

TAX BEHAVIOUR AND FINANCIAL DISCIPLINE OF HUNGARIAN ENTERPRISES

by

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Background and objectives

In transition economies the depth and the extent of progress are indicated by the relative importance of the emerging new institutions of the market economy and the share of the private sector within the national economy. Inter-enterprise relations, especially the nature of business relations and changes in financial and contractual discipline can also indicate the advances made in transition. Financial discipline covers two aspects: the discipline of *payments* (meeting the terms of payments in business transactions without in due time) and *fiscal* discipline (meeting tax liabilities fully and in due time). While the discipline of payments relates to inter-enterprise (market) relations, fiscal discipline informs us about the relationship between two types of economic agents: businesses and the government.

Due to underdeveloped capital markets and banking sector and the high level of information asymmetry (a typical consequence of the transformation in the enterprise sector) the financial situation of enterprises is known to be much more vulnerable in transition economies than in full-blown market economies (*Cornelli et al., 1996*). Short-term liquidity problems might lead to grievous long-term repercussions for enterprise survival. In a situation where enterprises lose their markets to a dramatic degree the survival of the enterprise may depend on the temporary relief provided by delaying the payments to suppliers, or to the tax authority (*Laki, 1994*). Tax arrears became more prevalent in the first years of transformation¹. An increased reliance on tax avoidance and evasion can provide another survival strategy: the management's efforts to minimise tax liabilities in a legal or illegal way (i. e. by taking advantage of loopholes in tax laws or by shifting part of the enterprise's output from the visible to the hidden economy) may be of crucial importance. Unreported or underreported economic activities are included in the concept of the hidden economy (*Feige, 1989*): there is some empirical evidence showing that the share of the hidden economy increased during the first phase of transition (*Lackó, 1998*).

The above mentioned strategies are micro-level behavioural responses to macroeconomic problems and to changes in the tax environment. As the tax system differentiates between certain enterprise groups treating them rather differently when allocating the access to tax breaks and benefits, there might be important differences in effective tax rates and the perceived tax environment: this will also generate significant differences in the fiscal responses of enterprises. The trends of enterprise level tax behaviour and financial discipline in general deserve a great deal of attention: the interplay between these and certain institutional and/or macroeconomic developments seems to offer an interesting field for research as well.

The present paper is a new phase in an ongoing research process investigating

¹ Payroll tax arrears, for instance, nearly doubled during 12 months starting from 1990 December 1990. (*Laki, 1994, p. 361.*)

the issues mentioned above. This process was started by the authors about four years ago: the main earlier steps were covered by *Semjén, 1995, Tóth and Semjén, 1996, Semjén and Tóth, 1996 and Semjén, 1998*. At the beginning the authors' main goal was to investigate the tax behaviour (including attitudes, compliance and awareness) of enterprises *at a given point of time* using survey techniques. The first enterprise survey was conducted by the authors in 1994 for a rather special sample of small and medium size private enterprises². A similar survey was made for a more general sample representing medium and bigger enterprises in 1996: 293 enterprises were selected from manufacturing, construction and commerce, having more than 50 employees in each case. In 1998 we conducted a new survey of 300 enterprises. In the present paper we are going to focus on a few selected issues or areas on the basis of these survey data and some other micro data available from tax returns and company balance sheets. (A more detailed comparison of survey and sample characteristics of the data sets used can be found in *table A1.1* in Appendix 1.)

Scope, hypotheses and methods of research

Here we outline the scope of the present research, form some basic hypotheses, and set out the methods of the present research. We want to analyse the interrelations between some objective characteristics and some behavioural responses of enterprises on the basis of empirical data, using a survey method. Many different fields of tax behaviour will be covered, and in each field the researcher can test several interesting hypotheses: some of these were already dealt with in (*Semjén, 1998*). We are not going to repeat all those here; we will rather concentrate on a few crucial issues instead, and enumerate our detailed hypotheses concerning these issues only at a later stage (when we present our main findings).

There is an issue that will not be dealt with here separately but that will recur from time to time when analysing other issues: this is the *impact of changes* in business conditions or macroeconomic environment on behaviour (contractual and fiscal discipline, compliance, etc.) and opinions. Although the main emphasis in this study is on *recent trends in tax behaviour* based primarily on a 1998 survey, the fact that three similar surveys were conducted by the authors in the last four years allow us to make *intertemporal comparisons* and draw some interesting conclusions on the development of tax morale and compliance over time. *We expect to find that there has been a significant improvement in tax compliance, parallel with better expectations due to an improved business climate.* (This improvement can be clearly seen from different angles in *table 1*.)

An important issue relates to the tax environment itself: the differences in the *access to tax benefits*³, *effective tax rates*, or the distribution of tax benefits between various enterprise groups will be investigated on the basis of tax return data. *Such differences may serve or promote some economic policy objectives; at the same time they might distort the system and can always be criticised on equity grounds.*

Contractual and fiscal discipline, tax arrears, delayed payments will also be dealt with in detail. These indicators are expected to reflect the hardening of the budget

² 275 small and medium size enterprises with a dominant private ownership stake and a maximum of 200 employees were selected for the survey; there were some sectoral and geographical criteria employed as well.

³ The term tax benefit will be used throughout the text to denote all kinds of tax allowances, including deductions, tax credits, tax breaks, tax holidays and shelters.

constraint of enterprises, the consolidation of the institutions of the market economy and the diffusion of the norms prevailing in market economies (cf. Kornai, 1993 and Kornai, 1997).

Legal strategies of enterprises to reduce or minimise tax payments will also be analysed. Earlier research (Tóth – Semjén, 1996) as well as conventional wisdom suggest that such strategies aiming at *tax avoidance* are especially important to reduce wage-related taxes, to combat the tax wedge. Fringe benefits, employment at substandard wages are commonly used methods in medium or bigger enterprises.

Tax evasion, non-reporting or underreporting of economic activities and corporate incomes are also known to be common in the Hungarian economy. Tax evasion is the fiscal aspect of the *hidden economy*. This is a rather delicate issue, and its analysis requires the use of rather sophisticated methods - however, such difficulties should not deter us from trying to analyse this area.

Changes in the prevailing *opinions or subjective judgements* of managers about the tax system are expected to reflect not only changes in the legal environment but macroeconomic trends, changes in general business conditions and expectations.

As it was made clear before, the analysis presented below will be based on empirical data, stemming from consecutive enterprise surveys. Some issues will be analysed using tax return data for an enterprise population selected according to similar (though slightly different) criteria⁴ as the recent survey samples. The samples used for the surveys were randomly selected; to ensure representativity some weighting was used where necessary. Naturally, simple and more sophisticated methods of statistical inference will be used: the distribution of the main variables will be presented and statistical relationships between variables will be analysed using simple cross table results as well as more sophisticated models⁵. Most of our indicators are not continuous and their distribution is far from normal, so the necessary conditions for using the most popular statistical methods (such as regression analysis and correlation) do not hold. However, allowing for some unavoidable compromises and with caveats and precautions, we are going to use analysis of variance to detect statistical relationships between variables. The results of some more sophisticated methods (such as logit and ordered logit estimations) will also be presented where appropriate⁶.

⁴ Services is an extra sector in the tax return database, which contains besides these three main sectors - manufacturing, construction and commerce - that were used for selecting the enterprise population for the 1996 and 1998 surveys. (Manufacturing can be broken down to 8 subsectors as well.) There is another difference in employment: companies with more than 20 employees are used in the tax return data base, while companies with more than 50 employees were only selected for the two surveys.

⁵ For the definition of variables analysed see A4. in the Methodological Appendix.

⁶ The logit model is well suited to estimate stochastic relationships with binominal (dummy) dependent variables. It is based on the findings that the probability for a dummy variable to take the value 1 can be represented by a logistic distribution function. It can be shown that in this case the natural logarithm of the odds ratio $P_1 / (1 - P_1)$ is linear in the explanatory variable and in the parameters as well (see i. a. Gujarati, 1995, chapter 16.7.) This property of the model makes the estimation of the parameters rather straightforward. The general form of this linear regression on the log-odds can be written as

$$\log(\text{prob}(\text{event}) / \text{prob}(\text{no event})) = B_0 + B_1 X_1 + B_2 X_2 + \dots + B_n X_n$$

Then $\exp B_i$ (e raised to the power B_i) shows the change in the odds ratio when the i -th independent variable increases by one unit. If B_i is positive this factor will be greater than 1, (odds are increased); and consequently if B_i is negative, this factor will be smaller than 1 (odds are decreased).

See *Amemiya*, 1981 or *Chow*, 1995 for more on logit and ordered logit models.

Main findings

Business climate, macroeconomic conditions and expectations of firms

As it was already shown in *table 1*, after 1993 there was a graphic shift from drastic decrease to a modest or moderate increase in investment, production and value added. After the success of the 1995 stabilisation package there was a spontaneous acceleration in business dynamics; growth rates and especially investment growth became more ambitious and even household consumption started to grow. Inflation rates started to diminish gradually, following the drastic rise in 1995. It is interesting to see how these macroeconomic trends are reflected in our survey data (see *table 2*). Quite in line with the macro trends, there is a dramatic increase according to the 1998 survey in the share of those companies that expect or witness investment growth. The share of profit-making firms is also higher in the 1998 survey than in the 1996 data, and the time horizon of company planning also expanded. These signs unambiguously show a better business climate and more optimistic expectations. As mentioned above, *we expect that these changes in macro trends and expectations will be reflected in tax behaviour, fiscal and contractual discipline and also in the subjective opinions on the tax system.* We will test these hypotheses later, when the above issues come up separately.

It is also worth mentioning that a closer look at the 1998 data would show that there is a relationship between company size (employment) and the time horizon of planning: the smaller the company, the shorter its planning horizon. 52 per cent of companies with 201-300 employees plan for a 3-5 year horizon, while in the whole population this share is estimated only at 31.4 per cent. However, for the few companies above this size the relevant share is somewhat smaller, 43 per cent, but still well above average.

The data also show clearly the increasing openness of the Hungarian economy. Both the share of exporting firms and the share of exports in net sales increased: exports seem to be positively related to company size, and they also depend on sector. – cf. *table 2*.

Distribution of the tax burden: effective tax rates and access to tax benefits

Here we can confront or combine survey results with data from the tax return database. The distribution of effective corporate income tax rates and tax benefits as calculated from tax return data can be seen in *figure A2.1* in the Appendix (see A2). Enterprise survey data on tax benefits can be seen in *table 3*.

Before turning to the results let us recall some of our *hypotheses* made in (*Semjén*, 1998):

- Despite its uniform legal tax rate the relative burden of the corporate income tax is significantly higher for smaller enterprises than for the big ones (through the uneven distribution of tax allowances and items correcting the operating balance).
- Access to tax allowances and tax benefits correlates positively with the share of foreign ownership: effective corporate income tax rates⁷ are

⁷ It can be seen on the figure that effective tax rates (ETR1 and ETR2) can also be higher than the legal rate. This is due to two reasons: as far as ETR1 is concerned the operating balance

below average and much smaller than the legal tax rate for companies with a majority foreign ownership stake.

- Access to tax allowances and tax benefits correlates positively not only with foreign ownership but with company size (employment) as well.

We expect these hypotheses to hold because giving tax breaks or allowances to foreign investors was a significant feature of Hungarian economic policy from the late eighties for a long time (even at the expense of the transparency of the tax system). Anecdotal evidence also supports that bigger investors were more successful in getting tax preferences than the small ones, despite all the lip service paid to the idea of developing a strong SME sector⁸.

Table 3 data seem to be in line with the above hypotheses: the bold numbers in the table show the categories where the average number of corporate tax benefit types claimed was the highest: it is clear that it was the highest in the foreign group and for big enterprises (at least in 1998).

The results from the analysis of variance of effective tax rates based on tax return data (presented in *table A3.1* of the Appendix) also show clearly the expected effect of majority foreign ownership: belonging to this ownership category will diminish the effective tax rate by 4 percentage points *ceteris paribus* as compared to the reference case. Although the effect is clearly significant it does not seem to be as strong as shown in (*Semjén, 1998*), where a 9 per cent effective tax rate was estimated for firms with majority foreign ownership. The explanation may be that other factors (e. g. size, sector and region) also have an effect and these effects may add up: if there is a stochastic relationship between these factors (let's say ownership type and company size), the effects may reinforce each other. As the models explain little of the variance of the dependent variable, we can suspect that some possible explanatory variables are missing: may be a political dummy variable (measuring lobbying power or political contacts) could improve the fit of the models.

Table A3.3 and *A3.4* show, respectively, that belonging to the foreign ownership category will significantly increase the tax benefit rate (the rate of tax benefits to the theoretical tax) or the probability of taking advantage of tax allowances. The expected

(profit before tax) for tax purposes must be corrected by some special items and this can cause some of the difference. As for ETR2, there is an additional reason: the effective tax rate was calculated here using a tax base that included not only CIT but the tax on dividends as well.

⁸ Tailor-made tax preferences (suited to the special circumstances characteristic to selected companies) have been often legislated. Let us just mention some examples here: according to a recent modification of the Corporate Income Tax Law (see Act CVI/1997) companies investing more than HUF 3 billion in projects leading to an increase in output in some *prioritised underdeveloped regions* are eligible to an *investment tax credit* (the total amount of investment can be deducted from corporate income tax in any year within 10 years from completion) if they meet special requirements concerning the size of their increase in sales due to the project and employment increase. This favours big companies with sizeable investment but at least it has a welcome effect on employment in an underdeveloped region. However, according to another paragraph any company investing more than then HUF 10 billion anywhere in the country (in projects leading to an increase in output) is eligible to an *investment tax credit* in any year within 10 years from completion if it increases its sales at least by 5 per cent of the investment value *in the given year* and has a corresponding cumulative increase in sales. An additional rule valid from the second year after the completion of the project says that the company is eligible only if it increases its employment level by more than 500 persons. Given the fact that the total number of companies with more than 300 employees in the Hungarian economy was less than 1000 in 1996, there can be very-very few companies in the Hungarian economy meeting these criteria.

impact of company size (measured here by employment) can also be demonstrated on these tables.

Contractual and fiscal discipline

In this subchapter we are going to analyse some aspects of contractual and fiscal discipline: the breach of contractual obligations by the respondent firms or by their clients, and the occurrence of tax arrears. To capture fiscal discipline we will use tax arrears. This approach defines fiscal discipline rather narrowly: one could also argue that beside a delay in the payment of tax liabilities an open impingement of tax laws (i. e. tax evasion) should also be considered a breach of fiscal discipline. Nevertheless, this latter phenomenon will not be analysed here: we are going to deal with it somewhat later, in the subchapter on the hidden economy.

As it can be seen in *table 4*, and as it was expected before, an *increasing and impressively high share of companies reported having met all their contractual obligations*. Although there was no explicit hypothesis made in (Semjén, 1998) on the change of contractual and fiscal discipline over time, there was one hypothesis that could probably be closely related:

- *Tax compliance is being enforced as access to legal credit and capital markets is tied to previous tax compliance records.*

The share of those companies that had no payroll tax arrears at the time of the survey decreased by more than ten percentage points and was below 7 per cent⁹. This decrease reflects the improved macroeconomic conditions as expected. The 6.9 per cent level of companies with payroll tax arrears is especially impressive if we consider that 27.1 per cent of firms reportedly had payroll tax arrears in a longer period (during the two previous years).

If we take a closer look at contractual discipline in the 1998 survey, we find that 15 per cent of the companies reported having breached their contractual obligations in 1997. Publicly owned companies as well as companies where the majority of the company is owned by foreign owners or by other domestic companies performed well (better than average) in this respect, while companies with Hungarian private persons as majority owners performed close to the average. Companies in mixed ownership (without any ownership category holding a majority stake) performed rather poorly. The breach of obligations seemed to be far more prevalent in manufacturing than in construction and trade (the respective rates of „deviant” companies were 12.5; 3.1 and 4.0 in the three sectors).

15 per cent of sales revenues was reportedly received late. While manufacturing companies are close to the average figure, construction companies fare much worse in this respect: they received 24 per cent of their sales revenue late.

Payroll tax arrears are more typical amongst manufacturing companies than in the other two sectors. They are above average amongst companies below 100 employees or with 201-300 employees; and they are least likely for big companies. Ownership type also has an effect in this respect: while "majority foreign" companies met the payroll tax deadlines practically completely, companies with a majority stake in the hands of Hungarian private persons and companies without any kind of clear majority ownership pattern (those in "mixed ownership") seem to have rather low

⁹ See (Schaffer, 1995) for earlier Hungarian data and for an international background on tax arrears in transition countries.

payroll tax discipline (10.5 and 12.8 per cent of companies in these groups had payroll tax arrears). Tax arrears in general occurred at 27 per cent of companies during the last two years; companies in "majority foreign" hands (arrears found in 24.3 per cent of the group) or with a majority stake owned by domestic companies (arrears found in 13.5 per cent of the group) are more disciplined than the others.

The first two columns of *table A3.5* in the Appendix contain odds ratios (based on logit estimations) for some indicators of contractual and fiscal discipline. It is clear from these results that the effect of explanatory (independent) variables on contractual and/or fiscal discipline was stronger in 1996 than in 1998. A possible and plausible explanation for this could be that the marked differences in the contractual discipline and tax behaviour of Hungarian enterprises must have diminished over time as the norms of the market economy became more and more prevalent. Both contractual and fiscal discipline were in 1996 unanimously better for the "foreign" ownership category than in the others. An opposite effect could be detected for enterprises owned by domestic companies.

If we compare the effect of ownership type in 1996 and 1998 on fiscal discipline, we can see that the strong difference between foreign and domestic ownership disappeared from 1996 to 1998. This might indicate a catching-up effect, although the results should be interpreted with some precaution.

As far as fiscal discipline is concerned, there are three main effects. First, the negative effect of company size could be observed in both years (the breach of fiscal discipline is significantly more frequent amongst smaller companies). Second, for companies with a majority stake held by domestic companies there has been a significant improvement in fiscal discipline. Third, a new effect also seems to become manifest: better tax compliance is associated with better growth potential.

Tax avoidance, tax evasion and involvement in the hidden economy¹⁰

Tax rules, rates and schedules obviously have a consequence on the behaviour of economic agents. Basically there can be three „pure” types of behaviour, namely tax compliance, tax avoidance and tax evasion. In practice, however, most economic agents take advantage of the possibilities of individual tax planning when selecting the *mix of the three behaviours*. Tax compliance, avoidance and evasion all have substantial costs: in the case of avoidance one has to employ tax consultants or study the ever changing tax laws; in the case of evasion there is a probability of being caught and there is an expected penalty, and there are also the subjective costs of worrying¹¹. The benefits appear mainly as a reduction of tax payments.

Our previous chapters on the scope and the main hypotheses of research and on the change in macroeconomic conditions and business climate already made clear that we expect to find visible and significant changes in the tax behaviour of enterprises as we suppose that there is a relationship between the overall business climate (or economic prosperity) and tax compliance.

- We suppose that *there is a certain trade-off between macroeconomic conditions and tax rules*: if this is true, tighter macroeconomic conditions can have a very similar effect on tax behaviour to tighter tax rules, and,

¹⁰ Cf. also the chapter of *Lackó* in this volume (ed. note).

¹¹ About the comparative and theoretical analysis of tax evasion and tax avoidance see *J. Alm*, 1988; for a discussion of the economic analysis of crime and punishment see *Becker*, 1968

consequently, when there is a significant improvement in macroeconomic conditions this should provoke similar behavioural responses to a relaxation of tax rules. As there has been a significant positive change in business conditions and expectations during the two years between the 1996 and 1998 surveys (and an even more significant change if we include the 1994 survey in the picture), *we expect to find better tax compliance, less avoidance and evasion in 1998 than before.*

Beside checking this expected development pattern we can also test using the 1998 data some hypotheses that were set out earlier in (Semjén, 1998) based on a preliminary analysis of the 1996 tax returns.

- The predominant role of foreign ownership in the ownership pattern of a company is expected to correlate positively with the importance of dividend payments. If the dividend rate (dividends/profit after tax) is found to be above average in this ownership category, this might indicate that such enterprises take advantage of the favourable tax environment through transfer pricing.
- A personalised planning of the remuneration package (including devices like employment at substandard wages, subcontracting to businesses operated by employees, wide-spread use of untaxed fringe benefits¹² instead of monetary payments, an increased reliance on dividend payments to employee-owners, etc.) is used as a tax planning device to reduce wage related costs, i. e. to avoid taxes.

Table 5 provides an opportunity to test the hypothesis of better tax compliance as it offers some insight into the issue of tax avoidance, or individual (enterprise level) tax planning. The share of employment at substandard wages dropped from 1996 to 1997 as could be expected; however, as the same nominal wage level was used in both surveys to determine what is and what is not below the standard, the data are not directly comparable due to inflation, so this is not a decisive result. The ratio of fringe benefits to wages increased: this is the opposite direction. However, this could hardly be interpreted as a disapproval of the hypothesis: in the first place, the hypothesis was about tax avoidance through *untaxed* fringe benefits, while in Hungary most fringe benefits have gradually been included in the tax base. On the other hand, an improvement in business conditions might trigger a more generous enterprise behaviour in connection to fringe benefits without any second thought of tax avoidance. So the answers to the first and the second questions in *table 5* are inconclusive. The interesting one is the third question, and the answers to this clearly demonstrate that improved business climate has a diminishing effect on the relative importance of tax planning through personalised remuneration packages.

The logit and ordered logit models presented in the Appendix (A3) also can be used to test the above hypotheses. Our *results are somewhat blurry and far from convincing*, although the relationship between the occurrence of *dividend payments* and ownership type can be detected from A3.4. The odds ratio for companies owned by Hungarian individuals is of the expected sign and size, but it is not significant. Foreign ownership seems to have a significant impact on odds but not in the expected direction. The same inconclusiveness holds for the results in A3.3. All in all, the hypotheses on the use of dividend payments as a tax avoidance device could *not* be

¹² The scope of these was radically decreased in 1995-98 (ed. note).

supported.

The model on *fringe benefits* in table A3.5 does not work well: not only it has very low pseudo R^2 -s for both years, but the significance level is also unacceptable. The supposed negative relationship between company size and an abuse of fringe benefits cannot be substantiated: the odds do not show the expected tendency. The only promising results from the A3.5 logit estimations refer to employment at substandard wages. Here we have the expected results both for foreign companies (they are less likely to use this device than the others) and for companies owned by Hungarian individuals (in this group we get very high and significant odds ratios): so we can conclude that companies where a majority ownership stake is in the hands of Hungarian individuals tend to rely on this practice. Nevertheless the data *do not confirm that this reliance was intended as a tax avoidance device*. It may well be a consequence of the limited financial possibilities of these companies. So in this case again logit results are somewhat inconclusive.

So far we have dealt with tax avoidance; let us see if we have better luck with an even more delicate issue, tax evasion. It is known from everyday experience that besides company-level tax planning and tax avoidance (i. e. legally acceptable responses to the tax environment) some illegal techniques of minimising tax liabilities (e.g. non-reporting or underreporting of sales, employing unregistered labour, etc.) are also used in the Hungarian economy. There is also some evidence (both international and Hungarian) that sector, size and the ownership pattern of businesses may significantly influence the affinity of enterprises to rely on tax evasion. However, owing to the very nature of tax evasion one has to rely mostly on indirect estimations, as no exact direct data can be collected on the occurrence and incidence of these techniques.¹³

One way to get around the problems of insincere answers for such a touchy question is if we do not ask the enterprises directly about their own behaviour but we ask them to evaluate the behaviour (tax compliance or evasion) of their suppliers and competitors. In this case there is no clear motivation to lie; however, it is impossible to tell to what extent are the answers based on real knowledge or reflect gossips and malevolent hypotheses. The logit results in *table A3.6* for unreported sales amongst the firm's suppliers are based on the answers to such questions. The results are again rather poor: the model seems to work for 1996 but not for 1998. The most important results apply to the suppliers of firms in majority domestic ownership (owned by domestic company or Hungarian individuals): they seemed to be more likely to have had unreported sales than the suppliers of other categories and this effect was clearly found significant for 1996. Actually the failure of the model for 1998 can *indirectly prove that there was a significant overall improvement in tax morale*: the detailed data in *table 6* (that allow some interesting comparisons as they contain data from the 1994 survey as well) also corroborate this. It is ironic that competitors reportedly have much worse tax morale than trading partners.

We will not be content with evaluating the rather dubious information given by

¹³ The Institute for Economic Research (GKI) estimated the weight of non-registered economic activity (not all of these activities entail tax evasion automatically) at 27 per cent of the official GDP in Hungary in 1992 (*Árvay and Vértés*, 1994). *Lackó*, 1995 also supported a roughly 30 per cent share of the underground economy. Later estimations (including a research by *Tóth*, (1997-98) on the prevalence of VAT evading sales, or *Lackó*, (1998) arrive at smaller figures, nevertheless it is difficult to say to what extent can these changes attributed to strengthened compliance as the methods are different and the results are not fully comparable.

the firms about their trading partners and competitors, but we will also make an attempt here to estimate the share of tax-evading enterprises in our sample and in the enterprise population somewhat more directly, and we will compare our results with some earlier results to check again if there has been a significant improvement in fiscal discipline or tax compliance recently.

The incidence or frequency of tax fraud (or the share of tax-evading businesses) within the enterprise population can show the extent to which the norms prevailing in full-blown market economies are accepted and observed. If the share of tax fraud is high, it can indicate the prevalence of "wild capitalism" and the relative weakness of tax administration. Changes in this frequency may reflect changes in behaviour or may be due to changes in the composition of enterprise population. Behavioural changes may reflect internal changes in tax morale and law abidance or may as well be triggered by changes in the overall business climate, the perceived risk of tax fraud, the capacity of tax administration to detect unlawful behaviour, etc..

Needless to say once more that tax evasion cannot be estimated directly: one cannot ask a direct question in a survey concerning such a delicate issue and expect the respondent to give a sincere answer. Obviously, some indirect and more sophisticated method must be chosen. The randomised response technique was used here. This technique allows the researcher to estimate the true frequency of replies to especially delicate survey questions in a sample and use statistical inference to arrive at valid statements for the population the sample was selected from. This way delicate issues (such as unconventional sexual behaviour, AIDS infection, drug abuse, or for that matter, tax fraud) may be successfully analysed using survey data.

The method is based on the following: the respondent is given a pack of cards. Each card contains one of two opposite statements (one admitting and one denying the unobservable behaviour or characteristic: in our case one statement admitted and the other denied that the enterprise ever committed tax evasion or fraud). The respondent is then asked to shuffle and draw a card randomly and tell the interviewer, *without letting him know what the statement on the card actually was*, whether the statement is *true or false* in his case. The proportion of admission (p) and denial cards (1-p) must be determined beforehand in such way that p must not be equal to 0.5; in our survey p= 0.7 was used. The technique allows the researcher to determine the incidence of the studied hidden phenomenon in the population using an estimator based on the relative frequencies of "true" and "false" answers and the given share of cards containing the admission statement¹⁴.

The estimator of tax evasion rate (TER) can accordingly be determined by the following formula:

$$TER = \frac{1}{2p-1}(X/n + p - 1) \quad (1)$$

where TER is the estimated rate of tax evading businesses,
p is the share of cards admitting tax fraud,
n is sample size (number of enterprises in the sample),
and X is the number of "true" answers to this question.

The variance of this estimator can be calculated according to the following formula:

¹² For a description of the method and the mathematics of the estimator, see (Särndal et al., 1992).

$$V(\text{tax evasion rate}) = \frac{1}{(2p-1)^2} \left(\frac{1-f}{n-1} \frac{X}{n} \left(1 - \frac{X}{n}\right) \right) + p(1-p) / N \quad (2)$$

where V(TER) is the estimated variance of the share of tax evading businesses, N is the size of (enterprise) population from which the sample was drawn, and f is n/N.

Knowing the estimator and its variance will allow us to determine the mean and a confidence interval for the population at a given significance level: based on this we can arrive at conclusions on the frequency of tax evasion in the selected enterprise population.

In our 1998 survey the estimated rate of tax evasion was 8.8 per cent, and the estimated variance allowed us to estimate a ± 14 per cent 95 per cent confidence interval. As the rate of tax evasion cannot be negative, these results suggest that the true rate of tax evasion in the enterprise population surveyed must be with 95 per cent probability in the (0; 22.8) per cent interval, with a 8.8 per cent mean. These results suggest that there exist some tax evasion, though at 95 per cent probability level these data would not allow us to exclude even the - rather unlikely - case of complete tax compliance in the studied population. If one considers tax evasion a serious crime (in accordance with the Penal Code) even such a low mean crime rate might seem rather high. However, if we contrast this with other estimates on the prevalence of the underground economy in Hungary, the result is quite low.

We are in a fortunate situation as we also made an estimation of tax evasion four years ago that can serve as a natural comparison to our present results. In a previous enterprise survey conducted in 1994, using the same method for a somewhat different sample of small and medium businesses we estimated the incidence of tax evasion at 35.8 ± 15.0 per cent at a 95 per cent confidence level. (cf. *Tóth and Semjén, 1996*) This led us *then* to the conclusion that *tax evasion is a fairly widespread phenomenon* among small and medium-scale entrepreneurs in the Hungarian economy, as this suggests that even in the best case more than 20 per cent of the enterprises have already evaded taxes, while one could not even exclude that more than half of the business population was engaged in such illegal activities to some degree at some point.

So, according to the 1994 survey the conclusion in the best (most optimistic) case was only slightly better than the worst or most pessimistic results in the 1998 survey (20.8 versus 22.8 per cent). What can be the reason of such a drastic change in such a relatively short time?

It is tempting to conclude that these results show that there has been a drastic strengthening of tax morale in the Hungarian economy during this four year period. There are many reasons lending reasonable support to such a belief: first of all, there has been a very significant *reduction in the statutory tax rate*. (The corporate income tax rate was gradually reduced to 36 per cent in the first years of the decade, then from 1995 onwards to 18 per cent. Parallel to this rate reduction the tax base became more comprehensive, so the effective tax burden did not diminish that much.). There was also an undeniable improvement in business climate: the move from recession to boom allowed the businesses to breathe more freely, so more and more of them could realise that they can survive even without breaking the rules. Also there might probably have been some improvement in the *effectiveness of tax administration* during these years (the probability of being caught and punished is likely to have increased), so the expected private "costs" of tax evasion could be higher while the "benefits" were lower in 1998 than in 1994.

Unfortunately there are some crucial differences between the two samples that might be partially responsible for the improvement in tax compliance results. (cf. the first paragraph in Appendix A1.) The 1994 sample contained smaller enterprises than the 1998 one, while there prevails a widely accepted belief that there is a positive correlation between business size and tax compliance. Earlier research pointed out that effective tax rates seem to be negatively correlated with business size (cf. *table 5* in *Semjén, 1998*), and this hypotheses is also supported to some degree by the regression and variance analyses of the 1996 tax return data. So it seems to be justified to argue that the bigger the enterprise the less it is tempted to commit tax fraud. Smaller incentives for evasion might explain better compliance.

Opinions about the taxes and tax regime

Managers' opinions concerning some well-known problems of the Hungarian tax system are summarised in *table 7*. On the one hand such opinions are not very informative as it is always very difficult to avoid the trap of stereotypes and commonplaces; on the other hand, comparing the answers for the same questions in 1996 and 1998 gives an interesting opportunity to measure the level of subjective „satisfaction” with the tax system. There have been no dramatic changes in the tax system during this two year period. If there were any, they made the system only more complex and introduced some extra burdens, while at the same time tax administration improved, became more stringent, loopholes were closed and avoidance became more difficult. So if we find better opinions amongst managers these will have to do with better business climate and not with increasing laxity or an enterprise-friendly change in tax policy.

It is a well-known problem of the Hungarian tax environment that despite lasting and considerably high inflation depreciation rules do not allow for inflation, while asset lives are relatively long. This situation obviously leads to the *taxation of illusory profits* as real costs of assets cannot fully be deducted. The significant changes in the answers to the related question (a much smaller proportion considered this a major problem in 1998 than before, while the share of "no problem" answers also went up) show clearly that the seriousness of inflation and the perception of this problem go hand in hand: even a slowly diminishing level of inflation had a beneficial effect on the satisfaction with the tax environment from this particular aspect.

The share of opinions mentioning that tax rules change too frequently decreased by two percentage points only - at the same time the share of those enterprises who felt that the extent and frequency of these changes jeopardised of the reliability of their business calculations went down by 20 percentage points. Enterprises having domestic companies as majority owners are the least unhappy about the frequent changes of tax rules („only” 85.3 per cent of these reported this opinion), and only 35.7 per cent of such enterprises felt that their business calculations were jeopardised by the extent of this changes - at the other end of the scale are companies with Hungarian private persons as majority owners: 59 per cent of these firms felt being jeopardised by the speed and extent of changes. We also tried to detect what are the main factors behind subjective opinions complaining on tax changes jeopardising the reliability of business calculations: *table A3.5* in the Appendix contains the results of a logit model. The model proved to be a complete failure: fit is extremely bad and none of the variables are significant. This failure could have perhaps been explained supposing that answers to the respective question reflected more stereotyping than actual personal experience. However, in the light of some results presented below in

table 8 (although these support that there exists a considerable incongruence between personal perception and reflections to general statements on the tax system, see below) this sounds rather unlikely. Perhaps a more valid explanation can be that there are practically no structural differences within the enterprise population as far as opinions on general statements or stereotypes are concerned: the variance of opinions does not show any particular pattern.

Table 8 provides a somewhat longer perspective as it contains 1994 data as well. It is interesting that although the results in *table 7* clearly show that a smaller percentage of businesses feel personally that the tax system itself puts them at jeopardy, the general opinion about tax legislation has not become better. The percentage of firms finding tax legislation overly complicated and tax forms too difficult to understand has been growing steadily. A positive sign, however, that businesses are more satisfied than before with the level of information provided by the tax authority. The share of those thinking that personal contacts with tax officers do matter in settling disputes went down somewhat but much of this change can probably be attributed to differences between the 1994 and 1996-1998 samples (smaller firms might have had different experiences than the bigger ones). At the same time the share of those definitely disagreeing with this opinion changed little, and stayed practically the same in the 1996-98 period.

Conclusions

We investigated in our paper the tax burden and tax behaviour of Hungarian companies (together with their opinions on and attitudes towards the tax system) and tried to connect these to some objective data on the economic performance of these companies. Our analysis was based primarily on consecutive enterprise surveys but tax return data were also used when necessary.

Enterprise level data corroborate what is already known from objective macroeconomic indicators: there has been *a significant improvement in business conditions* recently. Our results showed that during the last two years this had a significant impact both on tax discipline and on the subjective perception of the tax environment. Due to these changes the extent to which legal norms and contracts are duly observed in the Hungarian economy has been growing. Contractual discipline has also improved. There has also been *a significant drop in tax evasion*, and consequently our results support that the *weight of the hidden economy has been slightly falling*.

There is a circular relationship between macroeconomic environment and financial discipline (consisting of the discipline of payments and fiscal discipline): an improvement in the macro environment can promote better financial discipline (as it is supported by our results). At the same time this improved financial discipline will have a beneficial effect at micro level: it will diminish the transaction costs of the companies by reducing the level of uncertainty in inter-enterprise relations and thus it will improve the companies' ability to grow and their chances for survival. On the macro level this will have a beneficial effect on the growth prospects of the economy as a whole.

Subjective opinions on the effects of the tax system on the respective companies' business prospects and viability also changed for the better. Interestingly this improvement is hardly reflected in the general opinions on the tax system.

Our results support the hypothesis that large and/or foreign-owned firms have better access to tax benefits than the average, and consequently, effective tax rates are higher for smaller and domestically owned companies. This might be a policy-based

obstacle to the strengthening of a domestic small and medium enterprise sector on the long run.

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Statistical tables

Table 1

Some macroeconomic indicators of the Hungarian economy, 1990-1998*

	1990	1991	1992	1993	1994	1995	1996	1997	1998**
GDP	-3.5	-11.9	-3.1	-0.6	2.9	1.5	1.3	4.4	5.0
Company investment	-10.3	-6.8	-5.2	0.1	13.7	0.3	6.9	12.0	12.0
Consumer price index	28.9	35.0	23.0	22.5	18.8	28.2	21.8	20.4	15.0
Industrial production	-9.3	-18.3	-9.7	4.0	9.6	4.6	3.4	11.1	11.0
Household consumption	-5.2	-9.0	-0.3	1.6	-0.3	-6.5	-1.3	1.0	2.5

Notes: * Annual rates

** Estimate

Sources: Hungarian Statistical Pocketbook - 1994-1997

Table 2

Change in business conditions in Hungary in 1996-98 (in per cent of respondents)

		1996*	1998**
Investment dynamics	(FIRM96=1997)		
	(FIRM98=1998)		
	Increase	19.5	44.7
	No change	49.8	34.8
	Decline	30.7	20.4
	Total	100.0	100.0
	N	277	296
Operating balance	(FIRM96=1995)		
	(FIRM98=1997)		
	Surplus	65.4	82.1
	Zero	5.5	2.7
	Deficit	29.1	15.2
	Total	100.0	100.0
	N	289	295
Time horizon of planning	No planning	1.7	1.7
	Less than 1 year	8.3	3.9
	1-2 years	36.1	30.7
	3-5 years	28.8	31.5
	More than 5 years	25.0	32.2
	Total	100.0	100.0
	N	288	297
Sales for export	Yes	54.6	61.2
	No	45.4	38.8
	Total	100.0	100.0
	N	293	300
Share of export in net sales	Mean (%)	33.9	45.8
	N	159	178

Notes: * source is FIRM96 survey.

** source is FIRM98 survey.

Table 3**Tax burden and tax benefits in Hungary in 1996-98**

		1996*	1998**
Average number of corporate tax benefit types claimed	Mean in the sample	0.87	1.02
Type of majority owner			
	Foreign	1.5	1.3
	Domestic firm	0.6	1.1
	Hungarian individual	0.7	0.9
	Public	0.7	0.9
	Mixed	1.0	0.9
	F =	9.2523	2.1350
	F sign.	0.0000	0.0765
	Eta	0.3374	0.1677
	N	293	300
Employment by size			
	- 100	0.7	0.8
	101- 200	1.1	0.9
	201-300	1.0	1.5
	301-	0.9	1.5
	F =	2.4022	9.8053
	F sign.	0.0679	0.0000
	Eta	0.1568	0.3030
	N	290	294

Notes: * FIRM96 survey.

** FIRM98 survey.

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Table 4**Changes in contractual and fiscal discipline in Hungary in 1996-98**

	1996*	1998**
1. Have you always met your contractual obligations (in p.c.)		
Yes	83.3	90.2
No	16.7	9.8
Total	100.0	100.0
N	293	298
2. Do you have payroll tax arrears?		
Yes	17.7	6.8
No	82.3	93.2
Total	100.0	100.0
N	293	299
3. Did you have tax arrears in the last two years?		
Yes	38.7	27.1
No	61.3	72.9
Total	100.0	100.0
N	293	296

Notes: * FIRM96 survey.

** FIRM98 survey.

Table 5**Strategies of tax avoidance in Hungary, 1996-98**

	1996*	1998**
1. Share of employment at substandard wages (20th Ft/months or below)		
Mean	9.7	4.1
N	274	299
2. Ratio of fringe benefits to wages		
Mean (%)	7.4	9.5
N	278	281
3. Do you design remuneration package so that to minimise your employees' tax payments?		
Very important	38.1	30.9
Important	43.6	46.1
Not at all important	18.3	23.0
Total	100.0	100.0
N	289	295

Notes: * FIRM96 survey.

** FIRM98 survey.

Table 6**Involvement in the hidden economy for supplier and competitor firms and the Hungarian economy in 1994-98**

		1994*	1996**	1998***
Unreported sales in amongst your trading partners (suppliers) are...				
	insignificant	73.5	79.8	80.7
	rare	18.8	13.7	14.6
	frequent	7.6	6.5	4.7
	Total	100.0	100.0	100.0
	N	286	277	286
Unreported sales in the Hungarian economy are....				
	insignificant	1.8	-	1.2
	rare	27.1	10.6	18.4
	frequent	71.1	89.4	81.4
	Total	100.0	100.0	100.0
	N	286	274	272
Unreported sales amongst your competitors are....				
	insignificant	-	43.1	45.0
	rare	-	23.6	25.2
	frequent	-	33.3	29.8
	Total	-	100.0	100.0
	N	-	195	218
Do your competitors' connections with the hidden economy have an adverse effect on your competitiveness?				
	No, not at all	-	28.8	38.5
	To a small degree	-	31.0	27.9
	To a great degree	-	40.2	33.6
	Total	-	100.0	100.0
	N	-	271	276

Notes: * for 1994 source is a survey made by the authors in 1994.

** source is FIRM96 survey.

*** source is FIRM98 survey.

Table 7

Managerial opinions on the taxes and tax rules in Hungary, 1996-98
(in per cent of respondents)

		1996*	1998**
No allowance for inflation in accounting of depreciation for tax purposes means...			
	a major problem	23.0	17.3
	a minor problem	42.8	42.3
	no problem at all	34.3	40.4
	Total	100.0	100.0
	N	283	290
Tax rules...			
	are stable, change rarely	-	0.5
	change when necessary	3.1	4.6
	change too frequently	96.9	94.9
	Total	100.0	100.0
	N	292	298
Does the extent of change of tax rules jeopardise the reliability of business calculations?			
	No	28.8	48.5
	Yes	71.2	51.5
	Total	100.0	100.0
	N	293	299
To what extent does ..jeopardise the competitiveness of your enterprise? (1- To a great extent, 5 - Not at all)		Means	
	Payroll tax	1.87	2.12
	Personal income tax	2.96	3.12
	VAT	3.17	3.39
	Corporate income tax	4.38	3.59
	Local taxes	4.45	3.80

Source: * source is FIRM96 survey.

** source is FIRM98 survey.

Table 8

Entrepreneurial opinions on the tax regime in Hungary in 1994-98
(in per cent at the respondents)

Statements	Entrepreneurs' opinions	Years		
		1994*	1996**	1998***
Tax legislation is so complicated that even professional accountants find it difficult to handle				
	fully agrees	69.6	75.7	78.2
	finds a point in it	24.0	21.2	20.0
	definitely disagrees	6.4	3.1	1.8
	Total	100.0	100.0	100.0
	N	280	292	298
Many tax forms are difficult to understand				
	fully agrees	59.7	57.2	63.8
	finds a point in it	29.8	30.8	27.7
	definitely disagrees	10.6	12.0	8.5
	Total	100.0	100.0	100.0
	N	279	292	295
Personal contacts do matter at APEH (the tax authority) when one wants to settle a dispute				
	fully agrees	55.5	52.3	50.5
	finds a point in it	28.0	33.0	34.9
	definitely disagrees	16.6	14.7	14.6
	Total	100.0	100.0	100.0
	N	252	279	278
The tax authority informs businesses properly and in due time about their duties as far as tax returns and tax payments are concerned				
	fully agrees	21.6	11.3	13.3
	finds a point in it	25.0	33.0	39.2
	definitely disagrees	53.4	55.7	47.5
	Total	100.0	100.0	100.0
	N	277	291	296

Notes: * source: a survey made by the authors in 1994.

** source is the FIRM96 survey.

*** source is the FIRM98 survey.

Appendix

A1. Description of data sets used

The present study was based on two main data sources: consecutive enterprise surveys conducted in 1996 and 1998 and tax return databases for 1996. The 1998 enterprise survey stands in the focus of the present study, while the 1996 survey serves as a background for comparison in most cases. In a few cases we also refer to our previous results from a 1994 survey representing a somewhat different, more special enterprise population. (The 1994 sample was based on the following selection criteria: a) annual net sales for 1992 not exceeding HUF 100 million; b) enterprises belonging to manufacturing; construction; commerce; road vehicle and commodity repair and maintenance; hotel business and catering; transportation and warehousing; post and telecommunications or education; c) ownership share of private capital - including stakes held by foreign owners and employees & managers - exceeding 50 per cent.)

The main characteristics of the 1996 and 1998 survey samples are summarised below in Table A1.1. Both surveys covered an enterprise population with employment above 50 employees, i. e. medium and bigger enterprises only. Only three main sectors of the Hungarian economy were covered: manufacturing, construction and commerce. The 1998 survey (FIRM98) was financed by CIPE, while the 1996 survey (FIRM96) was sponsored by the Hungarian Ministry of Industry, Commerce and Tourism. Both survey samples represent the selected enterprise population by sector and company size (measured here by employment). In these surveys company executives were asked about actual company data, including net sales, employment, sector, type of majority owner (property pattern). They were also asked to give their subjective opinion on some company characteristics and on the economic environment they operate in. The questions of the questionnaire focused primarily on such issues as the impact of the tax environment, the discipline of payments amongst the contractual partners of the company, the tax behaviour and the financial discipline of the company.

The tax return database (TAXRET96) contains company data from the 1996 tax returns and balance sheets for some 7000 Hungarian companies in manufacturing¹⁵, construction, commerce and *services* (an extra sector compared to the surveys) with employment exceeding 20 persons.

¹⁵ The data available in this data set allow us to divide manufacturing into several subsectors, like (a) food, beverages, tobacco;(b) textile, clothes, leather, fur; (c) wood, paper, printing; (d) chemical products; (e) non-metallic mineral products; (f) metal, fabricated metal products; (g) machinery, (h) other industries, recycling. In some tables or models this more extensive break-down was used.

Table A1.1**Some characteristics of the data sets used**

	FIRM96 survey	FIRM98 survey
Year of the survey	1996	1998
Employment	above 50 employees	above 50 employees
Sectors	Manufacturing Construction Commerce	Manufacturing Construction Commerce
Sample size (case number)	293	300
Size of enterprise population selected	1721	3494
Place of head office	Budapest or county capitol	Whole country
Representatives	size & sectors	(size & sectors)

Table A1.2**Distribution of the enterprise population and the sample by employment and sector**

	FIRM96		FIRM98	
	Selected population	Sample	Selected population	Sample
Size (Employment)				
-100	41.1	43.0	46.6	42.8
101-300	35.6	35.2		
101-250			31.2	38.8
301-251-	23.3	21.8		
251-			22.2	18.4
Total	100.0	100.0	100.0	100.0
N	1721	293	3494	297
Sector				
Manufacturing (15-37)	60.4	58.4	66.3	69.6
Construction (45)	16.7	18.4	12.5	7.7
Commerce (51,52)	22.9	23.2	21.5	22.7
Total	100.0	100.0	100.0	100.0
N	1721	293	3494	299

A2. Some main distributions: the two surveys and the tax return database

Table A2.1

Main variables in FIRM96 and FIRM98 data sets: basic distributions

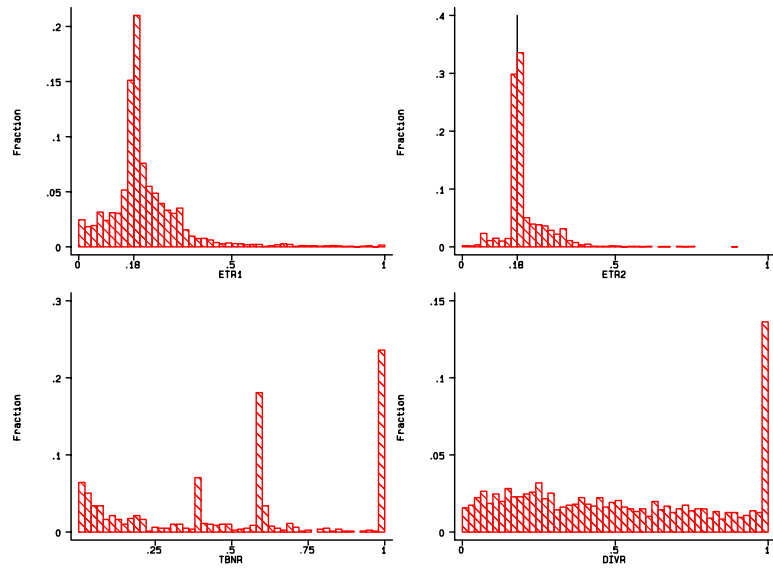
Variables	Categories	FIRM96 survey	FIRM98 survey
Type of majority owner			
	Foreign (individual or company)	19.1	20.7
	Hungarian individual	37.5	42.4
	Domestic company	20.1	20.8
	Public	13.3	6.6
	Mixed ownership **	9.9	9.5
	Total	100.0	100.0
	N	293	300
Size (employment)			
	- 100 head	43.1	41.8
	101 - 200	26.6	30.5
	201 - 300	11.4	12.3
	301 -	19.0	15.4
	Total	100.0	100.0
	N	290	295
Change of employment			
	Fall more than 20 p.c.	13.6	-
	Fall less than 20 p.c.	43.7	-
	No change	17.8	-
	Growth less than 20%	19.6	-
	Growth more than 20%	5.2	-
	Fall	-	37.1
	No change	-	16.6
	Rise	-	46.3
	Total	100.0	100.0
	N	292	300
Export ratio in the net sales (%)			
	Zero	45.7	42.6
	1-20	27.0	18.5
	21-50	12.3	12.9
	51-	15.0	26.0
	Total	100.0	100.0
	N	293	300
Number of corporate tax benefit types (titles) claimed			
	There are not	44.0	32.8
	One	35.2	41.4
	Two	12.6	18.8
	Three or more	8.2	6.9
	Total	100.0	100.0
	N	293	300
Share of fringe benefits to wages			
	Less or equal than 5%	61.5	48.2
	More than 5%	38.5	51.8
	Total	100.0	100.0
	N	278	281

Notes: *: We consider any of the first four categories as the majority owner if the total ownership share of all individuals and/or companies belonging to this category exceeds 50 per cent.

** : If there is no single category of owners (out of the first four categories) holding a 50+ per cent majority.

Figure A2.1

Distribution of companies by effective corporate tax rate, rate of tax benefits and dividends rate in the tax return (TAXRET96)database



Notes: ETR1: effective corporate tax rate = corporate tax /profit before tax, if $0 < \text{ETR1} \leq 1$, $N = 4767$
ETR2: effective corporate tax rate = corporate tax/tax base, if $0 < \text{ETR2} \leq 1$, $N = 4820$
TBNR: rate of tax benefits = tax benefits/ (tax paid + tax benefits claimed), if $0 < \text{TBNR}$, $N = 3542$
DIVR: rate of dividends = dividends / profit after tax, if $0 < \text{DIVR} \leq 1$, $N = 1660$

A3. Logit model (logistic regression) results

Table A3.1

Analysis of variance results for effective tax rates (based on TAXRET96)

Independent variables	Dependent variables	
	Effective tax rate (ETR1)	Effective tax rate (ETR2)
Sector	(F = 4.41 ^{**})	(F = 3.94 ^{**})
Food, beverages, tobacco	-0.02 ^{**}	-0.01 [*]
Textile, clothes, leather, fur	-0.02 ^{**}	-0.00
Wood, paper, printing	-0.02 [*]	-0.02 ^{**}
Chemical products	-0.02 [*]	-0.02 ^{**}
Non-metallic mineral products	-0.05 ^{**}	-0.03 ^{**}
Metal, fabricated metal products	-0.03 ^{**}	-0.01 [*]
Machinery	-0.01	-0.01
Other industries, recycling	-0.04 ^{**}	-0.00
Construction	0.05	-0.01 [*]
Commerce	-0.02 [*]	-0.01 ^{**}
Services (reference)	-	-
Employment	(F = 3.41 [*])	(F = 4.91 ^{**})
-100	0.02 ^{**}	0.02 ^{**}
101-200	0.01	0.01 [*]
201-300	0.01	0.01 [*]
301- (reference)	-	-
Type of majority owners	(F = 15.04 ^{**})	(F = 52.12 ^{**})
Public	0.00	0.00
Hungarian Individual	0.00	0.01
Domestic company	0.01	-0.00
Foreign	-0.04 ^{**}	-0.04 ^{**}
Other	-0.00	0.02 [*]
Mixed (reference)	-	-
Region ⁽¹⁾	(F = 3.19 ^{**})	(F = 2.60 [*])
Central	0.01	0.00
West Transdanubia	0.01	0.01
Middle Transdanubia	0.01	0.00
South Transdanubia	-0.01	-0.00
South-east	0.01	-0.00
Middle-east	-0.01	0.00
North-east (reference)	-	-
Constant	0.21 ^{**}	0.20 ^{**}
N	4764	4817
Mean of dependent variable	0.2138	0.2035
F	8.02 ^{**}	16.02 ^{**}
Adjusted R2	0.0342	0.0743

Notes: *: p < 0.05

** : p < 0.01

1: Regional pattern of Hungary follows statistical regions used by CSO in: *Magyar Statisztikai Zsebkönyv*, 1997.

Table A3.2

Definitions of ordered variables, and the distribution of variables by categories in the tax return (TAXRET) database

	ET10		ET20		TBN0		DIVO	
categories	definition	%		%		%		%
0	ETR1=0	37.9	ETR2=0	28.9	TBNR=0	84.5	DIVR=0	78.1
1	$0 < \text{ETR1} \leq 0.17$	16.5	$0 < \text{ETR2} \leq 0.17$	5.8	$0 < \text{TBNR} \leq 0.50$	7.3	$0 < \text{DIVR} \leq 0.50$	11.6
2	$0.17 < \text{ETR1} \leq 0.19$	16.6	$0.17 < \text{ETR2} \leq 0.19$	36.9	$0.50 < \text{TBNR} \leq 0.95$	4.5	$0.50 < \text{DIVR} \leq 0.95$	6.9
3	$0.19 < \text{ETR1}$	29.1	$0.19 < \text{ETR2}$	28.5	$0.95 < \text{TBNR} \leq 1$	3.7	$0.95 < \text{DIVR} \leq 1$	3.4
Total		100.0		100.0		100.0		100.0
N		7742		7794		5111		7578

Notes: ETR1: effective corporate tax rate = corporate tax /profit before tax,
 ETR2: effective corporate tax rate = corporate tax/tax base,
 TBNR: rate of tax benefits = benefits/ (tax paid + benefits),
 DIVR: dividend rate = dividends / profit after tax

Table A3.3

Ordered logit estimations for effective tax rates, rate of benefits and dividend rate

(based on TAXRET96)

Independent variables	Dependent variables			
	ET10	ET20	TBNO	DIVO
Sector				
Food, beverages, tobacco	-0.58**	-0.36**	1.55**	-0.29*
Textile, clothes, leather, fur	-0.53**	-0.24**	0.79**	-0.35**
Wood, paper, printing	-0.54**	-0.51**	1.43**	-0.26
Chemical products	-0.32**	-0.23	1.83**	0.07
Non-metallic mineral products	-0.32*	-0.34*	1.46**	-0.20
Metal, fabricated metal products	-0.51**	-0.19	1.34**	-0.20
Machinery	-0.20*	-0.06	1.51**	0.16
Other industries, recycling	-0.85**	-0.65**	0.83*	-0.46*
Construction	-0.15	-0.07	0.05	-0.17
Commerce	-0.49**	-0.34**	0.46**	-0.53**
Services (reference)	-	-	-	-
Staff				
-100	0.22**	0.19*	-1.75**	-0.52**
101-200	0.16	0.14	-0.97**	-0.25*
201-300	0.13	0.24**	-0.68	-0.16
301- (reference)	-	-	-	-
Type of majority owners				
Public	-0.58**	-0.26	-1.83**	-1.33**
Hungarian Individual	0.27*	0.26*	-0.89**	-0.22
Domestic company	-0.13	-0.14	-1.06**	-0.78**
Foreign	-0.68**	-0.56**	0.94**	-0.65**
Other	-0.46	-0.13	-1.25**	-0.43*
Mixed (reference)	-	-	-	-
Region				
Central	0.31**	0.30**	-0.81**	-
West Transdanubia	0.40**	0.18	-0.48**	-
Middle Transdanubia	0.34**	0.28**	-0.47**	-
South Transdanubia	0.28**	0.13	-0.72**	-
South-east	0.34**	0.26**	-0.59**	-
Middle-east	0.24**	0.16	-0.38*	-
North-east (reference)	-	-	-	-
Cut point	-0.49	-0.77	0.50	0.28
Cut point	0.23	-0.49	1.44	1.19
Cut point	0.99	1.13	2.46	2.38
N	7736	7788	5108	7578
Log likelihood	-9978.72	-9558.34	-2492.13	-5538.71
Model chi ²	500.50	338.87	1095.12	175.62
Prob > chi ² =	0.0000	0.0000	0.0000	0.0000
Pseudo R ²	0.0245	0.0174	0.1801	0.0156

Notes: *: p < 0.05

** : p < 0.01

Table A3.4

**Odds ratios for the occurrence of tax benefit claims and dividend payments
(based on TAXRET96)**

Independent variables	Dependent variables	
	Tax benefits (TBND)	Dividend payments (DIVD)
Sector		
Food, beverages, tobacco	2.08**	0.76*
Textile, clothes, leather, fur	1.88**	0.75*
Wood, paper, printing	1.91**	0.74*
Chemical products	1.93**	1.05
Non-metallic mineral products	1.85**	0.88
Metal, fabricated metal products	1.87**	0.86
Machinery	1.41**	1.22
Other industries, recycling	2.39**	0.63*
Construction	1.22*	0.86
Commerce	1.52**	0.60*
Services (reference)	-	-
Employment		
-100	0.48**	0.55**
101-200	0.60**	0.72**
201-300	0.67**	0.82
301- (reference)	-	-
Type of majority owners		
Public	1.38	0.27**
Hungarian Individual	0.71**	0.97
Domestic company	1.02	0.48**
Foreign	2.45**	0.56**
Other	1.37	0.77
Mixed (reference)	-	-
Region		
Central	0.62**	1.23*
West Transdanubia	0.65**	1.44**
Middle Transdanubia	0.61**	1.14
South Transdanubia	0.63**	1.02
South-east	0.63**	1.16
Middle-east	0.68**	1.07
North-east (reference)	-	-
Number of observations	7855	7855
Log Likelihood	-5036.3	-4267.8
Model Chi - Square	739.8	241.7
Chi sign.	0.0000	0.0000
Pseudo R ²	0.0684	0.0275

Notes: *: p < 0.05

** : p < 0.01

Table A3.5

Odds ratios for some indicators of contractual and financial discipline and tax related behaviour
(based on TAXRET96)

Sector	Contractual discipline (Dep. Var. = CDIS)		Fiscal discipline (Dep. Var. = TARR)		Fringe benefits (Dep. Var. = FBEN)		Employment at substandard wages (Dep. Var. = SWAG)		Reliability of business calculations (Dep. Var. = SCAL)	
	1996	1998	1996	1998	1996	1998	1996	1998	1996	1998
	Manufacturing	0.83	1.53	0.91**	1.40	0.89	0.79	2.05**	0.68	1.05
Construction	1.40	0.76	1.92	1.05	1.29	1.16	0.30**	1.11	1.40	0.73
Commerce (reference)	-	-	-	-	-	-	-	-	-	-
Type of majority owner										
Foreign	0.14*	0.61	0.29	0.68	0.52*	0.77	0.37**	0.27*	0.91	0.78
Domestic company	2.80**	0.55	1.74*	0.50*	1.38	1.09	0.92	0.87	0.72	0.56
Hungarian individual	1.60	1.61	1.54*	0.99	1.04	1.03	2.27**	2.71**	0.86	1.25
Public	1.40	0.83	1.60	1.72	1.85*	1.28	1.01	0.98	1.51	1.54
Mixed (reference)	-	-	-	-	-	-	-	-	-	-
Size (employment)										
- 100	0.90	0.65	1.47*	1.70*	0.64*	0.60*	0.88	0.97	1.02	1.09
101-200	0.77	0.97	0.74	1.38	0.90	0.98	0.80	0.77	0.99	1.05
201-300	1.23	0.94	0.84	0.98	1.91*	2.02*	1.44	1.10	1.62	1.47
301- (reference)	-	-	-	-	-	-	-	-	-	-
Change in employment (Previous year = 100%)										
Fall, more than 20%	6.45	-	1.50	-	0.55*	-	1.32	-	0.68	-
Fall, less than 20%	3.80	-	1.09	-	1.01	-	1.28	-	1.03	-
No change	2.00	-	0.54	-	2.05*	-	1.24	-	1.21	-
Rise, less than 20%	3.67	-	1.10	-	1.11	-	0.76	-	1.89	-
Rise, more than 20% (ref.)	-	-	-	-	-	-	-	-	-	-
Change in employment (Previous year = 100%)										
Fall	-	1.53	-	1.46*	-	1.01	-	1.45	-	1.22
No change	-	0.59	-	0.67	-	1.23	-	0.94	-	0.77
Rise (reference)	-	-	-	-	-	-	-	-	-	-
Export ratio to net turnover (%)										
Zero	0.45*	0.41*	0.60*	0.60*	1.25	0.61*	1.08	0.92	0.91	1.02
1-20	1.15	1.03	0.61*	0.89	0.87	0.79	0.84	1.06	1.66	1.15
21-50	1.38	1.27	1.86*	1.48	0.62	1.18	0.78	1.25	0.85	0.92
51- (reference)	-	-	-	-	-	-	-	-	-	-
N	286	290	285	286	271	271	270	289	285	289
-2 Log Likelihood	221.800	162.005	334.612	308.987	338.934	357.413	311.658	232.531	321.835	385.130
Model Chi - Square	33.764	23.232	47.325	28.522	22.903	20.808	46.343	27.773	16.524	16.162
Chi sign.	0.0058	0.0570	0.0001	0.0121	0.1164	0.1067	0.0001	0.0152	0.4170	0.3036
Pseudo R ²	0.1321	0.1254	0.1239	0.0845	0.0633	0.0550	0.1294	0.1067	0.0488	0.0403

Notes: + : p < 0.1, * : p < 0.05,

** : p < 0.01

Table A3.6

Ordered logit estimations of tax benefits, contractual discipline and the firm's clients' or suppliers' involvement in the hidden economy
(based on TAXRET96)

		Tax benefits (Dep. var. =TBEN)		Clients' discipline of payments (Dep. var. = PLAT)		Unreported sales (Dep. Var.= UNRO)	
		1996	1998	1996	1998	1996	1998
Sector							
	Manufacturing	-0.26	-0.64*	0.59 ⁺	1.28**	-0.67 ⁺	0.36
	Construction	-0.54	-0.13	0.14	1.95**	-0.49	0.27
	Commerce (reference)	-	-	-	-	-	-
Type of majority owner							
	Foreign	1.09*	0.74 ⁺	-0.26*	-0.65	1.80*	0.41
	Domestic company	-0.53	0.31	1.02	-0.54 ⁺	2.28*	-0.07
	Hungarian individual	-0.18	0.11	0.08	-0.76 ⁺	2.26 ⁺	0.75
	Public	-0.12	-0.40	-0.25	-0.46	1.90 ⁺	1.29
	Mixed (reference)	-	-	-	-	-	-
Size (employment)							
	- 100	-0.18	-1.22**	-0.05	0.07	-0.42	0.45
	101-200	0.29	-1.08**	0.17	-0.28	0.00	0.90
	201-300	0.23	-0.16	0.11	0.01	0.45	0.81
	301- (reference)	-	-	-	-	-	-
Change in employment (Previous year = 100%)							
	Fall, more than 20%	0.10	-	0.32	-	-0.22	-
	Fall, less than 20%	0.58	-	0.42	-	-0.64	-
	No change	0.74	-	-0.43	-	-0.05	-
	Rise, less than 20%	0.76	-	-0.37	-	-1.05	-
	Rise, more than 20% (ref.)	-	-	-	-	-	-
Change in employment (Previous year = 100%)							
	Fall	-	-0.09	-	-0.10 ⁺	-	-0.30
	No change	-	0.10	-	-0.62 ⁺	-	-1.04
	Rise (reference)	-	-	-	-	-	-
Export ratio to net sales (%)							
	Zero	-0.52	-0.48	0.05	1.43*	0.31 ⁺	0.70
	1-20	-0.08	0.11	0.29	1.65*	1.10 ⁺	1.01
	21-50	0.22	0.34	1.51	1.59*	-0.04	0.76
	51- (reference)	-	-	-	-	-	-
	cut1	-0.22	-2.07	-1.24	0.55	2.77	3.21
	cut2	1.58	-0.11	0.66	2.01	4.18	4.84
	cut3	2.79	1.45	-	3.25	-	-
N		286	290	281	274	271	277
Log likelihood		-320.71	-340.67	-246.95	-341.93	-159.24	-155.50
Model Chi - square		43.82	35.09	37.43	53.43	27.98	18.49
Chi sign. ²		0.0002	0.0014	0.0018	0.0000	0.0318	0.1855
Pseudo R ²		0.0639	0.0490	0.0704	0.0725	0.0807	0.0561

Notes: + : p < 0.1

* : p < 0.05

** : p < 0.01

A4. Definition of variables

CDIS	0, if the firm always met its contractual obligations during the previous year 1, if the firm did not meet its contractual obligations at least once during the previous year
DIVD	0, if the firm pays no dividend in the given year 1, if the firm pays dividend in the given year
DIVR	dividend rate = dividends / profit after tax
ETR1	effective corporate tax rate = corporate tax /profit before tax
ETR2	effective corporate tax rate = corporate tax/tax base
FBEN	0, if share of fringe benefits to wages is below or equal to 5% of total wage cost 1, if share of fringe benefits to wages is higher than 5% of total wage cost
PLAT	in FIRM96 database: 1 - clients always met their contractual payment obligations in due time in the previous year 2 - clients were sometimes late with payments in the previous year 3 - clients often were late with payments in the previous year in FIRM98 database: 0 - clients always met their contractual payment obligations in due time in the previous year 1 - not more than 10 % of clients were late with payments in the previous year 2 - more than 10 % but not more than 30 % of clients were late with payments in the previous year 3 - more than 30 % of clients were late with payments in the previous year
SCAL	0, if the extent of changes in tax rules does not jeopardise the reliability of business calculations according to the respondent 1, if the extent of changes in tax rules jeopardises the reliability of business calculations according to the respondent
SWAG	0, if the firm has no employees employed at substandard wages (20th Ft/months or below) 1, if the firm has employees employed at substandard wages
TARR	0, if the firm has no tax arrears at the moment 1, if the firm has tax arrears at the moment
TBEN	Number of titles (types) of different tax benefits or tax breaks claimed in the previous tax year 0 - zero 1 - one 2 - two 3 - three or more
TBND	0, if the firm did not claim tax benefit in the previous year 1, if the firm claimed tax benefits in the previous year
TBNR	rate of tax benefits = benefits/ (tax paid + benefits)
UNRO:	Unreported sales amongst the firm's contractual partners (suppliers) 1 - never occur 2 - rarely occur 3 - often occur
UNRS	0, if the respondent considered unreported sales amongst the firm's trading partners insignificant 1, if the respondent considered unreported sales amongst the firm's trading partners significant