Mária Lakatos

Changes in the Hungarian taxpayers' behaviour with a view to changes in the personal income tax and the national insurance contribution, 2005–2006

The Hungarian literature has not provided a description of the Hungarian model based on a mathematical scheme and the investigation of the resulting relations. In general, the tax and national insurance levies are two separate systems, and the interference of them has hardly or not been analysed by the experts. Therefore, I first looked at these relations when examining the personal income tax revenues, the tax rate and the national insurance levies and the changes of this system. It was clearly revealed that it was the change in the national insurance levies that primarily influenced the taxpayers' behaviour and consequently the declared tax; nevertheless, this was suitable for analysis only with certain restrictions. The separation of the effects, the changes of the individual factors and their interference still need to be proved.

The principles, acknowledgement and implementation of the Hungarian tax system do not differ from the systems used in developed countries; therefore descriptive models used in such countries may be used for the description of the Hungarian system, too. Based on this, I set up and analysed the English descriptive model suitable for the calculation of the tax burdens, taking the Hungarian peculiarities into account.

Adapting the English descriptive model, taking the Hungarian circumstances into account, has enabled me to analyse the impact of the effective tax rates and the tax allowances with regard to the tax revenues. The Hungarian model differs from the English in that different allowances are used in Hungary and certain allowances depend on the employment status; for this reason I have established two groups: employees and private entrepreneurs. The classification of taxpayers by occupational groups and allowance categories has shown which group may generate more or less revenues when certain changes take place.

According to the model, the tax revenues are influenced not only by the rate of the contributions and taxes, but their relative proportions. In addition, the introduction of more stringent measures regarding the national insurance contributions significantly decreases the number of taxpayers, including the widening of the tax base for the contributions. Therefore any tax-related measures and their impact should be analysed together with the changes in the national insurance contributions taking place the same year so that revenue estimates could become true the following year. At the same time, a group of taxpayers adapt to the changes extremely fast, while the

493

only strategy available to the employees in the public sector is asking for a bigger pay rise. These differences are duly reflected in the models set up for the two occupational groups.

First I am going analyse the changes that have taken place in the last two decades based on the international tax indicators. I am going to examine the revenues from each tax type, the changes in the number of taxpayers while giving a brief description of the national insurance system.

I am going to continue this reasoning by calculating tax levies for different occupational groups, and based on this, outline the changes that have taken place. The description of the English mathematical model of the tax burden indicator may be used for the analysis of the impact of the measures on the marginal tax rate and allowances.

Then I am going to modify this model taking the Hungarian peculiarities into account, and draw the necessary conclusions.

Finally, I am going to summarise the key findings.

GENERAL DESCRIPTION OF TAX BURDEN INDICATORS, MARGINAL TAX RATES

Besides theoretical models, international comparison provides valuable clues for the description of the procedures; however, it seems to be a good idea to examine what semantic problems arise when the tax systems are compared and conclusions are drawn from the changes of the indicators. Understanding and applying these will help us to explore the problems of the Hungarian tax system, too.

A key indicator used in the international comparison is the effective tax rate, i.e. the percentage of the income to be paid as tax.

Consequently, the *establishment of the income for tax purposes* is essential; not only to see the visible and invisible incomes, but to see

whether incomes exempt from personal income tax exist, and if yes, to what extent. Therefore, the comparison of the effective tax rates is rather difficult, since it makes a difference when you calculate the tax burden on the declared income, the total income or the income increased by social allowances.

> *If, for example, the status of various monetary social allowances changes from one year to the next, the maternity benefit becomes tax exempt, the effective tax burden decreases in the household statistics (paid tax/income); but this in itself may indicate a reverse effect as the burden on the active population may increase.*

After defining the income, a *tax table* should be set up, which usually expresses the current government's preferences regarding the allocation and re-allocation of incomes in the form of progressive tax rates. Normally, the indicator representing the actual tax burden – paid tax/total income – serves as a basis for the comparison, or the marginal tax rates of various income categories or the tax rates of the highest category are to be considered; this burden is imposed on the taxpayer when a new unit of income is acquired. It means that the progression of the nominal tax table in itself does not adequately describe the tax burden.

The progression cannot be characterised by the marginal tax rate alone, since it makes a difference at which income category it is applied. In Hungary the highest tax rate applies to the average income.

Similarly, a significant difference may arise from the application of the *family income taxing,* regardless which method is used for the division of the taxable income in a 'dual earner' model. The family status is reflected in taxing in the United States to the greatest extent[1], (Dworin, 1993), while in Hungary the personal income tax system does not take the family status into account at all. (No child allowances

exist anymore in the general family model, and in addition, the amount of the alimony is not deductible.)

However, the Hungarian tax statistics have been providing information for the calculation of the tax statistics in line with the OECD methodology since 1995; as I have already mentioned, there are basic limits on the comparison arising from the difference of the national tax structures.

In Hungary, the general personal income tax burden may be calculated based on the *taxpaying groups created taking various considerations into account:* employees, private entrepreneurs, pensioners etc. In this case, the preferences granted to the taxpaying groups apply and one can see how these groups react to the same change in taxes[2] [Ministry of Finance, 2005].

The burden on the salaries are expressed by the so-called *tax wedge* instead of the effective tax rate, which projects the accumulated amount of tax, the employer's and the employee's contribution for the total labour costs. However, statistics may provide distorted data here as the rate of levies differs, when all or any element of the national insurance contribution may be deducted from the tax. (Or, on the contrary, when the employer pays 54 per cent personal income tax on the taxable contribution in kind plus 29 per cent national insurance contribution on the 154 per cent, then for this income type the tax wedge is not the quotient

$$\text{of } \frac{0+54+29}{100+54+54} \ = \ \frac{83}{183} \text{ , but}$$

$$\frac{0+54+54*1{,}29}{100+54+54*1{,}29}$$

The comparison was rendered even more difficult by the irregularities in the disclosure of statistical data in Hungary: only sporadic statistical tables were prepared in a different account system treating incomes in a different way before 1994. For example, private entrepreneurs could opt to pay corporate tax, i.e. their income was recorded partly as personal income tax and partly as corporate tax. The analysis of corporate tax revenues is further hindered by that the national insurance contributions paid by companies were recorded as national insurance revenue from employer's contribution and corporate tax items. Tax allowances cannot be compared and do not indicate trends, since before 1994 allowances reducing the tax base were in place, which were then replaced by tax reducing allowances depending on income limits and family circumstances. Therefore, in this analysis data from the period after 1994 have been used: all earlier data is only for information purposes, their increase or decrease carries relevant information rather than their volume.

International comparison

The most common indicator of the personal income tax in the national economy is the *tax revenue expressed in proportion to the GDP.* This indicator shows the proportion of the GDP deducted by public finance through personal income taxes, national insurance, turnover-related taxes or tax on profit. In the period under review, i.e. between 1994 and 2005 there was a definite increase in personal income tax burdens. If you place the data on the national insurance contribution next to the tax data, you will see that the burden on labour is extremely high even if the rate of the national insurance contribution against the GDP decreases. *(See Table 1)*

The above table shows that 6.7 per cent of the GDP was levied as personal income tax in 2004. The national insurance contributions – paid by the employer and the employee – account for the double of this amount, therefore it is not surprising that these are the most significant sources of revenue within the GDP. In Hungary during the period under review the proportion of the GDP realised through tax revenues decreased, while this ratio remained

Table 1

PERSONAL INCOME TAX AND NATIONAL INSURANCE REVENUES IN PERCENTAGE OF THE GDP[3]

	1988	1992	1994	1995	1998	2000	2001	2002	2004	2005
Personal income tax	4.3	5.5	7.0	6.8	6.5	7.1	7.5	7.5	6.7	6.9
National insurance	15.49	14.15	14.3	14.05	13.61	13.92	13.97	13.86	13.64	13.29
Total	19.7	19.65	21.3	20.85	20.11	21.2	21.47	21.36	20.14	20.19

(The data indicated in the publication OECD Revenue Statistics 1965–2004; 2005 only differs by a few tenths of a percent. Since the OECD took another amount as a base for the GDP.)

Source: data from the Ministry of Finance and own calculations

unchanged in the developed countries, although the rate of the personal income tax decreased and the corporate taxes increased. However, in Hungary within the total tax revenue the *rate of the personal income tax grew* from 16.1 to 18.9 per cent.

As far as the main tax types are concerned, *the share of the turnover tax increased,* while the proportion of the corporate tax against the GDP became marginal. At the same time, the proportion of the *national insurance contributions significantly increased,* and together with the personal income tax they guarantee one fifth of the revenues each year, therefore tax-related changes usually affect the personal income tax and the national insurance contribution.

As far as the data related to Hungary is concerned, I have to mention the household statistics produced by the Hungarian Central Statistical Office, which provides adjusted data with the aim of aligning the declared incomes to the assumed incomes and also covers own services and records national insurance payments made by the employers as revenue. The personal income tax burdens show an increase even within these limits.

Personal incomes tax data from tax returns

The behaviour of the taxpayers, their reaction to the modifications of the regulations in the given year may be more adequately modelled using the *tax return data,* which indicates the tax liabilities declared for that year. These amounts are lower than the revenues of the Hungarian Tax and Financial Control Administration, which are modified by data related to liabilities, penalties, reviews etc. carried over from the previous year. At the same time they may be treated as declared preferences, i.e. the tax base the taxpayers are willing to declare.

According to the *data in the tax returns,* the increase in incomes from employment exceeds the increase of the incomes taxed separately; however, the increase in the incomes of private entrepreneurs, who account for the second biggest group of taxpayers, lags behind the two previously mentioned groups. When we look at the proportion of the *declared entrepreneurial withdrawal or the entrepreneur's income,* it is notable that the proportion of the wage type amount and the amount subject to national insurance contribution taxed similarly is getting smaller and smaller. Furthermore, according to the data of the Tax Authority, the rate of losses are on the increase; based on the summary of the tax returns the losses of the private entrepreneurs exceed their profits.

The difference becomes even more obvious when looking at the changes in the number of taxpayers, although the number of those preparing tax returns has been more or less constant since 1991: in the beginning of the decade nearly one million former employees

disappeared from employment never to appear in the unemployment statistics. The number of the actual taxpayers first diminished significantly in 1995 primarily due to the private entrepreneurs, but at the same time, forty thousand people switched over to flat-rate taxation. The changes in the number and the incomes again indicate that this group reacts to the changes in the tax legislation and other circumstances far more flexibly than the employees. The changes in the average personal income tax burdens are shown in *Chart 1* after processing all tax returns.

The burdens in general increased only by 0.9 per cent in 11 years; however, the changes seen in the individual years projected a different picture.
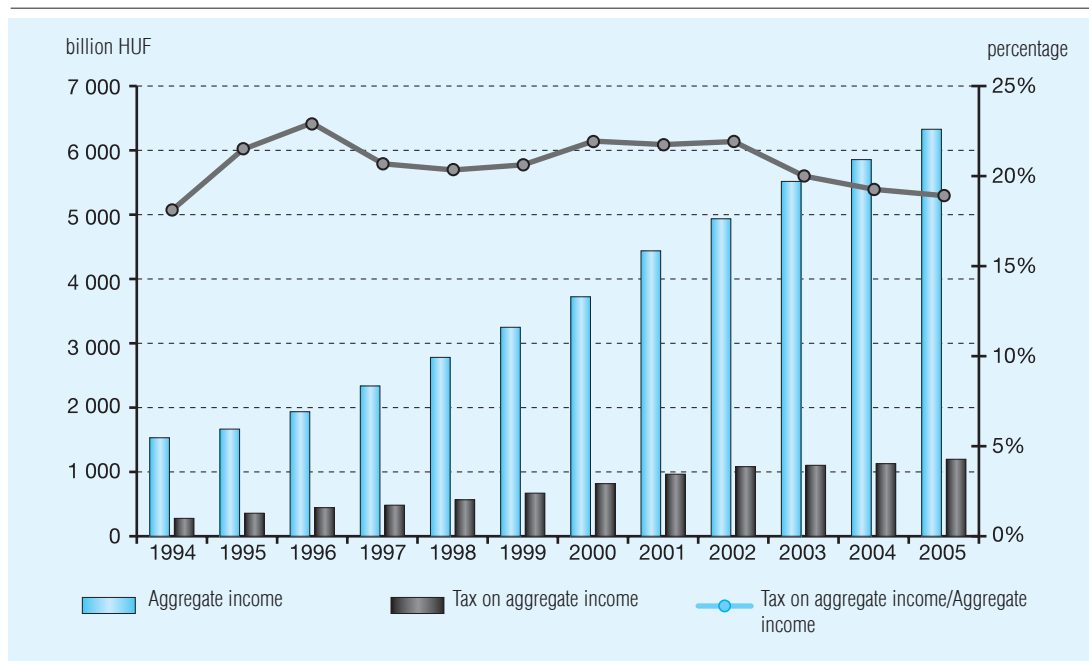
Between 1994 and 1996 *tax burdens significantly grew,* in 1997 somewhat decreased, while in 1998 remained unchanged. From 1999 tax burdens increased again, the tax table did not change significantly, but the tax credit lost sig-

nificance and the minimum monthly wage increased by eighty per cent. However, the *growth rate of the tax revenues significantly accelerated in this period,* statistical data indicates a similar trend at nominal value as well as net present value; in addition, the *number of taxpayers started to increase* again even among private entrepreneurs, who doubled their payments in four years. Since 2002 tax burdens have decreased again and the growth of the revenues of the central budget from private income taxes have significantly decreased, too. Separately taxed incomes have considerably increased partly due to stock exchange gains and the real estate market, which started to pick up. A *new group of taxpayers has emerged with no wages or entrepreneurial income,* who live exclusively on capital investments. In 2005 176 thousand people declared incomes to be taxed separately (i.e. these taxpayers had no other incomes).

Chart 1
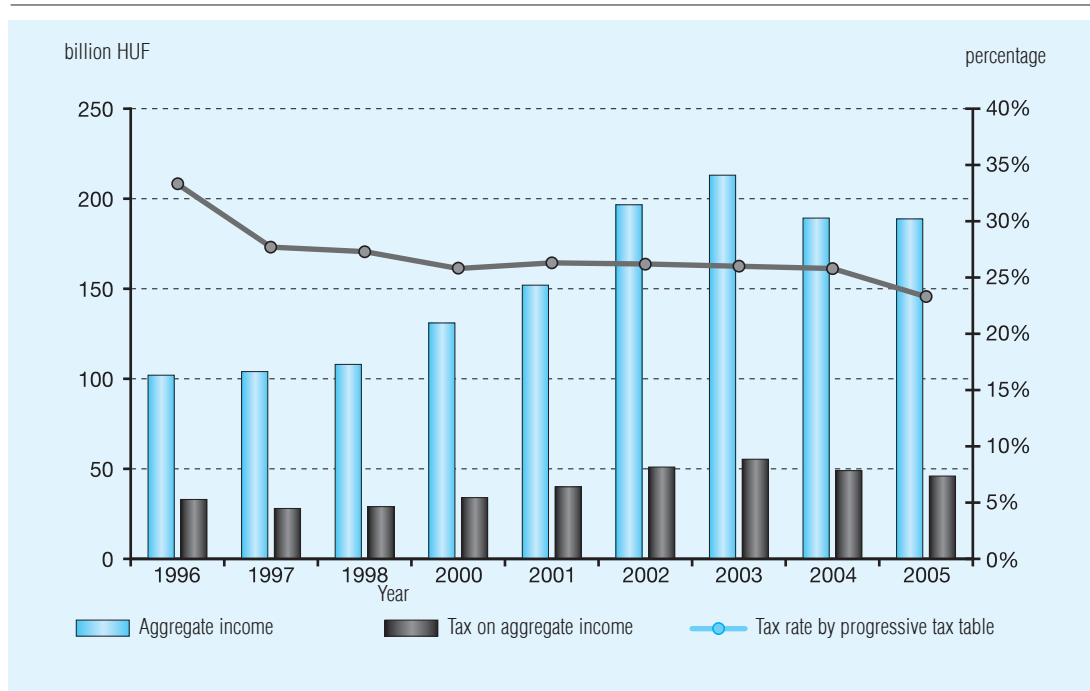
CHANGES IN THE AVERAGE PERSONAL INCOME TAX BURDENS
(at nominal value)

Source: Own calculations based on data from the Ministry of Finance

497

Chart 2

TAX BURDENS OF PRIVATE ENTREPRENEURS

(at nominal value)

billion HUF

percentage

Aggregate income   Tax on aggregate income   Tax rate by progressive tax table

Source: Tax Authority flash reports, 1996–2005

When occupational groups are compared, excessive disproportions are seen: 93.4 per cent of all tax liabilities are undertaken by employees, 4.2 per cent by private entrepreneurs and 0.9 per cent comes from agricultural activities. *(See Chart 2.)*

The growth rate of revenues, as indicated by the data of the personal income tax returns, *came to a halt* between 1995 and 1996, and the same has been happening since 2002, which cannot be explained by the decreasing inflation and the slowing economic growth; the taxpayers' tax avoiding behaviour and the impact of untaxed incomes are shown by the statistical data calculated at valorised value in *Chart 3.* This indicates that the revenues calculated at valorised value decreased even when more stringent tax provisions were introduced in 1994 and 1995.

However, data related to the *burden on property* is usually missing. There is no tax statisti-

cal data available on the wealth of the Hungarian population, since tax returns do not include the zero tax rate deposits and similar government bonds and amounts invested investment funds. Similarly, no survey has been carried out on stock exchange capital gains or the growth of real property. Therefore, wealth is not easy to estimate and the rate of wealth-related taxes can be ignored unlike their proportion against the GDP or the total tax revenue elsewhere in Europe.

National insurance revenues

The changes taking place since 1994 in the revenues from national insurance contribution, which is not treated as tax, should be discussed separately. The independence of the funds originally financing retirement-related and health

Chart 3

REVENUES FROM PERSONAL INCOME TAX AT NOMINAL AND VALORISED VALUE

billion HUF
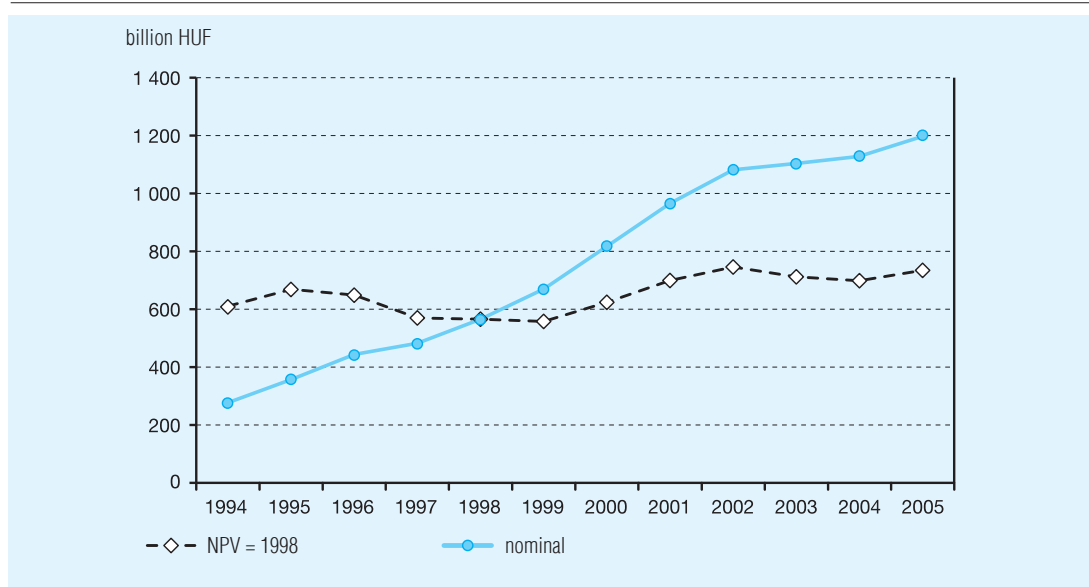
Source: Own calculations based on data from the Ministry of Finance and the Tax Authority

services, and their allocation to the Tax Authorities in 1999, as well as the treatment of these within the central budget made not only their operation ambiguous, but their imposing and collection, too. Collection has clearly improved since the Tax Authority took over this operation, and data published so far have been suitable for segmented analysis. The only source of data from the period before 1998 was the act on the final account; therefore no detailed data were available.

The national insurance burdens paid by the employer are lower than the European average, but those paid by the employee are higher, and the joint impact of the two exceeds the OECD average in proportion to the GDP.

Currently, revenues from contributions reach 12.5 per cent of the GDP, while revenues from personal income tax account for 6.8 per cent (in 2005), which indicates that the central budget should focus primarily on these revenues rather than tax revenues. Rates were decreased twice: the rate of the pension contribution slightly decreased before 1995 and then

again in two steps between 1998 and 2001; there was a 10 per cent fall as far as contributions paid by the employer are concerned. Since then the rate of contribution has grown from one year to the next, although only slightly, and new contribution types have been introduced such as the entrepreneurial contribution.

The increase in the contribution does not clearly have a positive effect on the budgetary balances primarily due to the peculiarities of the Hungarian employment structure, which are as follows:

• the number of employees is extremely high,
• every third employee works in the public sector,
• the salary of those working in the public sector – statistically – exceeds the declared salary of those working in the business sector and the entrepreneurs in the private sector.

Out of the contributions paid in 2005 600 billion HUF – about 25 per cent[4] – came from the contributions imposed on employees in the

public sector (CEMI, 2006). 20 per cent of all the employees are working in the public sector; however, their declared average salary is higher than those in the business sector, therefore their share of the national insurance revenues and taxes is higher than it would be justified taking their number into account.

Consequently, higher contribution rates do not necessarily increase the revenues; similarly, lower rates will not result in a shortfall of revenues: for example, the decrease in the contribution rates in 1998–2001 clearly had a decreasing budgetary effect on the deficit as public burdens lowered, while the decrease in the revenues caused by decreasing contribution rates was counterbalanced by the increasing number of taxpayers and the increase in the minimum wage, which did not affect the public sector, only the business and the private sectors.

However, the increase in rates since 2002 (except in 2003, when the rate of the healthcare contribution dropped) has been accompanied by a diminishing number of taxpayers, and the declared average salary in the entrepreneurial sector has been diverging from the salary of those employed in the public sector, and the salary of private entrepreneurs has been stagnating. Accordingly, the higher rate was followed by a decrease in the levies on the real incomes, which people are less and less enthusiastic to declare, and so revenues did not rise as expected. *(See Chart 4.)*

The data shows that reactions are sharper when the payment of the national insurance contribution is modified.

- 1995–1996: significant increase in tax rates, the deductibility of the employer's contribution from the tax base is gradually suspended, widening of the national insurance tax base.
- 1998–2001: increase in tax rates, but decrease in contributions, employer's contribution is again deductible from the tax base.
- 2002: the upper limit of employer's contribution payment doubled, employer's contribution again cannot be deducted from the tax base.

Chart 4

CHANGES IN THE NOMINAL VALUE OF NATIONAL INSURANCE CONTRIBUTION AND PERSONAL INCOME TAX REVENUES
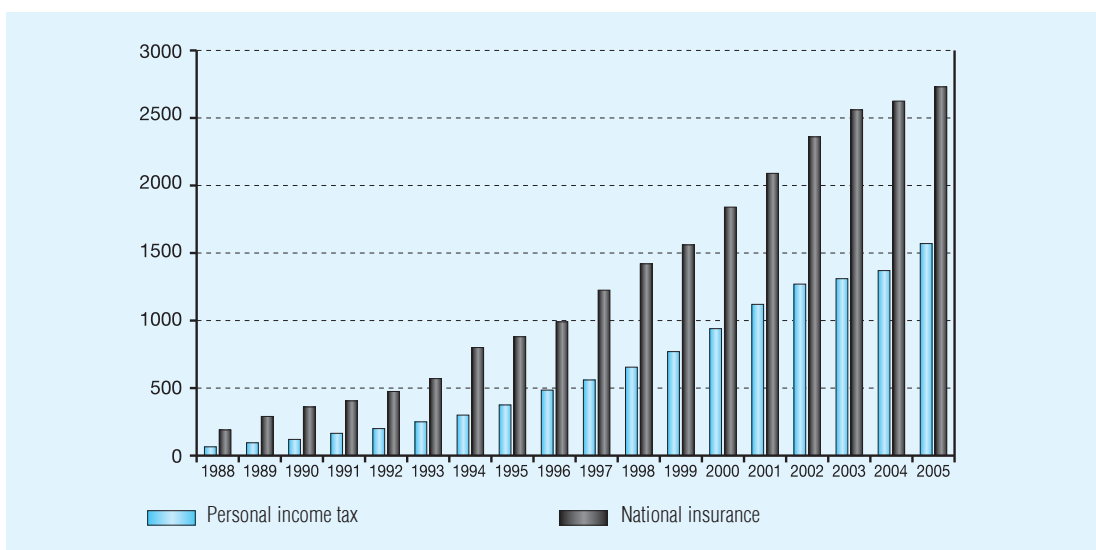
Source: Ministry of Finance, 1988-1998; flash report of the Tax Authority, 1988–2005

Incomes from intellectual activities

The reaction of taxpayers is significant in the case of incomes from the sale of intellectual property, where the cut-down on the earlier allowances (1995) calculated taking the marginal tax rate into account resulted in changes of a few thousand forints; nevertheless, this in itself cannot justify that the incomes from intellectual activities shrank to one fourth.

However, when you consider the widening of the national insurance tax base, reactions could be understood. Although the rate of the contribution did not change significantly, the tax base widened, i.e. the marginal rate for the national insurance contribution rose from 0 to 54 per cent in the case of intellectual products. The decline in the incomes from intellectual activities is shown in *Chart 5,* which reveals that the national insurance contribution decreases the tax income for the first time.

Before introducing the Bokros package, which changed the basis of the tax system, the tax base started to shrink gradually through the declared incomes of the entrepreneurs. While in 1994 the average annual salary was 390 thousand forints among employees in the public sector, private entrepreneurs paid tax on 118 thousand forints declared in their tax returns. Tax avoidance took place even when levies were theoretically lowered, although this effect was lessened by the failure to index the rate bands.

CALCULATING TAX BURDEN INDICATORS FOR DIFFERENT GROUPS IN HUNGARY

As we have seen, essential structural changes took place in 1995 and 1996 with regard to all three elements of the tax system, and the effect thereof – similarly to that of the reform – could be seen for two years. However, since 2002 even more significant changes have started to evolve:

Table 5

TAX BASE AND BURDENS OF THOSE CARRYING OUT INTELLECTUAL ACTIVITIES

Income from intellectual activites — Allowances — Number of those carrying out intellectual activities
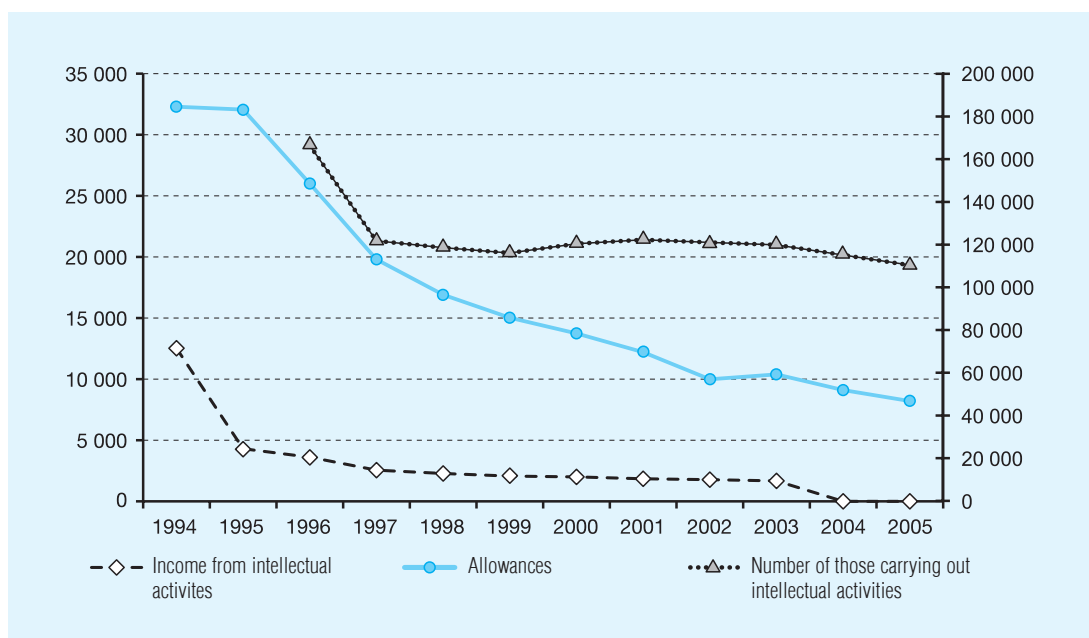
Source: own calculations based on data from the Ministry of Finance

- the number of those paying personal income tax dropped by eight hundred thousand partly due to the widening of the tax exempt category,
- the proportion of the personal income tax revenue transferred into the central budget decreased in 2005,[5]
- the entrepreneurial withdrawal (wages from their own business) decreased in absolute terms,
- the entrepreneurs' declared profits shrank,
- the average salary of those in the top 100 (i.e. those earning the highest incomes) have considerably increased.

The rate of changes in the personal income tax revenues unseen before (the number of taxpayers fell in 1995 and 1996, while it rose in 1999 and then again in 2001 to decrease by eight hundred thousand starting in 2002) indicates that certain factors had an impact on the taxpayers' behaviour, who apparently avoid the payment of taxes, although the marginal tax rates have remarkably reduced (from 44 per cent – the highest rate in 1994 – to 36 per cent).

However, when we compare the *tax wedge (private income tax + employer's and employee's contribution/total salaries)*, a tax table completely different from the traditional is received. Beside the progressive income tax, there is a national insurance tax, which is linear, but of its four elements (employer's old age insurance benefit, employer's healthcare contribution, employee's pension contribution and employee's health care contribution) the third has a limit; i.e. no payments have to be made over 6,325,400 per year (limit for the year of 2006). If we examine both tax types, marginal tax rates are as follows. *(See Table 2.)*

This indicates that in addition to a progressive personal income tax, a linear tax on salaries is to be paid, too, which is the pension and health care contribution paid by the employee. The 12.5 per cent contribution should be calculated as a part of the tax base similarly to the income (the upper limit of the contribution payment was HUF 6,325,400), i.e. income tax has to be paid on the contribution, too. (Besides Hungary, only Lithuania has a similar tax system.) If you consider this in the table and add the two types of taxes up, you can look at the personal income tax revenues from a different angle, and a special tax table evolves producing a different system of preferences. *(See Chart 6.)*

Instead of a system of tiered, progressive levies this tax table does presents a proportional tax system, which imposes levies in a progressive, and then in a regressive manner from a certain limit. In the highest income categories tax and national insurance levies even decreased.

The tax burden on private entrepreneurs may be modelled similarly by considering cer-

Table 2

ADJUSTED TAX TABLE FOR EMPLOYEES, 2006

Capital income	Tax rate	
HUF 0–750 000 forint	12.5%	
HUF 750 001–1 550 000 forint	30.5%	(18% personal income tax+12.5% national insurance), (93,750 + 30.5% of the amount above 750,000)
HUF 1,550,001–6,325,400	48.5%	(345,750 + 48.5% of the amount above 1,550,000)
over HUF 6,325,450	40.5%	(2,661,819 + 40.5% of the amount above 6,325,450)
If it was capital income, then (without dividends)		
over HUF 0	0%	

Source: own calculations

Chart 6

LIMITS ON THE LEVIES IN THE HUNGARIAN TAX SYSTEM (TAX + NATIONAL INSURANCE) FOR EMPLOYEES, 2006
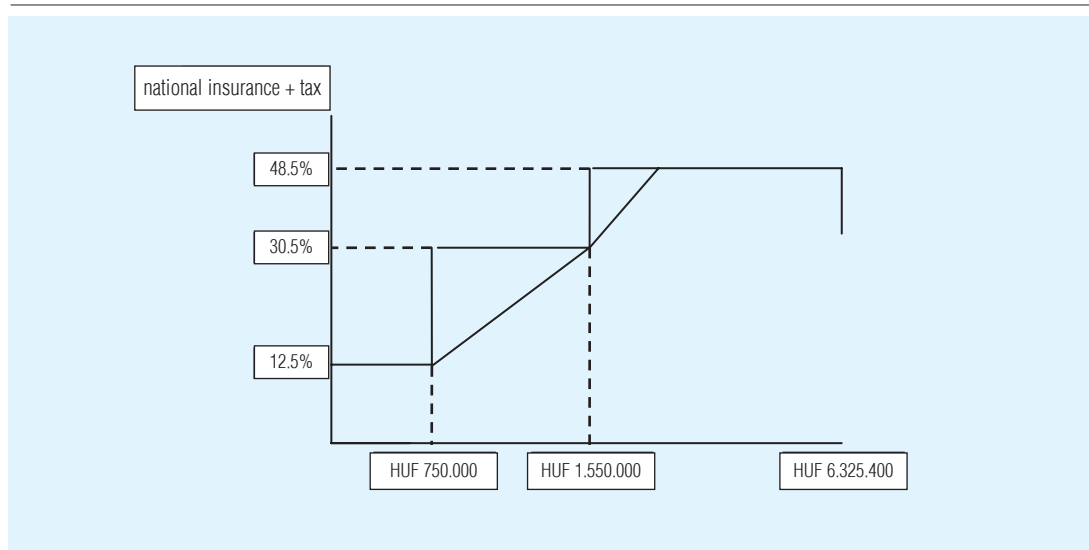
Source: own calculations

tain peculiarities, notably that they are given no tax credits. (In both cases only two types of contributions, the amount of which is the highest, were taken into account, since the rate and payment method of the others are different, but their percentage is so low that it has no impact on this analysis.) *(See Table 3)*

Private entrepreneurs have to pay the entire amount since no tax credit applies to the minimum wage, and they are their own employers, therefore they pay the employer's contributions, too. *(See Chart 7)*

These two figures lead to a number of conclusions, which may shed a different light on the traditional approach of the personal income tax system:

• contrary to the original intention, the personal income tax is not a progressive tax system: it is progressive first to become regressive in the highest category,

• among the employees, the highest levies are imposed on the middle class, and the tax-wedge is decreasing over the upper limit of the contribution payment,

• the burden on the private entrepreneurs is extremely high from the first earned forint; the difference between the lowest and the highest categories is not more than 10 per cent,

Table 3

ADJUSTED TABLE OF LEVIES FOR PRIVATE ENTREPRENEURS

Capital income	Tax rate
HUF 0–750,000	59.5% (18+ 12.5 + 29)
HUF 750.001–1.550.000	59.5% ((18% personal income tax+12.5% national insurance)
HUF 1,550,001–6,325,400	(767,250 + 77.5% of the amount above 1,550,000)
over HUF 6,325,450	(3,990,645 + 69.5% of the amount above 6,325,450)

Source: own calculations

Chart 7

**MARGINAL TAX RATES IN THE HUNGARIAN TAX SYSTEM
(TAX + NATIONAL INSURANCE) FOR PRIVATE ENTREPRENEURS**
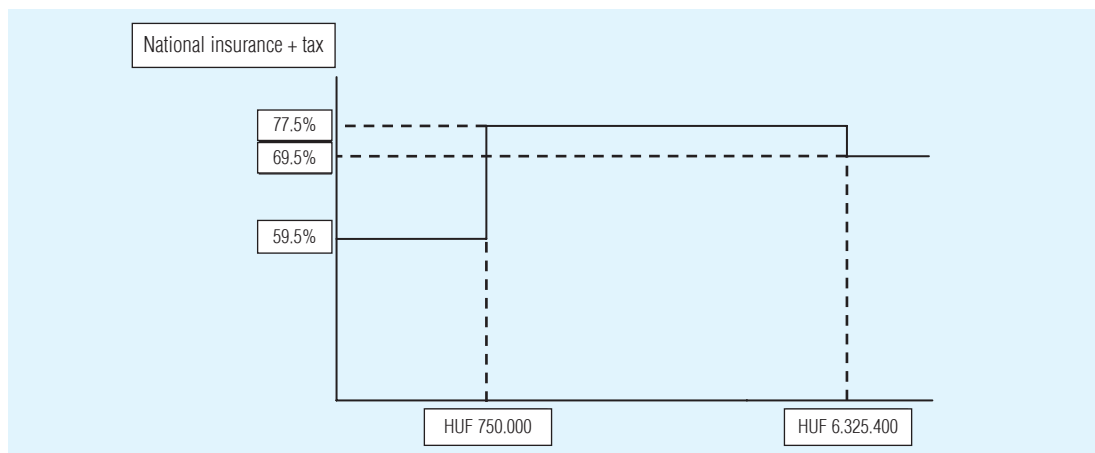
Source: own calculations

- the presentation of the tax wedge makes it clear that employees and private entrepreneurs behave differently,
- the 0 per cent and then from 2006 the highest tax rate on the interest and stock exchange gains   provides unjustified allowances for incomes taxed separately.

The above correlations are supported by international statistical data, when we compare the burden on a unit of net income. This means that it is only in Hungary where the amount of the taxes and contributions to be paid exceeds the net income, which ensures a leading position among European countries.

Based on the two types of tax tables of tax burdens shown previously, the behaviour of the two groups under review, i.e. employees and private entrepreneurs, may be modelled.

Employees try to raise their salary, since 29 per cent of the tax wedge is imposed on their employers, therefore they are not really interested how much the employer pays when their salary becomes higher (out of HUF 129 the employee receives HUF 87.5 when he is registered at a minimum wage). Of the same amount a private entrepreneur may receive

only HUF 69.5, while his total costs amount to HUF 129 and not HUF 100. Therefore, the private entrepreneur is interested in paying taxes and contributions at a minimum wage level. The same effects are reflected in the statistical data related to tax paying employees and private entrepreneurs.

Subsequent to this I tried to find an answer to the question that if the tax base and the contribution base are related, since only their rate differs and both have been collected by the Tax Authority since 1999, what interaction exists between the two, and how the tax base is influenced by the contribution rates, the widening/reducing of the contribution base and similar changes in taxes.

Alternative approach – mathematical description of the English tax system

So far individual elements of the tax system have been analysed separately; however, it is important to examine how much burden is imposed on the different groups by the individual elements of the tax system and the inter-

action thereof. The Hungarian literature has analysed the socio-political aspects of the tax system in detail,[6] therefore I focus on the impact of the changes in two key tax elements – personal income tax and national insurance contribution – on the tax base. For this purpose, I took the mathematical model of *Dilnot, Kay* and *Morris* of 1984 as a basis,[7] which I modified in accordance with the Hungarian peculiarities and the objective of this research (Dilnot, Kay, Morris, 1984).

According to the assumptions of the English model, tax legislation determines the following:
- method of tax payment,
- volume of the income to be considered,
- available allowances,
- payment schedule of national insurance contributions,
- VAT rates.

The model established based on equations known from macro-economics is static, because instead of indicating the changes in the individual factors on a timeline, it models the forms of levies and shows their joint at a given time. It aims at assessing the individual's tax burdens and showing the relation between the levy forms and revenues.

According to the original model the tax system may be modelled by the following equation:

(1.1) $$T = T_a + bY$$
where
T = total tax revenue
T_a = autonomous taxes not linked to the income
Y = taxable income
b = effective marginal tax rate

Since the two tax types seem to interact, this model shows the resultant of interactions. Since it assumes interaction between income, marginal tax rate and the tax paid, it may be used for modelling the tax regulations including the peculiarities.

(1.2) $$t = bY\text{-}a$$
where
t = personal income tax paid
a = tax allowance, tax reduction
Y = gross taxable income

Now the income-dependent levies should be considered in the model.

The original English model took the following income-dependent levies into account with certain restrictions. Only levies significant for tax payment were modelled, such as mortgage interest, payments made to pension funds and life insurance fees.

Mortgage payments may be expressed in the following way in an equation:

(1.3) $$M = M1 + M2Y$$
where
M indicates mortgage payments, a part of which is an income-dependent payment

Substituting these in equation (1.2):

(1.4) $$t = b(Y - M) - a$$
(1.5) $$t = b(Y - (M1 + M2Y)) - a,$$

with further emphasis

(1.6) $$t = b(1 - M2)Y - (a + bM1)$$

Based on this relation, one can conclude the effective marginal tax rate and the tax allowances
- the principal payment increased the deduction not dependent on the income (M_1),
- while the income-dependent M_2 decreased the effective marginal tax rate.

Taking the national insurance contribution into account, the following equation may be set up:

(1.7) $$Yt = (1 + n_2)Y$$
where
Yt = employees' total labour costs
n_2 = social insurance contribution paid by the employer in %

(1.8) $$Y = 1/(1 + n_2) * Yt$$

505

Equation (1. 6.) may be expressed as follows:

(1.9) $t + n_2Y = (b(1-M_2) + n_2))Yt/$
$(1+n_2) - (a+bM_1)$

This means that the legal regulation of direct taxes facilitates the inclusion of the impact of the direct taxes.

In the second step, the impact of the indirect taxes may be included with the use of the estimated Engel curve

(1.10) $X_i = Z_i + x_iY$

where

X_i is the consumption expenditure spent on product i

x_i is the marginal propensity to consume product i

Now the equation may be supplemented, which already includes the personal income tax and the tax allowances, the national insurance contribution paid by the employer and the turnover tax.

(1.11) $T = t + t_iX_i + n_2Y = (b(1-M_2) + t_ix_i +$
$n_2)Yr/(1+n_2) - (a+bM_1 - tZ_i)$

Based on this equation, the tax reducing items for the individual tax types, the marginal tax rates and the total tax for the various income groups may be established. The impact of indirect (turnover) taxes could be determined, if we used consumption-related data available in addition to the Engel curve. The expenditure on taxable goods should be compared to the total expenditure of the various income groups. Understanding the structure of indirect taxes, the structure of taxable goods, in peculiar the structure of taxable goods with different tax rates will help us to determine the tax burden of the different income groups.

Tax reducing items in income taxation are descried by Dilnot, Kay and Norris:[8] (Dilnot – J. Kay – N. Norris: 1984)

	Tax-reducing items	Marginal tax rate
Personal income tax	$b(A+M_1+P_1+L_1)$	$b(1-M_2-P_2-L_2)\frac{1}{1+n_2}$
Employer's national insurance contribution		$\frac{n_2}{1+n_2}$
Employee's national insurance contribution		$\frac{n_1}{1+n_2}$

where

A = tax allowances

M_1+M_2Y = mortgage payments

P_1+P_2Y = pension contribution

L_1+L_2Y = life insurance fees

b = income tax base rate

n_1+n_2 = employee's and employer's national insurance contribution

The total tax burden and the aggregated tax rate for income per unit may be defined by adding all the marginal tax rates up. The actual calculations conveyed a rather appalling picture: in 1981 the aggregated tax burden on a single-earner family with two children with incomes below the national insurance ceiling was 53 per cent, and in certain groups it exceeded 60 per cent.

PROBLEMS, DIFFERENCES AND PECULIARITIES OF THE HUNGARIAN TAX SYSTEM

The mathematical equation introduced in the previous chapter appropriately models the basic peculiarities of the tax system, and indicates the relation between different factors, while it enables you to explore the relation between the various factors on the individual's level as well as on a budgetary level. Building on this feature, I modified the equation in line with the Hungarian circumstances. Accordingly, those preparing tax returns have been divided into two groups: employees and private entrepreneurs[9] (Ministry of Finance, 2006).

The employees were then divided into three groups based on the tax allowance limits:

- HUF 0–750,000, where the effective tax rate is 0 per cent due to the tax credit,
- HUF 750,000–6,325,450, no tax credit, the tax rate between 0–36 per cent; this is the upper limit for employer's pension contribution,
- over HUF 6,325,400 there is no tax credit and only one rate applies; certain allowances exist with restrictions, no employer's pension contribution.

Similarly, private entrepreneurs may be divided into three groups:

- HUF 0–1,550,000, one tax rate applies (18 per cent), no tax credit,
- HUF 1,550,000–6,325,400, two tax rates apply (18 and 36 per cents), tax allowances exist except tax credit,
- over HUF 6,325,400, one rate applies; allowances are available with restrictions, no employer's pension contribution.

A separate model should be set up due to the following unique characteristics of the Hungarian tax system:

- there are no tax-reducing allowances,
- tax base reducing allowances are income dependent, which support the consumption of certain products,
- employer's national insurance contribution is taxable (cannot be deducted from the tax base),
- allowances related to mortgage interest rates and housing loans no longer exist.

MODEL FOR THE HUNGARIAN SYSTEM OF LEVIES

The starting circumstances of the Hungarian model are similar to those of the British with a view to the following:

- method of tax payment,
- volume of the income to be considered,
- available allowances,

- payment schedule of national insurance contributions,
- VAT rates.

The tax regulations determine the method of tax payment, the schedule, the deadline; the payment of national insurance contributions is similarly regulated. However, the income calculation method is different: different allowances are available, and the national insurance contribution behaves as a tax in a number of ways, e.g. it cannot be deducted from the tax base, therefore the equation needs to be modified.

The revenue from personal income tax and national insurance contribution collected from employees are as follows:

$$(2.1) \qquad T = T_t + T_s$$

where

T_t is the tax revenue,

T_s is the revenue from national insurance contribution

$$(2.2) \qquad Y = y_1 + y_2 + y_3$$

where

Y is the total taxable income

y_1 is the taxable income of the first group

y_2 is the taxable income of the second group

Y_3 is the taxable income of the third group

$$(2.3) \qquad T = y_1 b_1 + y_1 N_1 + y_2 b_2 + y_2 N_2 + y_3 b_3 + y_3 N_3.$$

where

b_1 = tax rate for the first group

b_2 = tax rate for the second group

B_3 = tax rate for the third group

N_1 = employer's and employee's national insurance contribution of the first group

N_2 = employer's and employee's national insurance contribution of the second group

N_3 = employer's and employee's national insurance contribution of the third group

The payments made by the group of employees are as follows

(2.4) $\quad t_1 = b_1(y_1\_M) - a$

where

$M = m_1 + m_2$ = sum of the additional and tax credit

a = tax-reducing allowance not dependent on the income

(2.4) $\quad a = a_1 + a_2$

where

a_1 = contribution in kind, child-related allowances

a_2 = allowances not depending on incomes but linked to an income ceiling (such as Sulinet), which may be expressed as follows

(2.6) $\quad a_2 = (X_1 + X_2 + X_3 + ... X_i) * k$

where

$X_{1,2,...i}$ is the average amount spent on the given product

k – average rate of tax allowance (average allowance/average amount spent on product i)

(2.7) $\quad t_2 = b_2(y_2 - M) - (a_1 + (X_1 + X_2 + X_3) * k)$

(2.8) $\quad t_3 = b_3 y_3 - a_1$

Total tax revenue

(2.9) $\quad T_t = t_{t1} + t_{t2} + t_{t3}$

(2.10) $\quad Y = b_1(y_1 - M) + b_2(y_2 - M) - (a_1 + (X_1 + X_2 + X_3) * k) + b_3 y_3 - a_1$

Then the national insurance contribution revenues are included in the equation

(2.11) $T_t + T_s = b_1(y_1 - M) - a + y_1(n_1 + n_2) + b_2(y_2 - M) - (a_1 + (X_1 + X_2 + X_3) * k) + y_2(n_1 + n_2) + b_3 y - a_1 + y_3 n_1$

where

$N = n_1 + n_2$

n_1 = employer's national insurance contribution

n_2 = employee's national insurance contribution

(2.12) $\quad T = y_1 b_1(1 - M/y_1 + (n_1 + n_2)/b_1) - a + y_2 b_2(1 - M/y_2 + (n_1 + n_2)/b_2) - (a_1 + (X_1 + X_2 + X_3) * k) + y_3 b_3(1 + n_1/b_3) - a_1$

After sorting you arrive at the effective tax rates broken down by factor, and the equation also describes their relation.

In this manner, the revenue expected from the first group is proportional to the quotient of the national insurance contributions and the tax and is inversely proportionate to the rate of tax credits. Since we know that for employees the tax credit equals the tax payment amount in the lowest category, the equation may be further simplified based on the conditions as at 31 December 2006:

(2.13) $\quad b_1 y_1(1 - M/y_1) = 0$

(2.14) $\quad T = y_1 b_1(n_1 + n_2)/b_1 - a + y_2 b_2(1 - M/y_2 + (n_1 + n_2)/b_2) - (a_1 + (X_1 + X_2 + X_3) * k) + y_3 b_3(1 + n_1/b_3) - a_1$

Based on the analysis of the equation, the total tax and contribution revenue may be increased (while all the other factors remain unchanged), when the quotient of the contribution burden and the tax increases, and among the reducing items the tax credit and the part of the amount spent on a product that may be written off decreases the amount to be paid. However, this relation is only one of the factors included in the equation affecting the tax and national insurance contribution revenues; these factors are the following:

- taxable income declared in a year,
- sum of the deducted and utilised allowances,
- increase in the effective tax rate in the given categories, which is also related to the allowances.

The y income factor in the equation may be expressed in the following way:

(2.15) $y_1 = Y_{1t}N_{1p}, \quad y_2 = Y_{2t}N_{2p}, \quad y_3 = Y_{3t}N_{3p}$
where
Y_{1t}, Y_{2t} is the taxable, declared income per person by group
N_{1p}, N_{2p} is the number of those taking on tax liabilities

This shows the number of taxpayers paying the given amount of tax. In this case, the equation reflects whether the same tax revenue was generated by more or less taxpayers in a year in a certain category.

(2.16) $T = Y_{1t}N_{1p}(n_1 + n_2) - a +$
$+ Y_{2t}N_{2p}b_2(1 - M/y_2 + (n_1 + n_2)/b_2) -$
$- (a_1 + (X_1 + X_2 + X_3)^*k) +$
$+ Y_{3t}N_{3p}b_3(1 + n_1/b_3) - a_1$

The relation of the national insurance contribution and the effective tax rate therefore indicates that the proportion of these two modifies the revenue-increasing effect arising from the increase of the tax and the national insurance contribution rates. At the same time, the number of private entrepreneurs indicates that they react to the changes affecting them extremely quickly regardless whether the modification of the tax regulations introduces new levies or eases the tax burdens. The interpretation of the equation sheds a light on the changes expected in each income group (occupational group, i.e. employees and private entrepreneurs) when the structure of levies is altered.

Conclusions

In the employees' group only an increase in the national insurance contribution may bring forth an increase in the revenues up to the limit, where the tax credit exempts the income.

This happened in 2006, when the statutory tax base for contributions was increased to the double of the minimum wage.

In the case of the middle class, an increase in the tax rate does not necessarily result in an increase, since this effect is lessened by the decrease in the national insurance/tax quotient, and may modify the sum of the allowances (this group makes the most of the allowances)[10] (Tax Authority 2002, 2003, 2004, 2005, 2006). In the highest category, the rate of the marginal tax rate is dominant, since this group is not entitled to any tax credit or tax-reducing allowances. The revenues from this group are, however, limited due to the pension contribution ceiling.

The equation for the tax and national insurance revenue from the entrepreneurs may be set up similarly; in the first category the difference is that they cannot benefit from tax credits, therefore the levies to be collected depend on the quotient of the national insurance contribution rate and the tax rate – even in the first group.

(2.17) $T = Y_{1t}N_{1p}b_1(1 + (n_1 + n_2)/b_2) -$
$- a + Y_{2t}N_{2p}b_2(1 + (n_1 + n_2)/b_2) -$
$- (a_1 + (X_1 + X_2 + X_3)^*k) +$
$+ Y_{3t}N_{3p}b_3(1 + n/b_3) - a_1$

More revenue may theoretically be expected from entrepreneurs when levies rise, if the number of taxpayers does not change significantly from one year to the next. Nevertheless, this group reacts to the changes the quickest restricting their payments to the statutory minimum, i.e. the amount to be paid on the expected tax base for contributions.

Equations (2.12) and (2.17) indicate a new relation, which reveals the taxpayers' behaviour when any changes occur in the two key forms of levies. This relation gives rise to the conclusion unrevealed so far:
• that the volume of revenues is determined

not only by the absolute size of the tax rates for these two tax types, but also the relative proportions of the two tax types.

If you compare the effective national insurance contribution rate (12.4 per cent) to the average tax rate, which is 6.8 per cent, it is obvious that *the central budget may expect revenues primarily by increasing the national insurance revenues, for which purpose it may make certain sacrifices regarding the personal income tax.* This is a viable solution since through the management of the national insurance funds as a separate central fund this is regarded as a revenue-generating or loss-making activity. This relation is not influenced by the fact that until the end of 2006 the national insurance funds were making considerable losses; however, there have been months this year generating "profits".

Changes in the number of taxpayers

So far significant differences in the actual number of taxpayers, the increase in tax burdens and the decrease in national insurance contributions have been seen during two periods.

◘ The first is when the Bokros package was introduced, when in the first two years allowances decreased, the effective tax rate increased, and the number of taxpayers decreased already in the first year especially among private entrepreneurs.

◘ Between 1998 and 2002 the national insurance levies significantly decreased, and taking the effect of the then introduced healthcare contribution into account, the effective tax burdens increased by 8.5 per cent and then again by 1 per cent, and even so, the number of tax-paying employees and private entrepreneurs rose considerably. This results partly from the restoration of the minimum tax liability, but the number of taxpayers were reduced by family allowances introduced. These two different changes induced a considerable increase in the number of taxpayers.

In the first period, i.e. the first two years of the Bokros package, between 1995 and 1996, the growth rate of revenues from personal income tax accelerated at current price, and then slowed down between 1997 and 1998. This means that by suspending the allowances and increasing the effective tax rate increased revenues in the short run; however, due to the shrinking number of taxpayers and the increasing quotient of the national insurance and the tax, the growth rate of incomes slowed down.

In the second period, during the changes between 1998 and 2002, the decrease in the effective national insurance contribution and the increase of the effective tax rate had a decreasing effect on revenues for a short time; however, this was counterbalanced by an increase in the number of the taxpayers and especially the increase in the income declared by the private entrepreneurs. Furthermore, in the case of private entrepreneurs, the quotient of the national insurance and the tax increased when the minimum wage was doubled, and so revenues from national insurance contribution and tax paid by them considerably grew.

SUMMARY

Adapting the English descriptive model taking the Hungarian circumstances into account has enabled me to analyse the impact of the effective tax rates and the tax allowances with regard to the tax revenues. The classification of the taxpayers by occupational groups and allowance categories has shown which group may generate more or less revenues when certain changes take place. Based on the analysis of the model, I could also provide explanations for contradictory changes in the statistical data, e.g. why the increasing tax burdens increases or decreases tax revenues under different circumstances.

According to the model, the tax revenues are influenced not only by the rate of the contributions and taxes, but their relative proportions. The introduction of more stringent measures regarding the national insurance contributions significantly decreases the number of taxpayers, including the widening of the tax base for the contributions. Therefore any tax-related measures and their impact should be analysed together with the changes in the national insurance contributions taking place the same year so that revenue estimates could become true the following year. At the same time, a group of taxpayers adapt to the changes extremely fast, while the only strategy avai-lable to the employees in the public sector is asking for a bigger pay rise.

NOTES

[1] L. Dworin: Taxing low income families, in Social Politics Bulletin, 1993, Issues 1 and 2

[2] Ministry of Finance: Analysis of the personal income tax, 1994–2004, internal publication

[3] Data are obtained from the internal statistics of the Ministry of Finance, however, they come from unconsolidated balance sheets prior to 1994.

[4] CEMI: Macroeconomic balance and growth in the Hungarian economy, 2006, Budapest, www.cemi.hu

[5] Act CXVIII of 2005 on the implementation of the state budget of 2004 of the Republic of Hungary, www.pm.gov.hu, 2007, July

[6] Tóth, István György; dr. Ékes, Ildikó; dr. Hetényi, István

[7] John Cullis – Philip Jones: Public Finance and Public Choice, Theory and Practice of Taxation, KJK Kerszöv, 2004, pages 403–420

[8] A. Dilnot, – J. Kay – N. Norris: The UK Tax System, Structure and Progressivity, 1948-1982, Scandinavian Journal of Economics, 83,2 (1984), pages 150–165

[9] Based on Development of the personal tax system 1994–2004, Ministry of Finance, internal document, 2006, and the flash reports prepared by the Tax Authority

[10] Tax Authority, flash report, 2002, 2003, 2004, 2005, 2006

LITERATURE

Act on the budget, *Hungarian Official Journal*

BENEDEK, D., LELKES, O., SCHARLE, Á. and SZABÓ, M. (2004): Structure of revenues and expenses of the Hungarian public sector, *Ministry of Finance Research Papers, 8*

BUCHANAN, J. M. (1992): Market, state, constitutionality, Revenues and expenditure of the budget, Selected studies, *Közgazdasági és Jogi Könyvkiadó*

CEMI (2006): Macroeconomic balance and growth in the Hungarian economy, *Budapest*, www.cemi.hu

CULLIS, J. – JONES, PH. (2004): Public Finance and Public Choice. Theory and practice of taxation, *KJK Kerszöv. pages 403–420*

DILNOT, A. – KAY, J. – NORRIS, N. (1984): The UK Tax System, Structure and Progressivity, 1948-1982, *Scandinavian Journal of Economics, 83,2*

DWIGHT, A. (1991): Roemerharvard Institute for International Developments, pages 293–311, *Social Politics Bulletin, issues 1 and 2*

DWORIN, L. (1991): The Taxation of Low -Income Families: The United States Experience The Role of Tax Reform in Central and Eastern European Economies, *OECD, Paris*

DR. ÉKES, I. (1993): Taxation 1988-1996, *Statistical Review, issues 1–2*

DR. ÉKES, I.: Taxation 1988-1996, Statistical Analyses, Hungarian Central Statistical Office proposal on changes in taxation in 2006, *Ministry of Finance, internal document*

FRIEDMAN, M. (1993): Capitalism and Freedom, The University of Chicago Press, 1962, *Social Politics Bulletin, Issues 1 and 2*

GULÁCSI, G. (1993): Local taxation of personal income and the personal income tax as a revenue for local governments, *Social Politics Bulletin, issues 1 and 2*

HAUFLER, A. (2001): Taxation in a Global Economy, *Andreas Haufler Cambridge, U.K, New York: Cambridge University Press*

HETÉNYI, I. (2004): Taxation-related dilemmas, *Development and financing, Issue 3*

HETÉNYI, I. (2006): Development tendencies in the tax systems in OECD countries, *Financial Review, Issue 1*

JENKINS, G. P. (1993): Tax reform: Lessons learned, Perkins

KÁDÁR, B. (1991): Challenges of globalisation – economic answers, *Hungarian Science, Issue 1*

RAWLS, J. (1996): Political Liberalism, *Columbia University Press*

STIGLITZ, J. E. (2000): Economics of the Public Sector, *KJK Kerszöv*

Tax Authority flash reports based on tax returns (2003, 2004, 2005)

Tax Authority flash reports (1994–2005)