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perspective**

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Tax compliance costs: A business administration perspective

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Abstract*

Our paper analyses the relationship of tax compliance costs and business strategy. Due to instruments, like information technology, simplified cash accounting or outsourcing compliance activities to tax advisers, private businesses have a set of strategies to optimize their tax compliance cost burden. Under the assumption of rational choice a private business chooses a cost-optimal administration strategy. Nevertheless we find empirical evidence for small German businesses using only insufficiently the support of external tax advisers. Therefore a considerable number of small businesses in Germany would be able to reduce their compliance cost burden by a higher degree of outsourcing tax processes. By contrast we find no significant evidence for a cost reduction by an electronic data interchange with the tax and social insurance authorities or by a simplified cash accounting method for tax purposes. The insufficient use of external advice may be explained by bounded rationality arguments, like an overconfidence of the taxpayer as well as a cost perception deficit. An alternative motivation could be a mistrust of the taxpayer against an external tax adviser.

Key words: Tax complexity, tax compliance costs, bureaucracy costs, tax administration, administration strategy, business strategy, outsourcing, contracting out, e-filing, electronic data interchange, cash accounting

JEL classifications: H25, H26, L23, L24

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1 Introduction

The complexity of taxation is a widely discussed subject in the public finance literature (e.g. Kaplow 1996; Munk 2008). From an economic perspective tax complexity can be measured by the costs of the bureaucratic activities in calculating and remitting the tax and social

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insurance debts to the authorities.¹ This economic burden can be denoted as the compliance costs of the taxation system. There are at least three reasons why this specific form of transaction costs can be considered as a major economic problem:

- Tax compliance costs reduce the resources of private businesses without raising the financial budget of the government. Thus they can be considered as a waste of economic resources.
- Empirical evidence suggests that the economic burden of tax compliance decreases with increasing business size (OECD 2001) and rises with the international orientation of businesses (Blumenthal and Slemrod 1995). These effects could have a negative impact on the competitiveness of small and medium-sized enterprises and reduce their access to international markets.
- Tax compliance costs seem to be linked to the compliance level. Hence they could raise the degree of tax evasion (Erard and Ho 2003).

Since the groundbreaking surveys of Sandford in the UK (Sandford 1973) and Slemrod in the U.S. (Slemrod and Sorum 1984) the measurement of tax compliance costs has progressed significantly (see Allers (1994) and Evans (2003) for a comprehensive review). The necessity of measuring compliance cost burdens is nowadays widely accepted as being demonstrated by the implementation of the standard cost model in European countries (Nijssen and Vellinga 2002) or the ITBM model in the United States (Guyton et al. 2003).

From a business administration perspective the compliance cost burdens of private businesses are not only affected by the design and the implementation of the tax system but also by the compliance strategy of the taxpayer. As already stated in the literature, the way taxpayers prepare and submit their tax returns has changed dramatically in the last decades. There has been a considerable growth in the usage of tax administration software and in the outsourcing of tax processes to external advisers. According to Guyton et al. (2005) the share of self-prepared tax returns without software in the U.S. dropped between 1993 and 2003 from about 41% to 13%, while the paid preparer use rose from 51% to 62%. The number of electronic declarations in Germany increased from about 27,000 in 1999 to 8.2 million in 2008 (Bayerisches Landesamt für Steuern 2009). An increase in the outsourcing of tax administration processes has already been observed by McKinstry and Baldry (1997) for

¹ In accordance to the OECD (2006) we interpret also social insurance contributions as taxes in a broader sense. This approach is also chosen by the empirical literature about the compliance costs of wage taxation (e.g. Hudson and Godwin 2000).

Australia as well as by Collard et al. (1998) for Great Britain. Hence it is an important question of research how these different compliance strategies impact the compliance costs of private taxpayers.

According to the descriptive studies of Sandford and Hasseldine (1992) as well as Collard and Godwin (1999) the cost-efficient tax compliance strategy (for example outsourcing to an external adviser) depends on business size. Taxpayers on average should choose a cost-optimal compliance strategy. In contrast to these contributions Hansford et al. (2003) as well as DeLuca et al. (2005) identify higher compliance costs for taxpayers relying on the help of tax advisers. Guyton et al. (2005) detect higher average compliance costs by the use of paid preparers and software preparers. However they discover taxpayers also choosing a cost-efficient compliance strategy, if alternative influence factors and selection bias are considered. Hudson and Godwin (2000) confirm this result for most strategies but observe also evidence for a cost-inefficient use of a specialist tax bureau. A deficiency of all these contributions is to measure the strategies exclusively by dummy variables. Thus the degree of outsourcing or applying software is not taken into account.

The relationship of compliance costs and software usage has already been analysed by Vaillancourt (1989) who finds no significant evidence for a cost reduction by electronic administration tools. Hansford et al. (2003) detect higher compliance costs for businesses using a computer system for tax administration. By contrast Verwaal (2000) substantiates a significant reduction of compliance costs of international transactions by the use of information systems or an electronic data interchange with the authorities. He observes no significant effect for an electronic data interchange with other businesses. Kopczuk and Pop-Eleches (2007) find evidence that the participation in the Earned Income Tax Credit in the U.S. is significantly correlated with e-filing. This result can be taken as a hint on potential compliance cost reductions based on an electronic data interchange with the authorities.

In addition to outsourcing and e-filing taxpayers may also use options inherent in the tax law to simplify their tax return and reduce their compliance cost level. Slemrod (1989) as well as Pitt and Slemrod (1989) find significant evidence for a considerable cost increase by itemising deductions. Correspondingly Lerman and Lee (2005) report higher compliance costs for taxpayers being subject to an alternative minimum tax (AMT). Slemrod (1996) discusses a likely cost reduction by a cash-based income taxation. Up to our knowledge there exists no empirical evidence on the effect of cash accounting on the compliance cost burden.

In our article we use a data set of 1,220 German businesses to analyse the relationship of tax compliance costs and compliance strategies. In detail we analyse the effects of outsourcing obligations to external advisers, an electronic data interchange with the tax and social insurance authorities (e-filing), applying a simplified cash accounting method for tax purposes and substituting internal personnel resources by capital (for example tax administration software). Methodologically we enhance the measurement of compliance strategies by considering the share of specific cost categories (like the share of external adviser costs) instead of a dummy variable (for example paid preparer usage). Furthermore, this is up to our knowledge the first contribution analysing the effect of cash accounting on the compliance costs of private businesses.

The paper is organised as follows. In section 2 we deploy a simple rational approach of optimal tax administration to develop our hypotheses for the empirical investigation. Section 3 elucidates the applied data set, the estimation strategy and the regression results. The results of our empirical analysis are interpreted in section 4. The paper is concluded by section 5.

2 Tax compliance costs and administration strategy

First of all we analyse the relationship between tax compliance costs and tax administration strategy by a simple model of rational choice. Similar to Slemrod (2001) we assume a rational decision maker considering taxes as well as compliance costs in maximising his net income Y . We initially neglect deficiencies of rational choice like bounded rationality or limited information. The net income consists of the gross earnings E being reduced by tax payments T as well as by the costs of complying with the tax law C .²

The tax burden T rises with the gross earnings E and is reduced by the deductibility of the compliance costs C .³ Furthermore, the tax burden may be affected by the use of specific tax options O_k . Tax planning options as income shifting or the choice of an optimal depreciation method are generally associated with a lower tax payment but also with higher tax-related planning costs. By contrast the usage of a tax simplification option like cash accounting or a lump-sum deduction for business expenses generally reduces tax compliance costs. However its impact on the tax payment itself may be ambiguous. In summary the effect of an

² According to the literature (e.g. Sandford et al. 1989, p. 12.) also the costs of tax planning are included.

³ For simplicity we assume that all compliance costs are deductible with the same tax rate. Differences in the tax treatment of different costs categories (for example for the working effort of the entrepreneur) could result in a preferential treatment of specific administration strategies.

unspecified tax option O_k on the tax burden can be negative but also positive. The net income can be written as

$$Y = E - T(E, C, O_k) - C. \quad (1)$$

We consider three different types of tax compliance costs in the model. Personnel costs C_p result from personnel resources R_p (including the effort of the entrepreneur) deployed for bookkeeping, tax-filing, tax planning or other tax-related activities. Alternatively a business may substitute personnel resources by capital R_c with the costs $C_c(R_c)$ for tax administration hardware or software. Furthermore the taxpayer could also engage an external adviser to execute his tax administration obligations. The usage of external resources R_e may be characterised as an outsourcing of tax administration and tax planning activities with the costs $C_e(R_e)$. For simplicity reasons we postulate a constant market price p_e for external advice with $C'_e(R_e) = p_e$. We take into account that complex and sophisticated activities should be executed at lower cost by a professional. Moreover we assume businesses to execute the simple activities first before they look for external advice. Hence we presume the marginal costs of in-house tax compliance rising with the spectrum of in-house compliance activities ($C''_p(R_p) > 0, C''_c(R_c) > 0$). Based on these assumptions we should obtain an interior solution with simple compliance activities being fulfilled in-house while complex problems are solved by an external adviser. Such a composition of different compliance strategies corresponds to the empirical evidence (e.g. OECD 2001; Kegels 2008). The total compliance burden C is defined as

$$C = C_p + C_c + C_e. \quad (2)$$

The sum of resources spent on tax issues has to be sufficient to fulfil the quantity of necessary compliance activities A . Thus the maximisation of the net income is restricted by an administration constraint. For simplicity we postulate the production efficiency of external tax advisers to be 1. The efficiency parameter of a personnel-intensive (capital-intensive) compliance strategy is denoted by θ (ϖ). We obtain

$$A(E, O_k) \leq \theta \cdot R_p + \varpi \cdot R_c + R_e. \quad (3)$$

Corresponding to the empirical literature (e.g. Tran-Nam et al. 2000) the total compliance burden $A(E, O_k)$ is positively correlated with the business size implying also a positive

relationship with the pre-tax earnings $\left(\frac{\partial A}{\partial E} > 0\right)$. Due to economies of scale the relative compliance cost burden decreases in pre-tax earnings $\left(\frac{\partial A^2}{\partial^2 E} < 0\right)$. Hence, according to our model structure tax compliance costs can be interpreted as a kind of additional and regressive tax payment being deductible from the assessment base of other taxes on income.

The amount of compliance activities $A(E, O_k)$ may be further affected by specific tax options O_k . The sign of the derivative $\frac{\partial A}{\partial O_k}$ can be positive or negative. In case of a tax simplification option (for example e-filing, simplified cash accounting) we expect a negative derivative $\left(\frac{\partial A}{\partial O_k} < 0\right)$. By contrast a planning option (for example income shifting) requires planning costs and therefore implies a positive derivative $\left(\frac{\partial A}{\partial O_k} > 0\right)$. The target function (1) and the tax administration constraint (3) can be integrated into the following Lagrangian function

$$L = E - T(E, C, O_k) - C_p - C_c - C_e - \lambda \cdot (A(E, O_k) - \theta \cdot R_p - \varpi \cdot R_c - R_e) \quad (4)$$

with λ denoting the Lagrange multiplier.

For the resources R_p , R_c and R_e as well as the specific tax options O_k we obtain as first order conditions:

$$\frac{\partial L}{\partial R_p} = -C'_p \cdot \left(1 + \frac{\partial T}{\partial C}\right) + \lambda \cdot \theta = 0 \quad (5)$$

$$\frac{\partial L}{\partial R_c} = -C'_c \cdot \left(1 + \frac{\partial T}{\partial C}\right) + \lambda \cdot \varpi = 0 \quad (6)$$

$$\frac{\partial L}{\partial R_e} = -p_e \cdot \left(1 + \frac{\partial T}{\partial C}\right) + \lambda = 0 \quad (7)$$

$$\frac{\partial L}{\partial O_k} = -\frac{\partial T}{\partial O_k} - \lambda \cdot \frac{\partial A}{\partial O_k} \geq 0 \quad (8)$$

Based on these conditions we can draw the following conclusions:

1. In the optimum of an interior solution the gross marginal cost of in-house compliance per resource unit $\frac{C'_c}{\varpi} = \frac{C'_p}{\theta}$ equals the external market price of outsourcing tax

compliance activities p_e . Thus, under the assumption of rational choice, a taxpayer chooses the cost-optimal mix of administration strategies according to this condition.

2. Using (7) condition (8) can be written as $\underbrace{p_e \cdot \left(1 + \frac{\partial T}{\partial C}\right)}_{p_t} \cdot \frac{\partial A}{\partial O_k} + \frac{\partial T}{\partial O_k} \leq 0$. Hence

we can identify a decision rule for a rational taxpayer regarding a tax option O_k . A tax simplification option decreases the total compliance burden A , while a tax planning option reduces the tax payment T . If these advantageous effects are not counterbalanced by a contrary higher tax payment T or by a higher compliance burden vice versa, a rational taxpayer selects the accordant option. Besides the benefit of an option O_k depends on the after-tax price p_t that consists of the gross market price p_e being reduced by the marginal savings due to tax deductibility

$$p_e \cdot \frac{\partial T}{\partial C} < 0.$$

3 Empirical analysis

3.1 Data base

We use data of a German survey to investigate the relationship of compliance costs and administration strategy. The data base was collected in the year of 2003 on behalf of the German Ministry of Economics and Labour. It consists of 1,220 files and contains information about the costs of private businesses to comply with taxes, social insurance contributions, statistics as well as employment and environmental regulations (see Kayser et al. (2004) for further information). Due to missing values we have information on the overall compliance costs CC in 732 cases. Similar to OECD (2001) the tax-related costs TC and the social insurance-related costs SC are described by a fraction of the overall compliance costs CC. Except from the cost burden each record contains information on the dispersion on different cost categories (personnel costs PC including the labour costs of the entrepreneur, costs of external assistance EC and other monetary costs MC). Therefore we are analysing the relationship between the cost structure and the cost burden. Also the time burden of the entrepreneur and of the employees resulting from bureaucratic obligations is documented. In addition, the record includes the following details:

- Information on business size, location of the head office (Federal State), legal form, age and sector

- Data on specific forms of employment (apprentices, part-time employees, casualties, handicapped employees) and the fluctuation of employees
- The accounting method used for tax purposes
- Information on the usage and the correspondent problems of an electronic data interchange with the financial and social insurance authorities (e-filing)

Based on this information we can investigate the impact of cash accounting and e-filing on the compliance cost burden. In 2003 German businesses could choose to submit their tax returns and their monthly VAT statements electronically. By contrast only small businesses and liberal professions (lawyers, engineers, etc.) can choose a simplified cash accounting method.

As far as we know the data set is the best data source available relating compliance costs of small and medium-sized enterprises in Germany notwithstanding some measurement issues that have to be taken into account.

A basic problem of measuring compliance costs is the reliability of the taxpayers' statements. As Tate (1988, p. 352) argues the respondents may overstate their compliance cost burden to impose pressure on the political authorities. Otherwise Klein-Blenkers (1980) and other authors find evidence for a cost perception deficit of taxpayers. According to this literature the respondents may also underestimate their compliance costs because of disremembering parts of their cost burden.⁴ We may therefore assume that there is no systematic overestimation or underestimation of business tax compliance costs in our data set.

Because of a low response rate of 7.3 % the empirical results could be affected by a non-response bias. There are theoretical and empirical arguments for a positive as well as for a negative bias.⁵ Therefore the net effect of a selection bias on average compliance costs is unclear and could result in a "random noise". A selection bias would not necessarily distort

⁴ Klein-Blenkers (1980, p. 140) asked German enterprises for the sum of overall compliance costs as well as for the sum of itemised cost elements. According to his findings the sum of overall compliance costs was considerably lower than the sum of itemised cost elements. The observed oblivion of unspecified cost fractions can be taken as an evidence for a cost perception deficit. Similar results are reported by Rametse and Pope (2002) and Chittenden et al. (2005). These authors try to estimate the psychic costs of tax compliance by the difference of the sum of overall compliance costs and the sum of itemised cost elements. Contrasting qualitative findings of Delgado et al. (2001) and other authors this difference is in general identified as negative. In the applied survey, businesses were asked for personnel costs, external costs and other monetary costs without an allocation to specific activities. This could be a reason for an underestimation of the cost burden.

⁵ On the one hand taxpayers with high compliance costs may have an incentive to take part in empirical investigations to develop political pressure. On the other hand these taxpayers may be reluctant to participate in a survey because they do not like to waste their time. Empirical investigations provide evidence for both arguments (Wicks 1965; Allers 1994 and Tran-Nam and Glover 2002).

the regression results if it is not correlated to the investigated variables. Taking into account the small differences between the descriptive results of Kayser et al. (2004) and international studies (e.g. OECD 2001), there is no reason to suspect a major distortion of the regression results by a non-response bias. Nevertheless we calculate regressions for a number of target variables to eliminate the risk of possible measurement errors or a recall bias.

Table 1 contains the average values of the overall compliance costs (CC) of German businesses as well as the relative cost burden per associate (including the entrepreneur) and per turnover.

Table 1 Absolute and relative compliance costs

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
CC per business (€)	27,465	54,954	147,807	868,884
CC per associate (€)	4,165	1,837	1,062	875
CC per turnover (%)	3.97	2.09	1.03	0.36
Cases	272	162	235	58

Evidently the compliance cost burden rises with business size while the relative cost burden is remarkably higher for small businesses. Therefore, as already stated in the literature (see Evans (2003) for a literature review), the compliance costs of taxation are mainly a problem for small businesses and self-employed people. The following chart presents the share of compliance costs caused by taxes and social insurances for employees.

Table 2 Tax and social insurance compliance costs

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
Share of TC (%)	51.66	47.96	44.38	33.21
Share of SC (%)	27.83	29.37	29.48	28.12
Overall share (%)	79.49	77.33	73.86	61.33

In accordance to the empirical literature (e.g. OECD 2001) the impact of tax-related activities on the overall compliance cost burden is strong. Including payroll taxes and social insurance payments, on average about 74% of all compliance costs result from taxes and duties. The relevance of taxes is considerably higher for small businesses. The total compliance costs CC

consist of personnel costs PC (including the compliance work of the entrepreneur), external costs EC and other material costs MC documented in the following table.

Table 3 Compliance cost categories

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
Share of PC (%)	52.04	54.69	54.71	51.56
Share of EC (%)	37.76	33.80	32.10	31.34
Share of MC (%)	10.20	11.51	13.19	17.10
Total (%)	100.00	100.00	100.00	100.00

Apparently small businesses rely more on external support than medium-sized businesses, whereas their share in other monetary expenses is lower. This result can be explained by economies of scale favouring a capital-intensive business strategy for bigger businesses. The share of personnel costs is rather constant, but it consists in the smallest size classes mainly of the labour costs of the entrepreneur.

3.2 Hypotheses and estimation strategy

As elucidated before a rational decision maker c.p. chooses a cost-optimal business administration strategy depending on the firms’ characteristics. Therefore the outsourcing of administrative obligations to tax advisers and other contractors should not have a significant influence on the tax-related compliance costs of private businesses. That holds at least as far as the cost-relevant control variables are taken into account (see also Hudson and Godwin 2000).

By contrast the analytical model implies that a rational decision maker selects a tax simplification option if a reduction of compliance costs is not counterbalanced by a higher tax payment. Therefore we expect the compliance costs of private businesses to be lower, if a simplification option like cash accounting is chosen.

According to this argumentation we deploy the following hypotheses for our quantitative analysis:

1. The degree of outsourcing tax-related administration to external advisers has no significant impact on the tax-related compliance costs in the data set.

2. Also the weight of a capital-intensive administration strategy does not significantly affect the compliance cost burden.
3. Businesses using an electronic data interchange with the financial or the social insurance authorities bear a significantly lower cost burden unless they report problems related to this subject.
4. Businesses using a simplified cash accounting method have significantly lower tax-related compliance costs.

Corresponding to the literature (e.g. Verwaal 2000; Hudson and Godwin (2000); Slemrod and Venkatesh 2002) we use a logarithmic linear model to estimate the relationship between administration strategy and tax compliance costs. Furthermore, we include the following procedures to enhance our regression results:

- In contrast to previous studies we measure the applied administration strategy not only by a dummy variable (for example paid preparation) but more precisely by the share of external and internal monetary costs in the overall compliance cost burden CC.
- As exemplified especially high or low cost burdens may be caused by overestimations or underestimations of the respondents and could bias the regression results. For that reason we exclude cases with the residuals of a size-based estimation exceeding the double of the accordant standard deviation.⁶
- Because of possible measurement errors relating to overall compliance costs as well as to the share of tax-related and social insurance-related costs, we calculate all regressions for overall costs CC, tax-related costs TC and social insurance-related costs SC. Moreover we recalculated the personnel costs by the product of working hours and average personnel costs in the data set as well as by the official average German labour costs in 2003.⁷

The logarithmic GLS model can be written as:

$$CCost = \alpha_0 + \alpha_1 \cdot Size + \alpha_2 \cdot Employment + \alpha_3 \cdot Outsourcing + \alpha_4 \cdot Capitalintensive + \alpha_5 \cdot EDIF + \alpha_6 \cdot EDIFP + \alpha_7 \cdot EDIS + \alpha_8 \cdot EDISP + \alpha_9 \cdot Cashaccounting + \alpha_{10} \cdot X + \varepsilon \quad (8)$$

These variables are defined as follows:

⁶ The outlier correction is explained in more detail in appendix 6.1.

⁷ These results are documented in appendix 6.4.

<i>CCost</i>	Natural logarithm of the overall compliance costs CC, the tax-related costs TC or the social insurance-related costs SC ⁸
<i>Size</i>	Business size is measured as natural logarithm of turnover (for TC and CC) or associates (for SC) amplified by 1. ⁹
<i>Employment</i>	As documented in previous studies the compliance cost level increases significantly if a business has to pay wage taxes and payroll taxes for its employees (Hudson and Godwin 2000). Therefore we deploy a dummy variable for businesses with two and more associates assuming the first associate to be the entrepreneur.
<i>Outsourcing</i>	An outsourcing-oriented administration strategy is measured as the natural logarithm of external costs EC per overall compliance costs CC amplified by 1%. ¹⁰
<i>Capitalintensive</i>	A capital-intensive administration strategy is measured as the natural logarithm of material costs MC per overall compliance costs CC amplified by 1%.
<i>EDIF</i>	Dummy for businesses using an electronic data interchange with the tax authorities
<i>EDIFP</i>	Dummy for businesses reporting problems regarding the electronic data interchange with the tax authorities
<i>EDIS</i>	Dummy for businesses using an electronic data interchange with the social insurance authorities
<i>EDISP</i>	Dummy for businesses reporting problems regarding the electronic data interchange with the social insurance authorities
<i>Cashaccounting</i>	Dummy for businesses relying on a simplified cash accounting method for tax purposes
<i>X</i>	Vector of control variables ¹¹
ε	Error term

Similar to Hudson and Godwin (2000) we observe heteroscedasticity relating to the size of the responding businesses. Therefore we deployed a WLS regression with the natural logarithm of turnover amplified by 1 as weighting factor. This procedure ensures the Gauß-Markov theorem.¹² In accordance to Slemrod and Venkatesh (2002) we excluded missing values from

⁸ To consider cases without costs of social insurance and wage taxation (*Employment* variable) SC is amplified by 1 before applying the natural logarithm. Zero values for CC and TC are excluded.

⁹ The associate number is connected more directly to the costs of wage and payroll taxation. In contrast the turnover has a higher explanatory power for models of CC and TC. In any case the size measure is amplified by 1 to prevent undefined logarithmic values.

¹⁰ This is to prevent undefined logarithmic values. An amplification of the share by 1 (100 %) would result in biased regression results.

¹¹ See appendix 6.3 for a detailed list of the relevant variables for each model.

¹² Appendix 6.2 explains the estimation requirements including the problem of heteroscedasticity.

the analysis to prevent imputation problems. Thus we estimate tax-related compliance costs only for cases comprehending information on personnel costs PC, external costs EC, other monetary costs MC and the share of tax-related costs.

3.3 Regression results

Previous studies (e.g. Slemrod and Venkatesh 2002) document the remarkable impact of business size on absolute compliance costs as well as on relative compliance costs (per associate or per turnover). For that reason an univariate analysis is not assessed as appropriate. However a consideration of all available control variables results in a loss of information due to missing values. For that reason we calculate the regressions for a simplified S model excluding the vector of further influence factors X and an extended E model including vector X . The following table shows the coefficients and standard errors (in parentheses) for the whole data set excluding outliers.¹³ In the models for the tax-related (TC) and social insurance-related (SC) compliance costs only an electronic interchange with the accordant authorities is recognised. The cash accounting method is not considered in the models for SC.

Table 4 Regression results for the whole data set

Target variable	CC (S model)		CC (E model)		TC (S model)		TC (E model)		SC (S model)		SC (E model)	
Size	0.389***	(0.020)	0.360***	(0.033)	0.344***	(0.022)	0.333***	(0.029)	0.419***	(0.031)	0.349***	(0.046)
Employment	0.114	(0.299)	0.149	(0.382)	-0.294	(0.328)	-0.370	(0.335)	6.659***	(0.487)	5.892***	(0.585)
Outsourcing	-0.273***	(0.049)	-0.283***	(0.056)	-0.255***	(0.055)	-0.233***	(0.058)	-0.410***	(0.061)	-0.428***	(0.069)
Capitalintensive	-0.069	(0.049)	-0.050	(0.056)	-0.096*	(0.055)	-0.083	(0.058)	-0.005	(0.064)	0.027	(0.070)
EDIF	0.152	(0.115)	0.114	(0.131)	-0.009	(0.105)	-0.024	(0.109)	-		-	
EDIFP	-0.086	(0.224)	-0.049	(0.283)	0.129	(0.203)	0.175	(0.212)	-		-	
EDIS	-0.062	(0.100)	-0.089	(0.116)	-		-		0.023	(0.107)	-0.014	(0.121)
EDISP	0.074	(0.182)	0.015	(0.207)	-		-		0.002	(0.188)	-0.134	(0.207)
Cashaccounting	-0.246	(0.243)	-0.321	(0.349)	-0.226	(0.272)	-0.292	(0.310)	-		-	
Constant	3.919***	(0.427)	2.937***	(0.731)	4.026***	(0.475)	4.080***	(0.552)	0.461	(0.519)	0.124	(0.843)
R ² (corrected)	0.447		0.410		0.341		0.347		0.467		0.455	
Cases	654		511		603		571		631		505	

¹³ The complete regression results including the variables of the vector X as well as the variance inflation factors are presented in appendix 6.3.

Corresponding to previous studies (e.g. Sandford et al. 1989) we identify business size to be the most important influence factor for the compliance costs of taxes and social insurance payments. A growth in business size by 1% leads to a growth of compliance costs by 0.344% up to 0.419%. The regression coefficient <1 exemplifies the existence of economies of scale within the administration process. Furthermore, the high value of the constant indicates fixed cost elements. In the SC model the fixed cost effect is captured by the *Employment* variable.

In contrast to our hypothesis 1 we find a significant and negative relationship between compliance costs and the outsourcing of compliance activities to external contractors. The regression coefficient fluctuates between -0.233 (extended TC model) and -0.428 (extended SC model). Hence doubling the share of outsourced compliance activities (for example from 20% to 40%) on average reduces the corresponding compliance cost burden by 14.4% to 24.9%. The effect is stronger for the social insurance-related compliance costs and remains robust in all estimated models.¹⁴

There is no similar impact for the usage of a capital-intensive compliance strategy. Only in the S model for CC we identify a negative correlation that is barely significant. Thus hypothesis 2 is supported by the empirical results.

As well we do not find a significant relationship between the compliance burden and an electronic data interchange with the tax or social insurance authorities. Furthermore, there is no significant effect for businesses reporting problems related to an electronic data interchange. Moreover and in spite of a negative regression coefficient for *Cashaccounting* we can also not approve businesses using this simplified accounting method to bear a significantly lower cost burden. Correspondingly the hypotheses 3 and 4 are not confirmed by our regressions.

An administration strategy may have a different impact on small businesses compared to medium and big businesses. To account for that, we made separate regressions¹⁵ for small businesses with less than 50 associates (including the entrepreneur) and medium and big businesses.¹⁶ Table 5 illustrates the regression results for small businesses supporting our

¹⁴ A possible explanation for that outcome could be an overestimation of in-house labour costs within our data set. To account for that we recalculated the personnel costs of compliance by the product of the working hours and the average labour costs. The accordant regressions in appendix 6.4 support our findings.

¹⁵ An alternative approach would be to include combination terms of the independent variables and business size. We abstained from that approach because of multi-collinearity problems.

¹⁶ We use the small business criterion of the Commission of the European Communities (2003). Due to the limited number of big businesses in the data set it did not seem to be appropriate to calculate a separate regression for this group.

findings for the whole data set. Except from the models for SC the outsourcing effect on the compliance cost burden is even stronger than in the overall sample.

Table 5 Regression results for small businesses

Target variable	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Size	0.364*** (0.039)	0.302*** (0.052)	0.305*** (0.042)	0.286*** (0.050)	0.528*** (0.077)	0.422*** (0.104)
Employment	0.197 (0.264)	0.202 (0.347)	-0.204 (0.292)	-0.228 (0.304)	6.569*** (0.451)	5.986*** (0.558)
Outsourcing	-0.314*** (0.056)	-0.367*** (0.066)	-0.301*** (0.064)	-0.288*** (0.067)	-0.344*** (0.073)	-0.404*** (0.085)
Capitalintensive	-0.093* (0.056)	-0.033 (0.067)	-0.104 (0.064)	-0.074 (0.068)	-0.075 (0.076)	-0.034 (0.085)
EDIF	0.128 (0.143)	0.140 (0.162)	-0.078 (0.122)	-0.111 (0.128)	-	-
EDIFP	-0.016 (0.281)	-0.032 (0.376)	0.266 (0.271)	0.367 (0.284)	-	-
EDIS	-0.178 (0.133)	-0.320** (0.159)	-	-	-0.114 (0.134)	-0.233 (0.160)
EDISP	-0.075 (0.248)	-0.205 (0.283)	-	-	-0.175 (0.273)	-0.493 (0.306)
Cashaccounting	-0.333 (0.217)	-0.275 (0.312)	-0.331 (0.246)	-0.204 (0.284)	-	-
Constant	4.150*** (0.585)	4.191*** (0.967)	4.468*** (0.674)	4.779*** (0.778)	0.254 (0.488)	0.567 (0.916)
R ² (corrected)	0.294	0.296	0.202	0.208	0.509	0.488
Cases	400	301	372	355	381	292

Table 6 contains the regression results for the medium and big enterprises. Because of all these businesses having employees the variable *Employment* is neglected. We find similar results compared to the previous models but the effect of outsourcing tax administration is weaker and not significant in all cases. Therefore we determine the cost-reducing effect of outsourcing administration activities especially in the case of small businesses.

Table 6 Regression results for medium and big businesses

Target variable	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Size	0.419*** (0.040)	0.388*** (0.071)	0.407*** (0.047)	0.415*** (0.060)	0.446*** (0.072)	0.361*** (0.097)
Outsourcing	-0.234** (0.090)	-0.230** (0.106)	-0.197** (0.099)	-0.167 (0.110)	-0.505*** (0.107)	-0.480*** (0.121)
Capitalintensive	-0.018 (0.088)	-0.022 (0.107)	-0.077 (0.100)	-0.084 (0.108)	0.093 (0.111)	0.148 (0.127)
EDIF	0.214 (0.195)	0.062 (0.232)	0.079 (0.187)	0.113 (0.208)	-	-
EDIFP	-0.184 (0.369)	-0.005 (0.486)	-0.038 (0.322)	-0.101 (0.363)	-	-
EDIS	0.083 (0.160)	0.259 (0.201)	-	-	0.225 (0.178)	0.302 (0.205)
EDISP	0.108 (0.283)	0.000 (0.337)	-	-	0.052 (0.277)	-0.059 (0.309)
Constant	3.600*** (0.750)	1.937 (1.279)	2.735*** (0.867)	1.985* (1.074)	6.913*** (0.492)	4.434*** (1.098)
R ² (corrected)	0.318	0.270	0.253	0.237	0.222	0.250
Cases	253	209	230	215	249	212

4 Interpretations

In the empirical analysis we found strong evidence that businesses relying heavily on external support have lower tax compliance costs. This outcome contradicts our hypothesis of businesses in general choosing a cost-optimal compliance strategy. Presumably this observation is not caused by a lower quality of the “outputs” like the tax return.¹⁷ In the following section we discuss alternative approaches to explain this “irrational” decision making behaviour.

Koellinger et al. (2007) give empirical evidence for overconfidence of self-employed entrepreneurs. From a decision making perspective a systematic overestimation of the businesses’ capabilities results in higher presumed efficiency parameters θ and ϖ of the in-house compliance strategies. This implies a bias in decision making as well as an insufficient usage of external advice.

In a dynamic environment we would expect businesses to correct the misevaluation of their own capabilities by learning, if they are able to control the efficiency of their strategy. As substantiated by the empirical literature (e.g. Klein-Blenkers 1980), there is evidence for a deficit of taxpayers to percept their compliance cost burden. The oblivion of past compliance activities could distort the choice between the underestimated in-house tax compliance costs

¹⁷ Due to the experience and the accountability of tax advisers it does not seem to be probable that outsourced tax returns or financial statements have a lower quality than tax returns produced in-house. Bloomquist et al. (2007) do not find a higher failure rate for U.S. tax returns prepared by tax advisers.

and the well-known costs of an external tax adviser.¹⁸ In an analytical notation this aspect can be documented by a cost perception parameter $0 < \xi < 1$. The criterion of a perceived cost

$$\text{optimum converts to } C'_c / \varpi = C'_p / \theta = P_e / \xi .$$

A similar explanation would be an insufficient perception of the tax deductibility of tax adviser costs. For example Boylan and Frischmann (2007) provided empirical evidence for a misperception of marginal tax rates by taxpayers. If adviser costs are compared with the compliance performance of the entrepreneur, this could result in an overestimation of net tax adviser costs.

An alternative argument based on rational choice theory could be a mistrust of the taxpayer against an external adviser. Due to the information asymmetry between the tax adviser and the taxpayer the relationship may be negatively affected by a principal agent problem. For that reason it may be rational for a private businessman to keep at least some control over his tax affairs. Furthermore, there may be an incentive for partially non-compliant businesses to administer their tax affairs without external support. According to Rice (1992) and Slemrod et al. (2001) the compliance level of small businesses is lower than in the other size classes. In addition Erard and Ho (2003) find evidence for a negative correlation of non-compliance and the existence of an external confidant. Hence it should be reasonable for a partially non-compliant taxpayer not to initiate an external adviser into all business matters.

In case of capital-intensive compliance strategies we do not find evidence for cost-inefficiencies. Thus we may assume that German businesses use capital-intensive instruments, like tax administration hardware and software, to an adequate extent. In contrast to our hypotheses we also do not find significant support for a cost-reduction by the choice of a simplified cash accounting method or by an electronic data interchange with the authorities.

Regarding the electronic data interchange this outcome may be caused by the fact that the first projects of e-filing tax-relevant information to German tax authorities started in 1999. Therefore potential cost reductions could have been contradicted by start-up costs. However, the insignificance of e-filing could also result from a lack of a considerable relief of the taxpayer by an electronic submission method.

Concerning the simplified cash accounting method we detect constantly negative regression coefficients but also high standard errors. A possible explanation could be that a significant

¹⁸ A similar argument is applied by Glaser and Weber (2007) to explain the lack of learning within the portfolio investment decisions of private investors.

part of the respondents had also to prepare commercial balance sheets for business law reasons. The additional costs for preparing a tax balance sheet on the basis of a commercial balance sheet could be comparable to the costs of preparing an annual account based on a cash accounting method. As an alternative explanation potential cost reductions of cash accounting could be rather low compared to the variance of the overall tax compliance cost burden.

For the reasons elucidated above the insignificance of cash accounting or an electronic data interchange with the tax and social insurance authorities should be interpreted with caution. Nevertheless the regression results give cause for concern about the amount of potential cost reductions due to e-filing and cash based accounting for single taxpayers and the economy as a whole.

5 Conclusion

In this paper we analysed the relationship between tax compliance costs and business strategy. Using an analytical model of rational choice it can be postulated that taxpayers choose a cost-optimal compliance strategy. We used a German data set of 1,220 businesses to investigate this hypothesis in an econometric WLS model. Partially in contrast to the literature we found evidence that outsourcing tax compliance activities to external advisers can be an appropriate strategy to reduce the compliance cost burden especially of small businesses. This result can be interpreted as a hint for the usage of cost-inefficient compliance strategies.

We identify no similar cost-reducing effect for capital-intensive compliance strategies (for example the application of tax administration software), an electronic data interchange with the tax and social insurance authorities or a simplified cash accounting method for tax purposes. The insignificance of e-filing could be caused by start-up costs counterbalancing potential cost reductions or by the lack of potential reliefs due to the choice of an electronic submission method. Also the insignificant effect of cash accounting may be interpreted in different ways. Nevertheless our findings give reason to concern about potential cost reductions by e-filing or simplified cash accounting.

An explanation for the cost-inefficient compliance behaviour especially of small businesses could be an overconfidence of private businessmen regarding their own tax administration capabilities. Taking into account empirical evidence for a deficit in the perception of tax compliance costs, there could also be a biased decision due to neglecting in-house compliance

activities. Further motivations for a cost-inefficient degree of outsourcing could be a mistrust to the tax adviser or the avoidance of a confidant for a partially non-compliant behaviour.

Our findings suggest that promoting paid preparation could be an appropriate strategy to reduce the tax compliance burden especially of small businesses. Therefore the costs of external tax advice should be tax deductible as well as other cost categories.¹⁹ In addition government authorities and business organisations could try to inform about potential cost-inefficiencies of in-house tax compliance in order to improve the cost-awareness of small businesses. Taking into account the findings of Erard and Ho (2003) about non-compliant taxpayer behaviour the growing importance of external tax advice could also have a share in reducing tax evasion.

¹⁹ A “classical” decision between labour and leisure implies a valuation of compliance work with an after-tax marginal income. From that perspective there exists an implicit deductibility of the taxpayers’ working effort (Blumenthal and Slemrod 1992).

6 Appendix

6.1 Outlier correction and missing values

We use a size-specific regression of the form $CCost = \alpha_0 + \alpha_1 \cdot Size + \alpha_2 \cdot Z + \varepsilon$ to exclude outliers from our original data set. Taking into account also the fixed costs of SC resulting from employment, we use the following parameters in our regression:

- TC and CC: *Size* measured as the natural logarithm of the turnover amplified by 1. No further independent variables are deployed. *Z* is defined as zero.
- SC: *Size* measured as the natural logarithm of the number of associates amplified by 1. The control variable *Z* is defined as a dummy variable for *Employment*.

In case of the TC and CC models we observe heteroscedasticity of the residuals in relation to business size. Therefore in these models we use an estimator weighted by the corresponding parameter for *Size* (natural logarithm of the turnover amplified by 1). We exclude all cases with the residuals exceeding the double average standard deviation (33 cases for CC, 39 cases for TC and 22 cases for SC).

Missing values are eliminated listwise to prevent potential problems of imputation methods. With a view to the validity of the results we accept the disadvantage of this approach due to fewer cases being available for analysis. The following tables present the descriptive statistics of the data set excluding outliers and missing values related to compliance costs or business size. Evidently the average values of compliance costs are lower than in the unadjusted data set. That holds especially for the bigger size classes.

Table A1 Compliance costs (outliers and missings excluded)

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
CC per business (€)	26,033	49,125	88,588	384,951
CC per associate (€)	3,730	1,657	786	305
CC per turnover (%)	3.68	1.76	0.77	0.21
Cases	252	152	209	46

The composition of CC is described in the tables A2 and A3. Except from the biggest size class the share of tax-related is lower than in the original sample. In case of the cost categories

we find no considerable derivations from the results of the overall data set (including outliers and missing values).

Table A2 SC and TC (outliers and missings excluded)

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
Share of TC (%)	49.25	40.07	37.37	37.12
Share of SC (%)	27.41	32.72	30.41	27.11
Total share (%)	76.66	72.79	67.78	64.23

Table A3 Cost categories (outliers and missings excluded)

Number of associates	1 to 19	20 to 49	50 to 499	500 and more
Share of PC (%)	51.41	53.98	54.32	49.57
Share of EC (%)	38.37	34.54	32.74	33.74
Share of MC (%)	10.22	11.48	12.94	16.69
Total (%)	100.00	100.00	100.00	100.00

6.2 Analysis of the residuals

According to the Gauß-Markov theorem an OLS regression requires a linear model, an expected value for the error term of zero, the absence of multi-collinearity as well as a homoscedastic distribution of the residuals. Our model fulfils the first three conditions,²⁰ but violates the assumption of homoscedasticity. Table A4 contains the results of a Breusch-Pagan test (Breusch and Pagan 1979) for a size-based OLS regression. We consider the same parameters as in Appendix 6.1.

Table A4 Breusch-Pagan results

Model	CC (turnover)	CC (associates)	TC (turnover)	TC (associates)	SC (turnover)	SC (associates)
R ² (corrected)	0.038	0.028	0.041	0.031	0.016	0.012
F values	26.887	20.081	27.319	20.595	11.476	9.052
t values	5.185	4.481	5.227	4.538	3.388	3.009

²⁰ The fulfilment of the first and the second condition results from the linear model considering a constant factor. The existence of multi-collinearity can be investigated by variance inflation factors (VIF). Appendix 6.3 presents the variance inflation factors for the extended models. We find no empirical support for the thesis that multi-collinearity is a serious problem.

We find evidence for a significant (99% level) and positive correlation of business size and the estimated residuals. Besides the F and t-values are considerably higher for the models based on turnover. For that reason we use a WLS model based on the natural logarithm of the turnover amplified by 1 for our econometric analysis.

For our regressions we apply the t-test to control for the significance of the regression coefficients. The test requires normality of the regression residuals. The following table shows the Kolmogorov-Smirnov results - KS-Z value and significance in parentheses - of normality for the residuals. The hypothesis of normality cannot be refused.

Table A5 Kolmogorov-Smirnov results

Model	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Overall sample	1.100 (0.178)	1.148 (0.143)	1.168 (0.130)	0.764 (0.603)	1.172 (0.128)	1.203 (0.111)
Small businesses	1.127 (0.158)	0.743 (0.639)	1.196 (0.114)	0.955 (0.322)	1.127 (0.158)	0.743 (0.639)
Medium and big businesses	0.789 (0.562)	0.493 (0.968)	0.809 (0.529)	0.476 (0.977)	0.636 (0.814)	0.733 (0.656)
Average personnel costs	0.890 (0.407)	0.680 (0.745)	0.777 (0.582)	0.723 (0.673)	1.005 (0.265)	0.847 (0.470)
Average labour costs (2003)	0.915 (0.373)	0.804 (0.537)	0.847 (0.470)	0.862 (0.447)	0.917 (0.370)	0.969 (0.305)

6.3 Complete results of the extended regression models

Within our paper we use the vector X to implement further control variables. The variables covered by X are described in the following list:

- Age* Age of the businesses raised by 1: the variable accounts for possible start-up costs of young businesses which are documented by Hansford et al. (2003).
- Sector* Dummy variables for the sector including *traders*, *manufacturing businesses*, *building businesses*, *business service enterprises*, *other service enterprises*. An explicit variable for *building businesses* is neglected to prevent multi-collinearity. Besides we consider dummies for *handicrafts*, and *liberal professions*.
- Legal form* Dummy variables for legal form including *individual enterprises*, *partnerships*, *incorporated companies* and the combination of a limited partnership and a limited liability company (*GmbH & Co. KG*). An explicit variable for *companies* is neglected to prevent multi-collinearity. Because the legal form of a business has no considerable effect on the payroll obligations of the employees we neglected these variables in the models for social insurance-related compliance costs.

State Dummy variables for the Federal State of the business headquarter location including *Baden-Württemberg, Bayern, Berlin, Brandenburg, Hamburg, Hessen, Mecklenburg-Vorpommern, Niedersachsen, Nordrhein-Westfalen, Rheinland-Pfalz, Sachsen, Sachsen-Anhalt, Schleswig-Holstein* and *Thüringen*. Bremen and Saarland are ignored due to limited data. An explicit variable for *Bayern* is neglected to prevent multi-collinearity.

Furthermore, the data set contains variables regarding the employment type as well as the fluctuation. These variables are recognised within the models for CC and SC but neglected in the models for TC. The employment-related compliance costs should mainly incorporated within social insurance-related compliance costs.²¹ Due to missing data we have only a lower number of cases containing tax-related costs. Hence we decided to exclude the employment-related variables in the TC models. Control regressions including these variables did not result in different outcomes (see Eichfelder and Schorn 2009).

<i>Part time</i>	Natural logarithm of the fraction of part-time employees to all associates amplified by 1%
<i>Casuals</i>	Natural logarithm of the fraction of casual employees to all associates amplified by 1%
<i>Apprentices</i>	Natural logarithm of the fraction of apprentices to all associates amplified by 1%
<i>Disabled</i>	Natural logarithm of the fraction of disabled employees to all associates amplified by 1%
<i>Fluctuation</i>	Dummy variable accounting for the fluctuation in the employee number: it takes a value of 1 if the number of employees has grown or decreased in the last three years.
<i>Foreigners</i>	Dummy variable for businesses “feeling” burdened by the employment of foreigners: it is expected that a felt burden results from specific obligations of wage and payroll taxes of foreigners.

The following table A6 describes the overall results for the extended regression models including the standard errors (in parentheses). Because of the fact that the risk of multi-collinearity rises with the number of considered variables it contains additionally the variance

²¹ Taking into account the apparently high values of social insurance-related compliance costs, general expenses and overheads of the wage taxation system on average should have been allocated to the variable SC. Hence the variable TC substantially contains the costs of taxes on profits, value added tax and further business taxes.

inflation factor [in parentheses]. We find no empirical support for the thesis that multicollinearity is a serious problem.

Table A6 Complete regression results for overall data set

Target variable	CC	TC	SC
Size	0.360*** (0.033) [2.176]	0.333*** (0.029) [1.921]	0.349*** (0.046) [1.889]
Employment	0.149 (0.382) [1.554]	-0.370 (0.335) [1.292]	5.892*** (0.585) [1.136]
Outsourcing	-0.283*** (0.056) [1.069]	-0.233*** (0.058) [1.043]	-0.428*** (0.069) [1.076]
Capitalintensive	-0.050 (0.056) [1.149]	-0.083 (0.058) [1.114]	0.027 (0.070) [1.100]
EDIF	0.114 (0.131) [1.808]	-0.024 (0.109) [1.263]	-
EDIFP	-0.049 (0.283) [1.798]	0.175 (0.212) [1.287]	-
EDIS	-0.089 (0.116) [1.918]	-	-0.014 (0.121) [1.310]
EDISP	0.015 (0.207) [1.773]	-	-0.134 (0.207) [1.237]
Cashaccounting	-0.321 (0.349) [1.645]	-0.292 (0.310) [1.559]	-
Age	0.135*** (0.052) [1.717]	0.043 (0.046) [1.599]	0.161*** (0.062) [1.547]
Trader	0.128 (0.152) [1.930]	0.146 (0.145) [1.720]	0.238 (0.189) [1.864]
Manufacturing business	0.153 (0.131) [1.622]	0.150 (0.135) [1.533]	0.114 (0.162) [1.758]
Business services	0.342** (0.152) [1.789]	0.354** (0.150) [1.746]	0.313 (0.195) [1.758]
Other services	0.404*** (0.145) [2.183]	0.153 (0.143) [2.062]	0.440** (0.184) [2.176]
Handicraft	0.074 (0.114) [1.912]	0.092 (0.115) [1.858]	-0.018 (0.142) [1.858]
Liberal profession	-0.097 (0.120) [1.456]	-0.023 (0.120) [1.517]	-0.184 (0.152) [1.489]
Individual enterprise	-0.012 (0.159) [1.384]	0.037 (0.162) [1.414]	-
Partnership	0.117 (0.188) [1.123]	0.075 (0.186) [1.098]	-
GmbH & Co. KG	-0.066 (0.133) [1.228]	0.021 (0.141) [1.193]	-
Baden-Württemberg	-0.022 (0.150) [1.452]	-0.062 (0.154) [1.424]	-0.027 (0.186) [1.427]
Berlin	0.158 (0.219) [1.212]	0.073 (0.221) [1.204]	0.148 (0.278) [1.188]
Brandenburg	-0.075 (0.251) [1.189]	-0.199 (0.245) [1.166]	0.040 (0.335) [1.163]
Hamburg	0.009 (0.265) [1.171]	-0.075 (0.233) [1.899]	0.292 (0.340) [1.155]
Hessen	-0.152 (0.228) [1.182]	-0.490** (0.226) [1.169]	-0.056 (0.269) [1.198]
Mecklenburg-Vorpommern	0.335 (0.240) [1.212]	0.108 (0.253) [1.172]	0.252 (0.310) [1.197]
Niedersachsen	0.024 (0.165) [1.348]	-0.314* (0.169) [1.342]	0.066 (0.207) [1.331]
Nordrhein-Westfalen	0.177 (0.128) [1.604]	0.007 (0.130) [1.582]	0.271* (0.160) [1.584]
Rheinland-Pfalz	0.452 (0.277) [1.136]	0.203 (0.295) [1.105]	0.418 (0.344) [1.103]
Sachsen	-0.191 (0.196) [1.257]	-0.381** (0.193) [1.267]	-0.351 (0.248) [1.234]
Sachsen-Anhalt	0.214 (0.237) [1.189]	-0.346 (0.246) [1.165]	0.251 (0.292) [1.188]
Schleswig-Holstein	0.056 (0.239) [1.177]	-0.201 (0.259) [1.132]	0.249 (0.322) [1.141]
Thüringen	0.268 (0.264) [1.168]	-0.267 (0.246) [1.196]	-0.021 (0.349) [1.136]
Casuals	-0.044 (0.034) [1.236]	-	-0.060 (0.041) [1.134]
Disabled	-0.082 (0.059) [1.236]	-	-0.092 (0.074) [1.244]

Part time	-0.021	(0.036) [1.333]	-	-0.041	(0.044) [1.297]
Apprentices	-0.029	(0.040) [1.292]	-	0.033	(0.050) [1.256]
Foreigners	0.080	(0.093) [1.233]	-	0.144	(0.118) [1.218]
Fluctuation	0.094	(0.093) [1.114]	-	0.340***	(0.119) [1.086]
Constant	2.937***	(0.731)	4.080***	(0.552)	0.124 (0.843)
R ² (corrected)	0.410		0.347		0.455
Cases	511		571		505

Table A7 describes the complete regression results for small businesses including standard deviations (in parentheses) and variance inflation factors [in parentheses].

Table A7 Complete regression results for small businesses

Target variable	CC		TC		SC	
Size	0.302***	(0.052) [1.905]	0.286***	(0.050) [1.785]	0.422***	(0.104) [1.598]
Employment	0.202	(0.347) [1.765]	-0.228	(0.304) [1.379]	5.986***	(0.558) [1.320]
Outsourcing	-0.367***	(0.066) [1.176]	-0.288***	(0.067) [1.069]	-0.404***	(0.085) [1.196]
Capitalintensive	-0.033	(0.067) [1.246]	-0.074	(0.068) [1.123]	-0.034	(0.085) [1.131]
EDIF	0.140	(0.162) [2.050]	-0.111	(0.128) [1.252]	-	
EDIFP	-0.032	(0.376) [1.726]	0.367	(0.284) [1.283]	-	
EDIS	-0.320**	(0.159) [2.432]	-		-0.233	(0.160) [1.405]
EDISP	-0.205	(0.283) [1.759]	-		-0.493	(0.306) [1.278]
Cashaccounting	-0.275	(0.312) [1.809]	-0.204	(0.284) [1.690]	-	
Age	0.132**	(0.058) [1.362]	0.036	(0.051) [1.280]	0.105	(0.074) [1.258]
Trader	0.081	(0.168) [1.934]	0.170	(0.167) [1.773]	0.118	(0.222) [1.958]
Manufacturing business	0.076	(0.158) [1.631]	0.061	(0.162) [1.467]	-0.103	(0.206) [1.599]
Business services	0.322*	(0.175) [2.082]	0.394**	(0.174) [2.037]	0.254	(0.232) [2.049]
Other services	0.253	(0.171) [2.430]	0.083	(0.168) [2.272]	0.274	(0.226) [2.311]
Handicraft	0.004	(0.144) [2.334]	0.010	(0.143) [2.226]	-0.112	(0.187) [2.218]
Liberal profession	-0.144	(0.128) [1.505]	-0.178	(0.133) [1.655]	-0.243	(0.169) [1.525]
Individual enterprise	-0.207	(0.157) [1.512]	-0.165	(0.160) [1.515]	-	
Partnership	-0.150	(0.217) [1.196]	-0.054	(0.229) [1.136]	-	
GmbH & Co. KG	-0.134	(0.203) [1.229]	-0.021	(0.213) [1.175]	-	
Baden-Württemberg	-0.022	(0.150) [1.452]	0.047	(0.185) [1.445]	0.273	(0.237) [1.388]
Berlin	0.074	(0.229) [1.282]	0.024	(0.230) [1.258]	-0.032	(0.303) [1.250]
Brandenburg	-0.209	(0.307) [1.244]	-0.272	(0.259) [1.177]	-0.269	(0.400) [1.222]
Hamburg	-0.331	(0.335) [1.178]	-0.073	(0.294) [1.236]	0.038	(0.458) [1.136]
Hessen	-0.174	(0.261) [1.213]	-0.507*	(0.262) [1.176]	-0.121	(0.320) [1.225]

Mecklenburg-Vorpommern	0.054	(0.256) [1.263]	-0.005	(0.264) [1.201]	-0.135	(0.337) [1.270]
Niedersachsen	-0.136	(0.215) [1.322]	-0.434**	(0.218) [1.296]	-0.054	(0.284) [1.279]
Nordrhein-Westfalen	0.067	(0.150) [1.601]	-0.070	(0.154) [1.548]	0.072	(0.198) [1.571]
Rheinland-Pfalz	0.327	(0.281) [1.193]	0.089	(0.304) [1.136]	0.453	(0.382) [1.150]
Sachsen	-0.340	(0.210) [1.346]	-0.386*	0.210 [1.306]	-0.454*	(0.275) [1.290]
Sachsen-Anhalt	0.483*	(0.255) [1.232]	-0.155	(0.266) [1.176]	0.581*	(0.321) [1.212]
Schleswig-Holstein	0.098	(0.271) [1.219]	0.097	(0.292) [1.164]	0.156	(0.380) [1.176]
Thüringen	0.184	(0.278) [1.277]	-0.295	(0.256) [1.248]	-0.122	(0.369) [1.222]
Casuals	0.014	(0.037) [1.289]	-		-0.009	(0.047) [1.219]
Disabled	-0.098	(0.073) [1.227]	-		-0.016	(0.093) [1.249]
Part time	-0.010	(0.040) [1.489]	-		-0.040	(0.052) [1.442]
Apprentices	-0.015	(0.041) [1.391]	-		0.017	(0.054) [1.353]
Foreigners	0.139	(0.103) [1.232]	-		0.163	(0.136) [1.214]
Fluctuation	-0.021	(0.105) [1.171]	-		0.078	(0.143) [1.161]
Constant	4.191***	(0.967)	4.779***	(0.778)	0.567	(0.916)
R ² (corrected)	0.296		0.208		0.488	
Cases	301		355		292	

Table A8 describes the complete regression results for medium and big businesses including standard deviations (in parentheses) and variance inflation factors [in parentheses].

Table A8 Complete regression results for medium and big businesses

Target variable	CC	TC	SC
Size	0.388*** (0.071) [2.084]	0.415*** (0.060) [1.584]	0.361*** (0.097) [1.589]
Outsourcing	-0.230** (0.106) [1.108]	-0.167 (0.110) [1.080]	-0.480*** (0.121) [1.100]
Capitalintensive	-0.022 (0.107) [1.237]	-0.080 (0.108) [1.109]	0.148 (0.127) [1.189]
EDIF	0.062 (0.232) [1.863]	0.113 (0.208) [1.417]	-
EDIFP	-0.005 (0.486) [2.236]	-0.101 (0.363) [1.496]	-
EDIS	0.259** (0.201) [1.910]	-	0.302 (0.205) [1.395]
EDISP	0.000 (0.337) [2.001]	-	-0.059 (0.309) [1.301]
Age	0.092 (0.105) [2.035]	0.096 (0.095) [1.605]	0.210* (0.117) [1.740]
Trader	0.360 (0.326) [2.527]	0.084 (0.288) [1.907]	0.640* (0.355) [2.054]
Manufacturing business	0.156 (0.239) [1.892]	0.092 (0.246) [1.733]	0.295 (0.277) [1.757]
Business services	0.378 (0.291) [1.709]	0.134 (0.291) [1.529]	0.387 (0.371) [1.672]
Other services	0.753*** (0.280) [2.403]	0.302 (0.273) [2.087]	0.793** (0.338) [2.510]
Handicraft	0.249 (0.206) [1.962]	0.238 (0.208) [1.742]	0.273 (0.243) [1.914]
Liberal profession	-0.061 (0.270) [1.589]	0.152 (0.253) [1.430]	-0.018 (0.319) [1.575]

Individual enterprise	0.818*	(0.457) [1.255]	0.846	(0.521) [1.212]	-	
Partnership	0.275	(0.356) [1.209]	0.088	(0.335) [1.172]	-	
GmbH & Co. KG	0.053	(0.206) [1.316]	0.036	(0.218) [1.253]	-	
Baden-Württemberg	-0.158	(0.261) [1.563]	-0.300	(0.279) [1.513]	-0.308	(0.302) [1.529]
Berlin	-0.255	(0.500) [1.317]	0.098	(0.512) [1.195]	-0.005	(0.587) [1.248]
Brandenburg	-0.061	(0.465) [1.417]	0.022	(0.544) [1.252]	0.292	(0.617) [1.282]
Hamburg	0.509	(0.462) [1.355]	-0.142	(0.404) [1.234]	0.501	(0.550) [1.320]
Hessen	-0.091	(0.426) [1.261]	-0.505	(0.417) [1.188]	-0.043	(0.474) [1.232]
Mecklenburg-Vorpommern	0.781	(0.507) [1.280]	0.547	(0.573) [1.181]	0.878	(0.659) [1.241]
Niedersachsen	0.182	(0.279) [1.541]	-0.273	(0.282) [1.428]	0.171	(0.328) [1.515]
Nordrhein-Westfalen	0.302	(0.234) [1.178]	0.093	(0.241) [1.751]	0.384	(0.273) [1.724]
Rheinland-Pfalz	0.592	(0.664) [1.197]	0.064	(0.713) [1.191]	0.577	(0.673) [1.093]
Sachsen	0.255	(0.437) [1.436]	-0.221	(0.412) [1.322]	0.023	(0.510) [1.343]
Sachsen-Anhalt	-0.319	(0.498) [1.295]	-0.698	(0.526) [1.248]	-0.382	(0.594) [1.266]
Schleswig-Holstein	0.138	(0.455) [1.243]	-0.582	(0.509) [1.156]	0.437	(0.572) [1.161]
Thüringen	0.572	(0.589) [1.170]	-0.066	(0.566) [1.172]	0.373	(0.808) [1.148]
Casuals	-0.145*	(0.075) [1.647]	-		-0.170*	(0.088) [1.439]
Disabled	-0.076	(0.115) [1.220]	-		-0.143	(0.140) [1.274]
Part time	-0.049	(0.074) [1.520]	-		-0.027	(0.088) [1.497]
Apprentices	-0.035	(0.105) [1.610]	-		0.066	(0.126) [1.565]
Foreigners	0.142	(0.213) [1.475]	-		0.294	(0.251) [1.415]
Fluctuation	0.138	(0.185) [1.210]	-		0.575***	(0.215) [1.148]
Constant	1.937	(1.279)	1.985*	(1.074)	4.434***	(1.098)
R ² (corrected)	0.270		0.237		0.250	
Cases	209		215		212	

6.4 Regressions for recalculated costs

In addition to personnel costs, external costs and other monetary costs the data set contains also information about the working effort of entrepreneurs and employees for tax compliance. This data can be deployed to control our regression results by an alternative estimation of overall compliance costs CC, tax-related costs TC and social insurance-related costs SC. Firstly we identify the average labour cost per hour within the data set. We obtain an average labour cost of 48.76 €²² The average personnel cost per hour is considerably higher than the German average labour costs in 2003. This is not unexpected due to the fact that tax and social insurance-related compliance work is executed regularly by entrepreneurs, management

²² We also considered cases that have been considered as outliers in our original models. Ignoring these cases would result in a value of 48.55 €. Hence, the average value of labour costs is robust.

personnel or professionals. Table A9 contains the regression coefficients (standard errors) for the target values CC, TC and SC being calculated by average personnel costs in the data set. The results support the findings of our original regression models.

Table A9 Regression results for average personnel costs

Target variable	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Size	0.296*** (0.025)	0.324*** (0.040)	0.261*** (0.027)	0.261*** (0.034)	0.315*** (0.038)	0.312*** (0.053)
Employment	0.423 (1.088)	0.257 (1.184)	-0.261 (1.158)	-0.331 (1.223)	12.956*** (0.546)	12.390*** (0.692)
Outsourcing	-0.252*** (0.060)	-0.239*** (0.069)	-0.230*** (0.065)	-0.191*** (0.069)	-0.421*** (0.070)	-0.397*** (0.078)
Capitalintensive	-0.007 (0.058)	0.007 (0.067)	-0.060 (0.065)	-0.046 (0.069)	0.052 (0.071)	0.090 (0.079)
EDIF	0.121 (0.139)	0.054 (0.161)	-0.083 (0.122)	-0.077 (0.129)	-	-
EDIFP	-0.224 (0.262)	-0.129 (0.312)	-0.033 (0.222)	-0.013 (0.235)	-	-
EDIS	-0.041 (0.122)	0.047 (0.142)	-	-	0.205 (0.124)	0.134 (0.141)
EDISP	0.141 (0.213)	0.008 (0.237)	-	-	-0.150 (0.204)	-0.300 (0.229)
Cashaccounting	-0.361 (0.373)	-0.869 (0.639)	-0.152 (0.424)	0.005 (0.499)	-	-
Constant	5.369*** (1.141)	3.956*** (1.394)	10.132*** (1.220)	10.130*** (1.332)	-0.585 (0.590)	-1.402 (0.950)
R ² (corrected)	0.307	0.284	0.213	0.195	0.648	0.615
Cases	460	369	422	401	458	372

Secondly to control for a potential overestimation of labour costs per hour we also calculated alternative values for personnel costs by the average German labour cost of 27.89 € in 2003.²³ Due to the fact that tax work is regularly executed by entrepreneurs, management personnel or professionals, a considerable underestimation of the true labour cost per hour is expected. Even under these assumptions we find significant and negative effects for outsourcing tax and social insurance obligations. The result holds especially for the social insurance-related costs SC.

²³ We deploy the average value from Statistisches Bundesamt (2007) for 2004 indexed to 2003 (see <http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Statistiken/VerdiensteArbeitskosten/Arbeitskosten/Tabellen/Content50/IndexJaehrlich,templateId=renderPrint.psm>).

Table A10 Regression results for average labour costs in 2003

Target variable	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Size	0.312*** (0.024)	0.326*** (0.040)	0.277*** (0.027)	0.269*** (0.034)	0.330*** (0.037)	0.316*** (0.053)
Employment	0.384 (1.078)	0.223 (1.174)	-0.291 (1.153)	-0.393 (1.218)	12.578*** (0.545)	12.039*** (0.687)
Outsourcing	-0.132** (0.059)	-0.125* (0.068)	-0.110* (0.065)	-0.075 (0.068)	-0.308*** (0.070)	-0.289*** (0.078)
Capitalintensive	0.036 (0.057)	0.057 (0.066)	-0.020 (0.064)	0.000 (0.068)	0.094 (0.071)	0.135* (0.079)
EDIF	0.102 (0.138)	0.023 (0.160)	0.065 (0.122)	0.057 (0.128)	-	-
EDIFP	-0.191 (0.259)	-0.056 (0.309)	-0.017 (0.221)	0.019 (0.234)	-	-
EDIS	0.049 (0.121)	0.056 (0.141)	-	-	0.197 (0.124)	0.122 (0.140)
EDISP	0.116 (0.211)	-0.016 (0.235)	-	-	-0.157 (0.203)	-0.295 (0.227)
Cashaccounting	-0.321 (0.370)	-0.801 (0.634)	-0.110 (0.422)	0.060 (0.497)	-	-
Constant	5.116*** (1.131)	3.849*** (1.383)	9.871*** (1.215)	10.015*** (1.326)	-0.311 (0.588)	-1.202 (0.943)
R ² (corrected)	0.318	0.290	0.220	0.208	0.639	0.608
Cases	460	369	422	401	458	372

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