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**Tax compliance costs: A business administration
perspective**

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Tax compliance costs: A business administration perspective

Sebastian Eichfelder^{*} and Michael Schorn[†]

Abstract^{*}

The 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 should choose a cost-optimal administration strategy. In spite of that 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 could reduce their compliance cost burden by a higher degree of outsourcing tax processes. In 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.

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 has been a widely discussed subject in the public finance literature (*inter alia* 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 insurance debts to the authorities.¹ This economic burden can be denominated as the

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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 (*inter alia* Hudson and Godwin 2000).

compliance costs of the taxation system. There are at least three reasons why this specific form of transaction costs can be regarded 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 regarded as a waste of economic resources.
- Empirical evidence suggests that the economic burden of tax compliance decreases in business size (OECD 2001) and rises in the international orientation of businesses (Blumenthal and Slemrod 1995). These effects could have a negative impact on the competitiveness of small and medium-sized businesses and reduce their access to international markets.
- Tax compliance costs seem to be connected 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 can be demonstrated by the implementation of the standard cost model in European countries (Nijssen and Vellinga 2002) or of 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. Like has been stated in the literature, the way taxpayers prepare and submit their tax returns 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 reported by McKinstry and Baldry (1997) for 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 administrative cost burdens of private taxpayers and the economy as a whole.

According to the descriptive studies of Sandford and Hasseldine (1992) and Collard and Godwin (1999) the cost efficient tax compliance strategy (for example outsourcing to an external adviser) depends on business size, with taxpayers on average choosing a cost-optimal compliance strategy. Contrasting these contributions Hansford et al. (2003) as well as DeLuca et al. (2005) find higher compliance costs for taxpayers relying on the help of tax advisers. Guyton et al. (2005) determine higher average compliance costs of paid preparers and software preparers. But controlling for alternative influence factors and selection bias, they find taxpayers regularly choosing a cost-efficient compliance strategy. Hudson and Godwin (2000) affirm this result for most strategies but find also evidence for a cost-inefficient use of a specialist tax bureau. A deficiency of all these contributions lies in the fact that the compliance strategy is measured exclusively by dummy variables. Hence, the degree of outsourcing or of the software application 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) find higher compliance costs for businesses using a computer system for tax administration. In contrast, Verwaal (2000) substantiates a significant reduction of compliance costs of international transactions by the usage of information systems or an electronic data interchange with the authorities. He reports 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 possible compliance cost reductions due to 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) and Pitt and Slemrod (1989) find significant evidence for a considerable cost increase by itemizing 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 is no empirical evidence on the effect of cash accounting on the compliance cost burden.

In our contribution 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, of an electronic data interchange with the tax and social insurance authorities (e-filing), of applying a simplified cash accounting method for tax

purposes and of substituting internal personnel resources by capital (for example tax administration software). Methodologically we enhance the measurement of compliance strategies by not only considering a dummy variable for outsourcing and capital-intensive strategies but also by taking into account the share of the accordant costs. Furthermore, we are 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, estimation strategy and the regression results. The findings of our empirical analysis are interpreted in section 4. The paper is concluded by section 5.

2 Tax compliance costs and administration strategy

For first we analyse the relationship between tax compliance costs and business 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 its 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 . 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 connected with a lower tax payment but also with higher tax-related planning costs. In 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 unspecified tax option O_k on the tax burden can be negative but also positive. The net income can be written as

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

In the model we consider three different types of tax compliance costs. Personnel costs C_p result from personnel resources including the working effort of the entrepreneur R_p deployed

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

for bookkeeping, tax-filing, tax planning or other tax-related activities. Alternatively a business may substitute personnel resources by capital R_c for tax administration hardware or software, with the costs $C_c(R_c)$. Furthermore, the taxpayer could also engage an external adviser to execute its tax administration obligations. The usage of external resources R_e may be characterized as an outsourcing of tax administration and tax planning activities with the costs $C_e(R_e)$. For simplicity reasons we assume 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 adviser. Hence, we assume the costs of in-house tax compliance rising in the level 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 (*inter alia* OECD 2001, Kegels 2008). The total compliance burden C is defined as

$$C = C_p + C_c + C_e. \quad (3)$$

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

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

In accordance to the empirical literature (*inter alia* Tran-Nam et al. 2000) the total compliance burden $A(E, O_k)$ is positively correlated with business size implying also a positive relationship with the pre-tax earnings ($\partial A / \partial E > 0$). Due to economies of scale the relative compliance cost burden decreases in pre-tax earnings ($\partial^2 A / \partial^2 E < 0$). The amount of compliance activities $A(E, O_k)$ may be further affected by specific tax options O_k . The sign of the derivative $\partial A / \partial O_k$ can be positive or negative. In case of a tax simplification option (for example e-filing, simplified cash accounting) we assume a negative derivative $\partial A / \partial O_k < 0$. In

contrast, a planning option (for example income shifting from) requires planning costs and therefore implies a positive derivative $\frac{\partial A}{\partial O_k} > 0$. The target function (1) and the tax administration constraint (3) can be integrated into the following lagrange 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 earnings E , the usage of specific tax options O_k and the different resources R_p , R_c and R_e we obtain as first order conditions

$$\frac{\partial L}{\partial E} = 1 - \frac{\partial T}{\partial E} - \lambda \cdot \frac{\partial A}{\partial E} = 0, \quad (5)$$

$$\frac{\partial L}{\partial R_p} = -C'_p \cdot \left(1 - \frac{\partial T}{\partial C}\right) + \lambda \cdot \theta = 0, \quad (6)$$

$$\frac{\partial L}{\partial R_c} = -C'_c \cdot \left(1 - \frac{\partial T}{\partial C}\right) + \lambda \cdot \varpi = 0, \quad (7)$$

$$\frac{\partial L}{\partial R_e} = -p_e \cdot \left(1 - \frac{\partial T}{\partial C}\right) + \lambda = 0, \quad (8)$$

$$\frac{\partial L}{\partial O_k} = -\frac{\partial T}{\partial O_k} - \lambda \cdot \frac{\partial A}{\partial O_k} \geq 0. \quad (9)$$

Based on these conditions we can draw the following conclusions:

1. Condition (5) implies that tax compliance costs may be interpreted as part of the effective tax burden reducing the taxpayers' ability to consume leisure or material goods. A rational decision maker considers tax compliance costs and c.p. tries to reduce its accordant burden.
2. 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 .³ Under the conditions of rational choice a taxpayer thus chooses the cost-optimal mix of administration strategies.

³ For simplicity we assume that personnel costs, monetary in-house costs and external adviser costs are deductible with the same tax rate. Differences in the tax treatment of costs categories (for example for the working effort of the entrepreneur) could result in a preferential treatment of specific administration strategies.

3. Using (8) condition (9) can be converted to $p_e \cdot \left(1 - \frac{\partial T}{\partial C}\right) \cdot \frac{\partial A}{\partial O_k} + \frac{\partial T}{\partial O_k} \leq 0$.

Hence, we can identify two different reasons for a rational taxpayer to choose 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 contradicting higher tax payment T or by a higher compliance burden vice versa, a rational taxpayer selects the accordant option.

3 Empirical analysis

3.1 Data base

We use German survey data relating the compliance costs of small and medium-sized enterprises to investigate the relationship of compliance costs and administration strategy. The data base has been raised in the year of 2003 by order 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 727 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 the 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 may analyse the relationship between the cost structure and the cost burden. Also the time burden of the entrepreneur and 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 (state), legal form, age and industry,
- data on specific forms of employment (trainees, part-time employees, casualties, handicapped employees) and the fluctuation of employees,
- the accounting method that has been used for tax purposes,
- information on the usage and the accordant 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. In contrast, only small businesses and independent professions (lawyers, engineers, etc.) except from corporations could choose a simplified cash accounting method.

To our assessment the record is the best data source available relating the compliance costs of small and medium-sized businesses in Germany. In spite of that there are some measurement issues that have to be taken into account.

A basic problem of measuring compliance costs lies in 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. On the other hand Klein-Blenkers (1980) and other authors find evidence for a cost perception deficit of taxpayers. According to that literature the respondents may underestimate their compliance costs because of disremembering parts of their cost burden.⁴ In the survey data businesses had to declare the overall personnel costs, adviser costs and monetary costs without allocating them to specific activities. We may therefore assume that an overestimation due to political reasons should in part be counterbalanced by an underestimation due to a recall bias.

Because of a low response rate of 7.7 % 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 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 (OECD 2001) a major distortion of the regression results by a selection bias seems unlikely. Nevertheless we made regressions for a number of target values to overcome the risk of possible measurement errors or a recall bias.

⁴ Klein-Blenkers (1980, p. 140) asked German enterprises for the sum of the overall compliance costs as well as for the sum of itemized cost elements. According to his findings the sum of overall compliance costs was considerably lower than the sum of itemized compliance costs. This can be taken as evidence for an underestimation of the sum of overall compliance costs. 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 itemized cost elements. Contrasting Delgado et al. 2001 and other authors they find this difference in general to be negative.

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 find evidence for both arguments (Wicks 1965; Allers 1994 and Tran-Nam and Glover 2002).

Table 1 contains the average values about 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 has been 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 documents the share of compliance costs being 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 (*inter alia* 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 are composed by fractions 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 heavily on external support than medium-sized businesses, while their share in other monetary expenses is lower. This finding can be explained by economies of scale favoring a capital-intensive business strategy for bigger businesses. The share of personnel costs is rather constant but consists in the smallest size classes mainly of the labour costs of the entrepreneur.

3.2 Hypotheses and estimation strategy

As has been 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 as long as the equation controls for the cost-relevant characteristics of the firm (see also Hudson and Godwin 2000).

In contrast, the analytical model suggests a rational decision maker to select a tax simplification option if a reduction of compliance costs is not counterbalanced by a higher tax payment. Hence, we expect the compliance costs of private businesses choosing a simplification option like cash accounting to be significantly lower.

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 (*inter alia* 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 preparers) but more precisely by the share of external costs and internal monetary costs at the overall compliance cost burden CC.
- As has been 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
- There may be measurement errors related to overall compliance costs as well as to the share of tax-related and social insurance-related costs. Therefore, we estimate 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 as well as the average German labour costs in 2003.⁷

The logarithmic GLS model can be written as:

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

The 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 previous studies documented 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 the 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 | Interference factor |

Similar to Hudson and Godwin (2000) we observe heteroscedasticity being related 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

⁸ To consider cases without costs of social insurance and wage taxation (*Employment* variable) SC is amplified by 1 before the application of the natural logarithm. In contrast, zero values for CC and TC are neglected.

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 these variables.

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

values from the analysis to prevent imputation problems. Therefore, 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 document the remarkable impact of business size on absolute compliance costs as well as on relative compliance costs (per associate or per turnover). Therefore, 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 estimate 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 documents the coefficients and standard deviations (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 neglected 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 |

Corresponding to previous studies (*inter alia* Slemrod and Venkatesh 2002) we find business size to be the most important influence factor for the compliance costs of taxes and social

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

insurance payments. A growth in business size by 1% leads to a growth of compliance costs between 0.344% to 0.419%. The correlation 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 this 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 correlation 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 accordant compliance cost burden by 14.4% to 24.9%. The effect is stronger for the social insurance-related compliance costs and remains robust for 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 find 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 correlation coefficient for *Cashaccounting* we can also not approve businesses using this simplified accounting method to bear a significantly lower cost burden. These results are robust for all applied models. 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 this fact we made separate regressions¹⁵ for small businesses with less than 50 associates (including the entrepreneur) and medium and big businesses.¹⁶ Table 5 documents the regression results for small businesses supporting our 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.

¹⁴ A possible explanation for this result 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 results.

¹⁵ An alternative approach would be to include combination terms of the independent variables and business size. We abstained from that approach because of multicollinearity 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 make a separate regression for this group.

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 all these businesses have 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 can remark the cost-reducing effect of outsourcing administration activities to arise 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 for businesses relying heavily on external support to have lower compliance costs due to taxes and social insurance contributions. 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 behaviour if they are able to control for the cost-efficient strategy. As the empirical literature substantiates (*inter alia* Klein-Blenkers 1980), there is evidence on 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 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 $\xi < 1$. The criterion of a perceived cost 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. If adviser costs are compared with the compliance performance of the entrepreneur, this could result in an overestimation of net tax adviser costs. *Inter alia* Boylan and Frischmann (2007) find empirical evidence for a misperception of marginal tax rates by taxpayers.

A rational choice argument for the insufficient use of external advice lies in the limited degree small businesses comply with the tax law (Rice 1992; Slemrod et al. 2001). According to Erard and Ho (2003) the non-compliance of businesses is negatively correlated with the existence of external confidants. From this perspective there is an incentive for a non-compliant taxpayer to administer its tax affairs without the support of an external adviser.

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.

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

Furthermore, the information asymmetry between taxpayer and tax adviser may be a reason to abdicate external advice. Due to mistrust in the tax adviser the taxpayer could try to keep at least some control over its tax affairs.

In case of capital-intensive compliance strategies we do not find evidence for cost-inefficiencies. Hence, 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 of an electronic data interchange with the authorities. In case of an electronic data interchange this result 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. In terms of simplified cash accounting we find constantly negative correlation coefficients but also high standard errors. A possible explanation could be that a significant part of the respondents had also to prepare commercial balance sheets for business law reasons. Hence, 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 a cash-based balance sheet for tax reasons. Besides, the cash accounting method could have been chosen for tax planning reasons in some cases. For that reasons 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 possible cost reductions due to e-filing and cash based accounting for the single taxpayer or 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 applied a German data set of 1,220 especially small and medium-sized 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 may be an appropriate strategy to reduce the compliance cost burden especially of small businesses. The result can be interpreted as a hint for the usage of cost-inefficient compliance strategies.

We find no similar cost-reducing effect for capital-intensive compliance strategies (for example the use 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 electronic submission methods may be caused by start-up costs counterbalancing potential cost reductions.

An explanation for the cost-inefficient compliance behaviour especially of small businesses could be an overconfidence of private businessmen relating their own tax administration capabilities. Taking into account empirical evidence on a deficit in the perception of tax compliance costs there could be also a biased decision due to neglecting in-house compliance activities. Further motivations for a cost-inefficient degree of outsourcing could be mistrust to the tax adviser or the avoidance of a confident for a partially noncompliant 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-deductable and government authorities should support the relationship between external tax advisers and private 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.

6 Appendix

6.1 Outlier correction and missing values

We use a size-specific regression of the form $CCost = \alpha_0 + \alpha_1 \cdot Size + \alpha_2 \cdot X + \varepsilon$ to exclude outliers from our original data set. Taking into account also the fixed costs of SC resulting from employment, we apply 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. *X* is defined as zero.
- SC: *Size* measured as the natural logarithm of the number of associates amplified by 1. A dummy variable for *Employment* is considered as vector *X*.

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 accordant 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 possible problems of imputation methods. A disadvantage of this approach lies in the fact that the size of the relevant data set is negatively correlated with the number of independent variables. The following tables document 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 by 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 a OLS regression requires a linear model, an expected value for the interference factor of zero, the absence of multicollinearity as well as a homoscedastic distribution of the residuals. Our model application satisfies the first three conditions,¹⁹ 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 |

¹⁹ The satisfaction of the first and the second condition results from the linear model considering a constant factor. The existence of multicollinearity can be investigated by variance inflation factors (VIF). Appendix 6.3 presents the VIF values for the extended models. We find no empirical support for the thesis that multicollinearity 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. Hence, we use a WLS model based on the natural logarithm of the turnover amplified by 1 for our further econometric analysis.

For our regressions we apply the t-test to control for the significance of the correlation coefficients. The test demands normality of the regression residuals. The following table reports the Kolmogorov-Smirnov results of normality for the residuals of the estimated models. 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 | 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 control for further control variables. The variables covered by X are described by the following list:

| | |
|-------------------|--|
| <i>Age</i> | Age of the businesses raised by 1: the variable accounts for possible start-up costs of young businesses that have been documented by Hansford et al. (2003). |
| <i>Industry</i> | Dummy variables for industry including <i>traders</i> , <i>manufacturing businesses</i> , <i>building businesses</i> , <i>business service enterprises</i> , <i>other service enterprises</i> . An explicit variable for <i>building businesses</i> is neglected to prevent multicollinearity. Besides we consider dummies for <i>handicrafts</i> , and <i>independent professions</i> . |
| <i>Legal form</i> | Dummy variables for legal form including <i>individual enterprises</i> , <i>partnerships</i> , <i>companies</i> and a specific combination of partnership and company (<i>GmbH & Co. KG</i>). An explicit variable for <i>companies</i> is neglected to prevent multicollinearity. 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 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 multicollinearity.

The variables beneath account for specific effects of the wage and payroll taxation. They are neglected in the models for tax-related compliance costs TC:

Part time Natural logarithm of the fraction of part-time employees to all associates amplified by 1%

Casuals Natural logarithm of the fraction of casual employees to all associates amplified by 1%

Trainees Natural logarithm of the fraction of trainees to all associates amplified by 1%

Disabled Natural logarithm of the fraction of disabled employees to all associates amplified by 1%

Fluctuation 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.

Foreigners 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 multicollinearity rises with the number of considered variables it further contains the variance 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] |
| Independent 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] |
| Trainees | -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] |
| Independent 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] |
| Trainees | -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] |
| Independent 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] |
| Trainees | -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 estimate of overall compliance costs CC, tax-related costs TC and social insurance-related costs SC. For first we identify the average labour cost per hour within the data set. We obtain an average labour cost of 48.76 €²⁰ The average personnel cost per hour is considerably higher than 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 personnel or professionals. Table A9 contains the correlation 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.

²⁰ 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.

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 |

To control for a possible overestimation of labour costs per hour we also calculated alternative values for personnel costs by the average German labour cost of about 27.89 € in 2003.²¹ 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 to be 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.

²¹ 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.psmI>).

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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