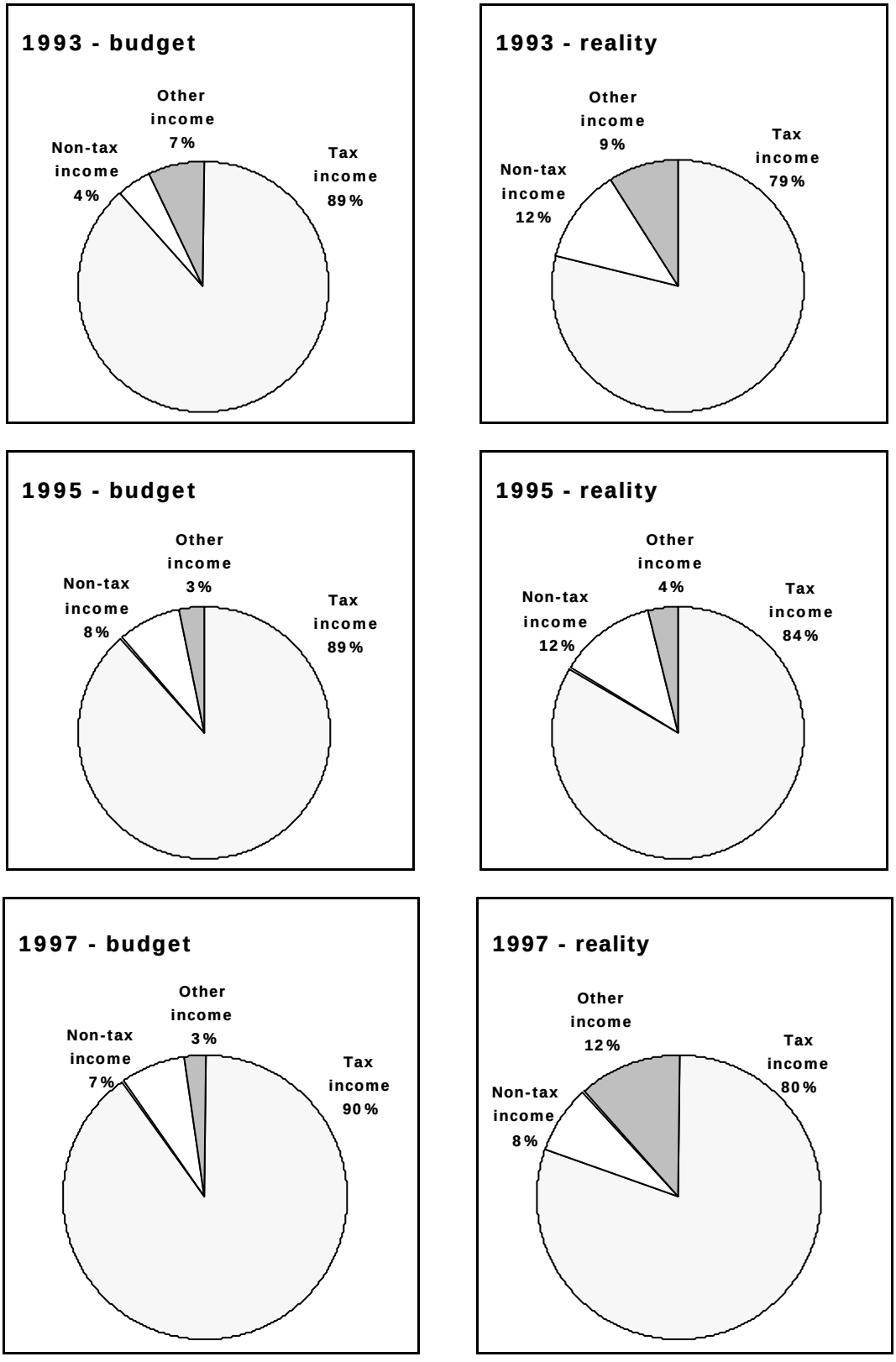

Shares of SB Revenue and Expenditure in GDP - cumul. by quarters
0,38
0,36
0,34
0,32
0,30
0,28
0,26
0,24
0,22
0,20
93 - 1.Q.
2.Q.
3.Q.
4.Q.
94 - 1.Q.
95 - 1.Q.
96 - 1.Q.
97 - 1.Q.
Revenue/GDP cumul.
Expenditure/GDP cumul.

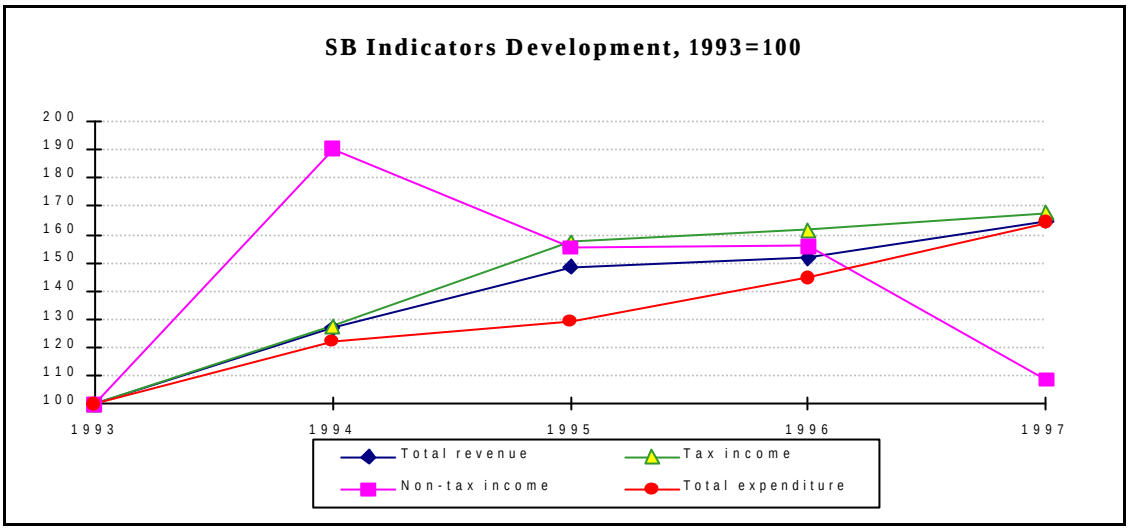

State Budget Fulfilment
%
125
120
115
110
105
100
95
90
85
80
276,3
171,1
182,4
Total revenue
Tax income
Non-tax income
Total expenditure
1993
1994
1995
1996
1997

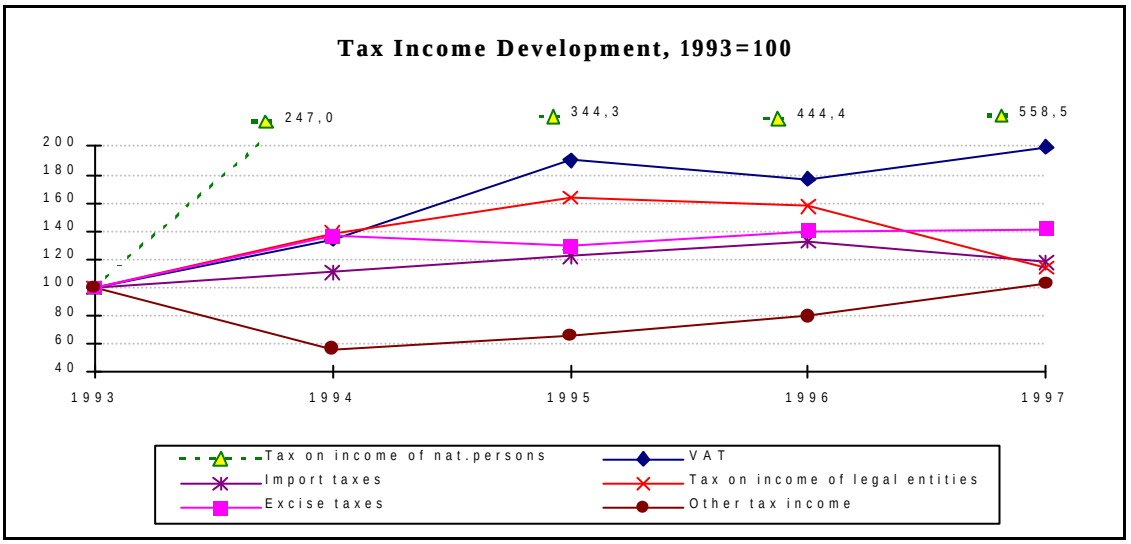

Tax Income Fulfilment
%
140
120
100
80
60
40
644,1
209,5
210,3
VAT
Excise taxes
Tax on income of legal entities
Tax on income of nat.persons
Import taxes
Other tax income
1993
1994
1995
1996
1997

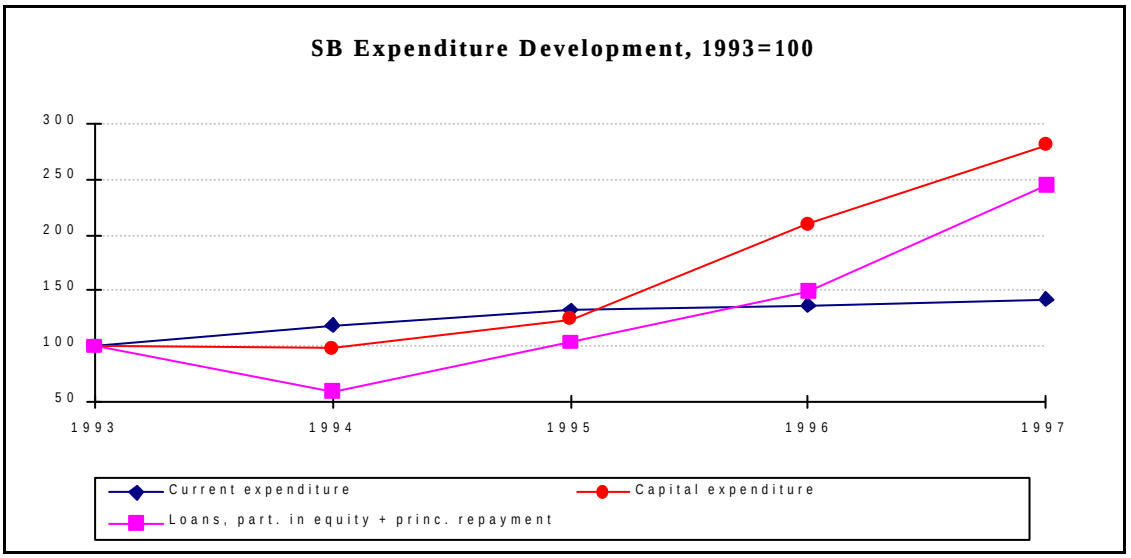

SB Expenditure Fulfilment
%
160
150
140
130
120
110
100
90
80
Current expenditure
Capital expenditure
Loans, part. in equity + princ. repayment
1993
1994
1995
1996
1997

State Budget Revenue Composition



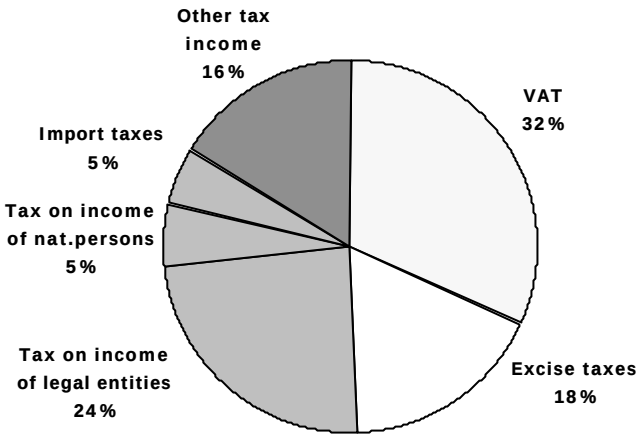

SB Indicators Development, 1993=100
200
190
180
170
160
150
140
130
120
110
100
1993
1994
1995
1996
1997
Total revenue
Tax income
Non-tax income
Total expenditure


Tax Income Development, 1993=100
247,0
344,3
444,4
558,5
200
180
160
140
120
100
80
60
40
1993
1994
1995
1996
1997
Tax on income of nat.persons
VAT
Import taxes
Tax on income of legal entities
Excise taxes
Other tax income

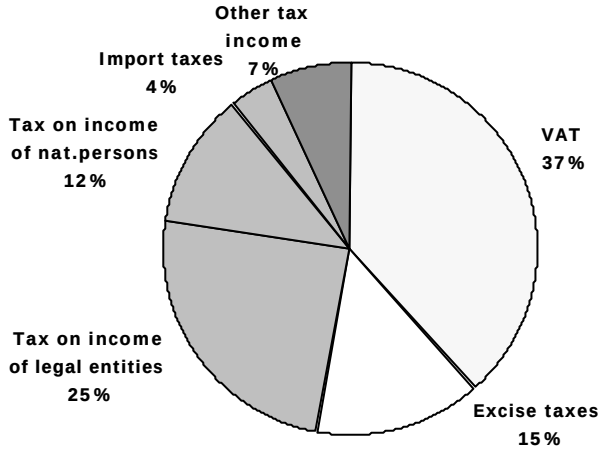

SB Expenditure Development, 1993=100
300
250
200
150
100
50
1993
1994
1995
1996
1997
Current expenditure
Capital expenditure
Loans, part. in equity + princ. repayment

Tax Income Composition in 1993, 1995 and 1997

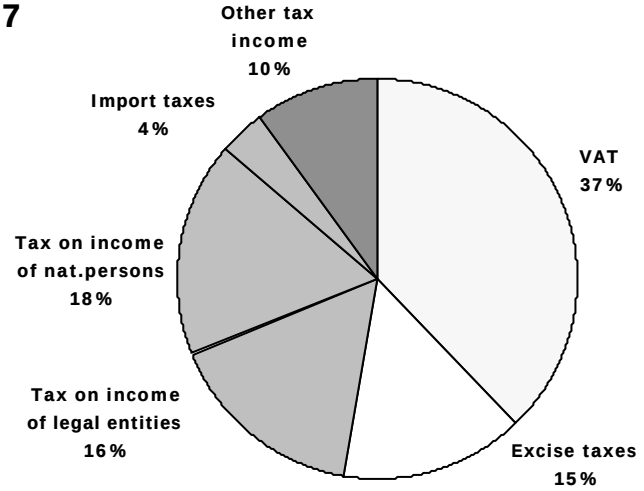
1993

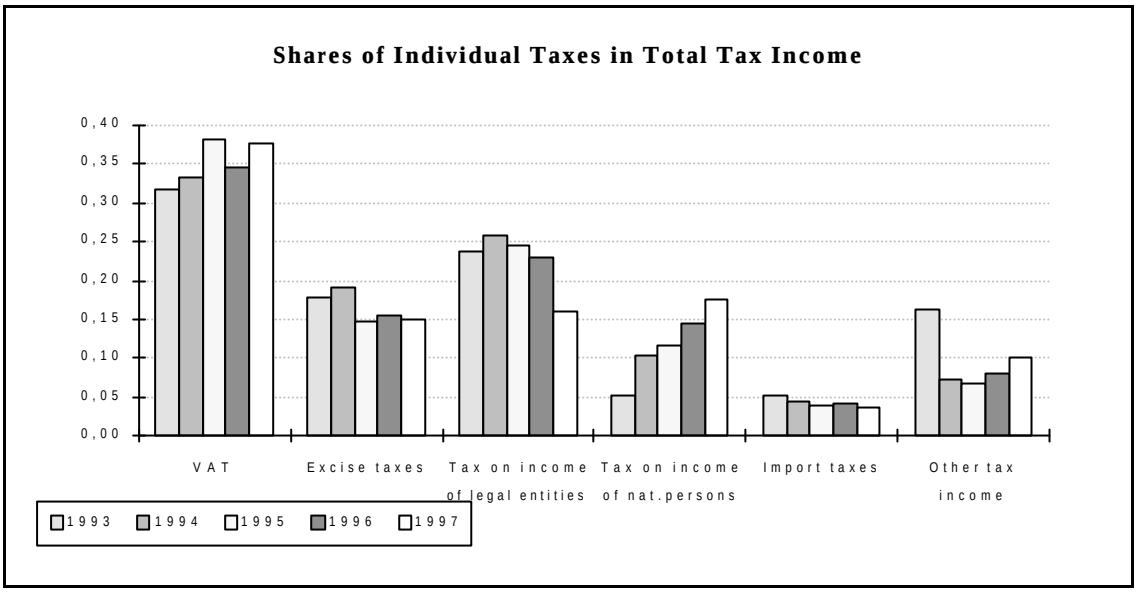


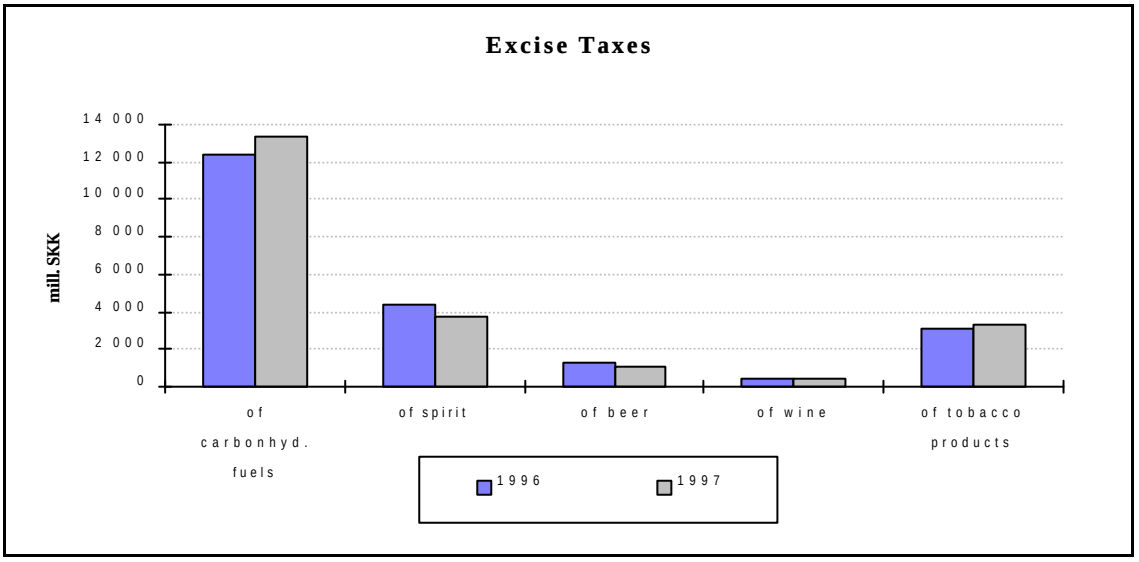
1995

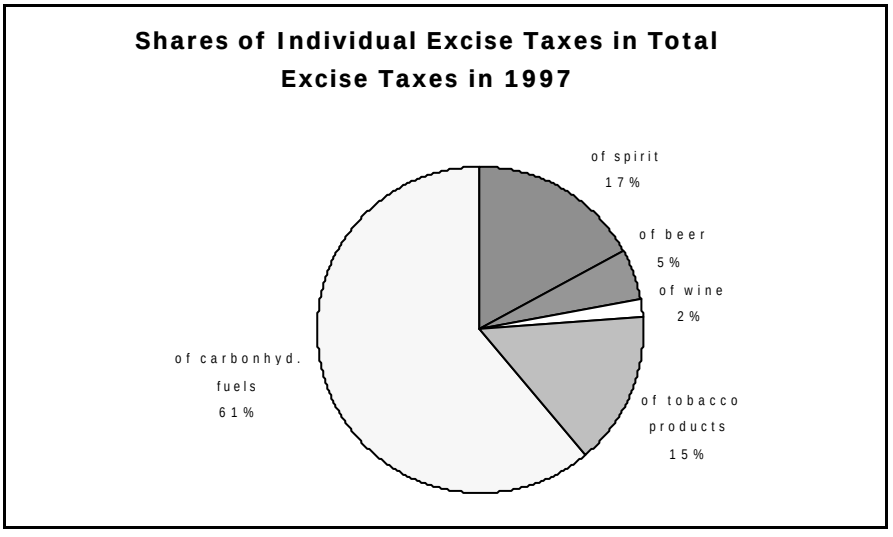


1997




Shares of Individual Taxes in Total Tax Income
0,40
0,35
0,30
0,25
0,20
0,15
0,10
0,05
0,00
VAT
Excise taxes
Tax on income of legal entities
Tax on income of nat.persons
Import taxes
Other tax income
1993
1994
1995
1996
1997


Excise Taxes
mill. SKK
14 000
12 000
10 000
8 000
6 000
4 000
2 000
0
of carbonhyd. fuels
of spirit
of beer
of wine
of tobacco products
1996
1997


Shares of Individual Excise Taxes in Total Excise Taxes in 1997
of spirit 17%
of beer 5%
of wine 2%
of tobacco products 15%
of carbonhyd. fuels 61%