Tax Compliance Costs: A Business-Administration Perspective

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Using instruments like information technology and paid preparation of tax returns, private taxpayers have a set of strategies to optimize their compliance cost burden. Assuming rational behavior, private businesses can be expected to choose a cost-optimal administration strategy. Nevertheless, we find empirical evidence of small German businesses, in particular, using external support to an insufficient extent. According to our results, doubling the proportion of outsourced compliance activities results in cost reductions of 14.4% to 24.9%. By contrast, we do not find significant evidence for a cost reduction due to an electronic data interchange with the tax and social insurance authorities or the use of a simplified cash accounting method. Therefore, our results give reason for doubt regarding potential cost reductions that could be reached by e-filing or cash-based accounting.

Keywords: tax complexity, tax compliance costs, tax advice, outsourcing, e-filing, cash accounting

JEL classification: H 25, H 26, L 23, L 24

1. Introduction

The complexity of taxation is a widely discussed subject in the public-finance literature (e.g., Alm 1996, Kaplow 1996, Slemrod 1996, Tran-Nam et al. 2000, Rametse and Pope 2002, Guyton et al. 2003, Klun and Blažić 2005, Vaillancourt and Clemens 2008). From an economic perspective, tax complexity can be measured by the operating costs of a tax system, defined as the sum of the administrative costs of the tax authorities and the costs of private households and businesses in complying with the tax law. In our study we concentrate

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on tax compliance costs, which can be defined as the "[...] costs incurred by taxpayers, or third parties such as businesses, in meeting the requirements laid upon them in complying with a given structure and level of tax."[1]

There are at least three reasons why this specific form of transaction costs can be considered as a major economic problem: (1) Tax compliance costs reduce the resources of private businesses without raising the financial budget of the government. Thus, they are an economic waste. (2) Empirical evidence suggests that the economic burden of tax compliance decreases with growing business size (Sandford et al. 1989, Slemrod and Venkatesh 2002) and rises with the international orientation of businesses (Blumenthal and Slemrod 1995, European Communities 2004). These effects could reduce the competitiveness of small and medium-sized enterprises and reduce their access to international markets. (3) Tax compliance costs seem to be linked to the compliance level. Hence, they could lead to tax evasion (Hasseldine 2001, Erard and Ho 2003).

Since the ground-breaking surveys of Sandford in the U.K. (Sandford 1973, Sandford et al. 1989) and Slemrod in the U.S. (Slemrod and Sorum 1984, Blumenthal and Slemrod 1995), the measurement of tax compliance costs has progressed significantly (for a comprehensive review see Evans 2003, Vaillancourt and Clemens 2008, and Evans 2008). The necessity of measuring compliance cost burdens is widely accepted nowadays, as demonstrated by the implementation of the standard cost model (SCM) in European countries (Commission of the European Communities 2006) and the individual taxpayer burden model (ITBM) in the U.S. (Guyton et al. 2003).[2]

From a business administration perspective,[3] compliance costs are not only affected by the design and the implementation of a tax system, but also by the compliance strategy of the taxpayer. As already stated in the literature, the

1 Sandford et al. (1989), p. 10. In accordance with the OECD (2011), we view social-insurance contributions as taxes in a broader sense. This approach has also been adopted by the empirical literature dealing with the compliance costs of wage taxation (e.g., Hudson and Godwin 2000).

2 While ITBM estimates are based on comprehensive empirical surveys adjusted to the relevant year (Guyton et al. 2003), the standard cost model typically relies on small-scale research and simulated cost estimates (Commission of the European Communities 2006). In addition, the standard cost model is generally restricted to information requirements and therefore does not take account of tax planning costs. In contrast to the ITBM, the standard cost model is not restricted to taxation, but is applied to all main areas of regulation.

3 We define business administration as a process in organizing a business to accomplish clearly specified goals, including aspects like planning, coordination, and controlling as well as functions like marketing, human resources, and finance. Tax administration or tax management can be interpreted as an aspect of business administration including the compliance with tax regulations, tax planning strategies, and the consideration of tax risk. A more detailed description of these issues is given by Scholes et al. (2009).

way taxpayers prepare and submit their tax returns has changed dramatically in the last decades. There has been a considerable increase in the use of tax administration software and in outsourcing to external advisers.

According to Guyton et al. (2005) the proportion of self-prepared tax returns without software use in the U.S. dropped between 1993 and 2003 from about 41% to 13%, while the use of paid preparers rose from 51% to 62% during the same period. The number of electronic income declarations in Germany increased from 0.3 million in 2001 to 8.6 million in 2010, while the number of electronic VAT registrations rose from 3.1 million in 2002 to 39.3 million in 2010 (Bayerisches Landesamt für Steuern 2011). An increase in the outsourcing of tax administration processes has already been observed in the U.K. by Collard et al. (1998) and in Australia by McKinstry and Baldry (1997).[4] Therefore, it is an important research question how these different compliance strategies affect the cost burden of private taxpayers.

According to the descriptive studies of Sandford and Hasseldine (1992) and Collard and Godwin (1999), the cost-efficient tax compliance strategy (for example, paid preparation) depends on business size. Nevertheless, Hansford et al. (2003) and Blaufus et al. (2011) find evidence that taxpayers relying on the help of tax advisers face higher compliance costs. Both studies control for a number of exogenous factors (e.g., turnover or income), but only to a limited extent for tax complexity.

Similar to the descriptive result of Vaillancourt (2010), Guyton et al. (2005) observe higher compliance costs among taxpayers using software or paid preparation. However, they also point out that taxpayers choose a cost-efficient compliance strategy if alternative influence factors and selection bias are taken into account. Hudson and Godwin (2000) confirm this result for most strategies, but also find evidence for cost-inefficient use of specialist tax bureaus. A shortcoming of the existing literature lies in the fact that compliance strategies are typically measured by dummy variables. Therefore, the degree of software usage or outsourcing is not taken into account.

The relationship between compliance costs and tax software has already been analyzed by Vaillancourt (1989), who finds no significant evidence for a cost reduction by electronic administration tools. According to Hansford et al. (2003), businesses using a computer system for tax administration bear higher compliance costs. In contrast, Verwaal (2000) substantiates a significant reduction of the compliance costs of international transactions by the use of information systems or an electronic data interchange with the authorities, but observes no significant effect of an electronic data interchange with other businesses. Kopczuk and Pop-Eleches (2007) find evidence that

4 However, in recent times the proportion of Australian individuals utilizing tax agents declined again to a still comparatively high percentage of 71% (ATO 2011, p. 11).

participation in the Earned Income Tax Credit in the U.S. is positively correlated with e-filing. This can be interpreted as empirical support for potential cost reductions based on an electronic data interchange with the authorities.

In addition to outsourcing and e-filing, taxpayers may also apply options inherent in the tax law to simplify their tax return and reduce their cost level. Slemrod (1989) and Pitt and Slemrod (1989) determine that a considerable cost increase results from itemizing deductions. Correspondingly, Lerman and Lee (2004) report higher compliance costs for taxpayers subjected to an alternative minimum tax (AMT). Slemrod (1996) discusses a possible cost reduction by cash-based income taxation. However, there is no empirical evidence regarding the effect of cash accounting on the compliance cost burden.

In our paper we develop a simple model of cost-optimal tax administration to derive hypotheses for the empirical analysis regarding the relationship of compliance costs and administration strategy. Using a data set of 1,220 German companies and self-employed taxpayers, we investigate in detail the effects of outsourcing tax obligations to external advisers, using an electronic data interchange with the tax and social insurance authorities, applying a simplified cash accounting method for tax purposes, and replacing internal personnel resources with capital (for example, with tax administration software). Methodologically, we enhance the measurement of compliance strategies by considering the proportion of a specific cost category (for example, the proportion of external adviser costs) instead of a dummy variable (for example, paid preparation). To our knowledge, this is also the first study to empirically analyze the effect of cash accounting on the compliance costs of private businesses.

The paper is organized as follows. In section 2 we employ a simple rational approach of optimal tax administration to develop our hypotheses for further analysis. Section 3 presents the database, discusses the estimation strategy, and presents the regression results. Section 4 interprets the empirical findings and discusses their implications. The paper is concluded by section 5. The technical details of the empirical investigation are elucidated in the appendices (section 6).

2. Tax Compliance Costs and Administration Strategy

We begin our analysis of the relationship between tax compliance costs and administration strategy with a simple model based on rational-choice theory. Similarly to Slemrod (2001), we assume a rational decision maker taking taxes as well as compliance costs into account in maximizing his net income Y. We initially neglect flaws in decision making like bounded rationality and

limited information. Furthermore, we do not take into account that incorporated businesses may be controlled by more than one decision maker.[5] The net income consists of the gross earnings E minus tax payments T and compliance costs C.[6]

The tax burden T rises with the gross earnings E and is reduced by the deductibility of the compliance costs C.[7] Furthermore, the tax burden may be affected by the use of specific tax options O_k. Tax planning options, such as income shifting or choosing an optimal depreciation method, are generally associated with lower tax payments, but also with higher tax-related planning costs. By contrast, a tax simplification option like a lump-sum deduction generally reduces tax compliance costs, but may also increase the tax payment if for example the itemized deductions would exceed a lump-sum deduction. In summary, the effect of an unspecified tax option O_k on the tax burden can be either negative or positive.

Thus, the net income can be written as

$$Y = E - T(E, C, O_k) - C\,. \tag{1}$$

Concentrating on the optimization of the tax strategy, we consider three different types of tax compliance costs in the model. Personnel costs C_p result from personnel resources R_p (including the working effort of the entrepreneur) used for bookkeeping, filing a tax return, tax planning, and other tax-related activities. Alternatively, a business may replace personnel resources by capital R_c along with the costs $C_c(R_c)$ for tax administration hardware and software. Furthermore, the taxpayer may also engage an external adviser to execute his or her tax administration obligations. The use of external resources R_e may be characterized as an outsourcing of tax administration and tax planning activities with the costs $C_e(R_e)$. Taking into account that the market price for one hour of external support within an equilibrium does not depend on the demand of the taxpayer, we postulate a constant price $C_e'(R_e) = p_e$ for external advice. It is crucial for our model that all taxpayers are able to buy a specific compliance activity for the same market price as other comparable businesses. Hence, there are no clientele effects in our model that would imply cheaper external support for a subsam-

5 Our data includes corporations, but also partnerships and self-employed taxpayers. From our perspective, this assumption should be rather unproblematic in case of small companies with a shareholder managing director.

6 In line with the literature (e.g., Sandford et al. 1989, p. 12), tax-planning costs are included.

7 For the sake of simplicity, we assume that all compliance costs are deductible with the same tax rate. Differences in the tax treatment of the various cost categories (for example, the working effort of the entrepreneur) could result in a preference towards specific administration strategies.

ple of businesses. For simplicity, we do not consider a possible correlation between R_e and the costs of a tax planning option O_k.[8]

We also consider that complex and sophisticated activities are generally executed at a lower cost by a professional. For that reason, businesses should typically execute simple activities like the collection of receipts or the bookkeeping of regular business transactions in-house, while complex activities are sourced out. Under these conditions, the marginal costs of in-house tax compliance increase in the amount of corresponding resources ($C_c''(R_c) > 0,\ C_p''(R_p) > 0$). This assumption is essential to obtain an interior solution, whereby complex problems are solved by an external adviser. Such a diversity of different resource categories corresponds to the empirical evidence (e.g., OECD 2001, DeLuca et al. 2007). The total compliance burden C is defined as

$$C \equiv C_p + C_c + C_e\,. \tag{2}$$

The sum of resources spent on tax administration has to be sufficient to fulfill all the necessary compliance activities A. Thus, the maximization of net income is restricted by an administration constraint. To simplify the notation, we postulate that the productivity of an external tax adviser is equal to 1. The productivity parameter of a personnel-intensive (capital-intensive) compliance strategy is denoted by θ (by ω). Thus, we obtain

$$A(E, O_k) \leq \theta \cdot R_p + \omega \cdot R_c + R_e\,. \tag{3}$$

The left-hand side describes the minimum amount of tax compliance activities required by the (exogenously given) legal obligations, while the right-hand side is the compliance level achieved by a strategy involving R_p, R_c, and R_e. In line with the empirical literature (e.g., Tran-Nam et al. 2000), the amount of compliance activities $A(E, O_k)$ is positively correlated with business size, which also implies a positive relationship with pretax earnings $\left(\partial A \big/ \partial E > 0\right)$. Due to economies of scale, the relative compliance cost burden decreases in pretax earnings $\left(\partial A^2 \big/ \partial^2 E < 0\right)$. Thus, tax compliance costs can be interpreted as an additional and regressive tax burden on income.

The amount of compliance activities $A(E, O_k)$ may be further affected by the aforementioned tax options O_k. The sign of the derivative $\partial A \big/ \partial O_k$ can be positive or negative. In case of a tax simplification option like e-filing, we expect a negative derivative $\left(\partial A \big/ \partial O_k < 0\right)$. However, a planning

8 Taking into account that the demand for tax preparation is partially driven by tax planning (Collins et al. 1990), it could be argued that the costs of tax planning are negatively correlated with the demand for tax advice. However, our data does not include information on the planning effort. Hence, it would not be worthwhile to discuss this aspect in detail, as we are not able to test corresponding hypotheses empirically.

option like income shifting requires planning costs increasing the amount of activities $\left(\partial A / \partial O_k > 0\right)$. The target function (1) and the tax administration constraint (3) can be integrated into the following Lagrangian function:

$$L = E - T(E, C, O_k) - C_p - C_c - C_e - \lambda \cdot (A(E, O_k) - \theta \cdot R_p - \omega \cdot R_c - R_e), \tag{4}$$

with λ denoting the Lagrange multiplier.

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

$$\partial L / \partial R_p = -C_p' \cdot \left(1 + \partial T / \partial C\right) + \lambda \cdot \theta = 0, \tag{5}$$

$$\partial L / \partial R_c = -C_c' \cdot \left(1 + \partial T / \partial C\right) + \lambda \cdot \omega = 0, \tag{6}$$

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

$$\partial L / \partial O_k = -\partial T / \partial O_k - \lambda \cdot \partial A / \partial O_k \geq 0. \tag{8}$$

Based on these conditions, we can draw three conclusions:

1. In the optimum of an interior solution, the marginal compliance levels per euro spent on in-house resources (capital and personnel resources) and outsourcing are equalized, i.e., $\omega / C_c' = \theta / C_p' = 1 / p_e$. Under the assumption of rational choice, a taxpayer chooses a cost-optimal mix of compliance strategies according to this condition.
2. Businesses optimize their cost burdens with regard to their in-house compliance productivity (depending on θ and ω) as well as the complexity of their tax return (affecting C_c' and C_p'). Regarding comparable businesses with identical levels of in-house productivity and tax complexity, we expect the same (or at least a very similar) compliance burden. By contrast, compliance costs should be higher if the complexity of a tax return increases and/or the compliance productivity of a company decreases. In these cases, a company will try to mitigate its complexity and/or productivity disadvantage by a higher demand for external support. However, keeping in mind the cost optimization behavior of all businesses and the constant market price p_e, a higher outsourcing level will not enable a company to overcome a corresponding complexity and/or productivity disadvantage. Therefore, if businesses choose a cost-optimal compliance strategy, our model implies a positive correlation between the demand for external support and the overall tax compliance burden of a company.
3. Using (7), the condition (8) can be written as $\underbrace{p_e \cdot \left(1 + \partial T / \partial C\right)}_{p_t} \cdot \partial A / \partial O_k + \partial T / \partial O_k \leq 0$.

Thus, we are able to identify a decision rule for a rational taxpayer regarding a tax option O_k. A tax simplification option decreases the necessary amount of compliance activities A, while a tax planning option reduces the tax payment T. If these advantageous effects are not counterbalanced by a higher tax payment T or by a higher cost burden C, a rational taxpayer selects the appropriate option. The benefit (cost) of a simplification (planning) option O_k depends on the after-tax price p_t, which consists of the gross market price p_e reduced by the marginal savings due to tax deductibility, $p_e \cdot {}^{\partial T}\!/_{\partial C} < 0$.

3. Empirical Analysis

3.1. Database

We use data from a German mail survey to investigate the relationship between compliance costs and administration strategy. The database was collected in 2003 on behalf of the German Ministry of Economics and Labor. The purpose of the survey consisted in quantifying the bureaucratic burden of companies resulting from taxes, public social insurances, statistics, and employment and environmental laws, identifying particularly burdening regulations and comparing the results with those of a former survey (Clemens and Kokalj 1995).

The data consists of 1,220 cases and contains information on the compliance burden, business size, and other business data (see also Kayser et al. 2004). The random sample was drawn by sectors and companies' size classes using the database Creditreform. This large data source contains not only registered companies and partnerships, but also the smallest businesses and single proprietorships, which are usually not listed in the registers. The response rate of about 7.3% was not unusual compared to similar surveys in Germany. An overview of the survey response compared to the original distribution of German businesses is given by table 1.

As can be seen, the number of small (medium and big) businesses is disproportionately low (high). The same holds for some of the sectors (e.g., the construction sector is overrepresented). This is due to the fact that the size classes containing bigger businesses and some sectors have been deliberately overweighted to obtain a sufficient number of businesses for each sector and size cell. That was especially necessary to derive an aggregate cost estimate.

In line with investigations in other countries (OECD 2001, European Communities 2004, DeLuca et al. 2007), the overall cost burden is calculated as the sum of internal personnel costs, expenses for external advice, and other

Table 1
Distribution of the Sample Compared to all Businesses (Germany, 2003)

Sector	Sample	1 to 49		50 to 249		250 and more	
Trader	Survey	132	11.0%	34	2.8%	27	2.2%
	All businesses	955,057	30.1%	8,913	0.3%	1,347	0.0%
Manufacturing business	Survey	117	9.7%	69	5.7%	46	3.8%
	All businesses	274,721	8.7%	15,519	0.5%	4,099	0.1%
Construction business	Survey	193	16.0%	79	6.6%	11	0.9%
	All businesses	309,259	9.7%	2,786	0.1%	183	0.0%
Business service	Survey	126	10.5%	27	2.2%	21	1.7%
	All businesses	993,523	31.3%	10,579	0.3%	2,431	0.1%
Other service	Survey	181	15.0%	64	5.3%	64	5.3%
	All businesses	580,685	18.3%	11,069	0.3%	2,600	0.1%

Notes: The table presents case numbers and percentages based on the total number in the respective sample. Manufacturing business includes mining and manufacture of goods as well as energy and water supply. Trader includes bars, restaurants, and hotels. Business service includes transport and communication as well as banks and insurance. The data concerning all businesses is available at the web site of the German Federal Statistical Office. In contrast to the survey sample, the classification of all businesses refers to the number of employees subject to social-insurance contributions. Therefore small enterprises are underrepresented in the distribution of all businesses.

monetary costs. All parts of the cost burden are subjective estimates given by the survey participants. The same holds true for the personnel costs per hour. The tax-related costs TC and the social insurance related costs SC are described by a fraction of the overall cost burden CC. Except for the social insurance related costs, the compliance burden is not allocated to specific taxes like the value added tax. Furthermore, there is no allocation of the cost burden to specific activities like tax planning.

As mentioned above, each record contains information on the distribution of the costs among different cost categories (personnel costs PC, including the labor costs of the entrepreneur; costs of external assistance, EC; and other monetary costs, MC). Hence, it is possible to analyze the relationship between the cost structure and the total cost burden. After we exclude cases with a missing value in one of these cost categories, the database provides information on the overall compliance costs CC as well as on its composition in 732 cases. In addition, the time effort of the entrepreneur and of the employees resulting from bureaucratic obligations is documented. We use this information for crosschecks of our original estimates (see appendix 6.4).

In addition each record includes the following details:

- Information on business size, location of the head office (German federal state), legal form, age, and sector
- Data on specific forms of employment (trainees, part-time employees, casual workers, handicapped employees) and on the fluctuation of employees
- Accounting method used for tax purposes
- Use of an electronic data interchange with the financial and social insurance authorities and problems associated with this interchange

This data enables us to investigate the effects of cash accounting and e-filing on the compliance cost burden. The electronic submission of tax declarations in Germany became possible in 1999 (Bayerisches Landesamt für Steuern 2010). After a transition period, German businesses could choose to electronically submit their tax returns as well as their monthly VAT and wage tax statements in 2003. By contrast, only small businesses and members of liberal professions (lawyers, physicians, etc.) were entitled to calculate their taxable income using a simplified cash accounting method.

To our knowledge, the described data set is the best data source available concerning the tax compliance costs of small and medium-sized enterprises in Germany. Nevertheless, some measurement difficulties have to be taken into account. One basic problem associated with measuring compliance costs is the reliability of the taxpayers' statements. That holds especially for the internal resources that are not exclusively used for compliance purposes (allocation of personnel resources and expenses for rooms or computers).

As Tait (1988, p. 352) argues, the respondents may overstate their compliance cost burden to impose pressure on political authorities. On the other hand, the literature gives also some evidence for a possible cost perception deficit: respondents may also underestimate tax compliance costs by failing to remember parts of their cost burden.[9]

Because of a low response rate of 7.3%, the empirical results could be affected by a nonresponse bias. There are theoretical and empirical arguments for a positive bias as well as for a negative bias.[10] Therefore, the net

9 A possible underestimation of the cost burden has already been assumed by Oster and Lynn (1955). Klein-Blenkers (1980, p. 140) asked German enterprises for the sum of 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 (by about 50%). Hence, within the overall cost burden some cost elements must have been "forgotten." Comparable results are reported by Rametse and Pope (2002) and Chittenden et al. (2005).

10 Pressure on the political authorities may be a motive for taxpayers with high compliance costs to participate in a survey. Nonetheless, these taxpayers may also be reluctant to take part in a survey, because they do not want to waste their time. Empirical investigations provide evidence for both arguments (Wicks 1965, Allers 1994, Collard et al. 1998).

effect of selection bias on average compliance costs is unclear and could result in random noise. A selection bias would not necessarily distort the regression results if it is not correlated with the investigated variables. Taking into account the small differences between the descriptive results of our database and international estimates (e.g., OECD 2001, European Communities 2004),[11] there is no reason to suspect a major distortion due to nonresponse bias. Nevertheless, we calculate regressions for a number of alternative target variables to eliminate the risk of possible measurement errors or recall bias (see section 3.2).

Table 2 contains the average values of the overall compliance costs (CC) of German businesses resulting from taxes, social insurance contributions, statistics, and employment, and environmental regulations as well as the relative cost burden per staff member (including the entrepreneur) and per turnover. The different size classes are based on the definition of small, medium-sized, and big businesses of the European Communities (Commission of the European Communities 2003).

Table 2

Absolute and Relative Compliance Costs (Germany, 2003)

Number of staff members	1 to 49	50 to 249	250 and more
CC per business (€)	37,726	103,323	649,716
	(49,267)	(157,063)	(1,798,894)
CC per staff member (€)	3,296	1,090	894
	(5,549)	(1,625)	(3,161)
CC per turnover (%)	3.27	1.06	0.59
	(5.24)	(1.84)	(1.21)
Cases	434	196	97

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, and the number of employees. Regarding CC per turnover, we include only cases with information on turnover, reducing the case numbers to 417 (1 to 49), 184 (50 to 249), and 91 (250 and more).

11 According to OECD (2001), the average costs for taxes, employment regulations (including wage and payroll taxation), and environmental regulations of small and medium enterprises in 11 OECD countries are 4,100 U.S.$ per employee and about 4% of turnover. 43% of these costs result from taxes, and a further 34% from labor regulations including wage and payroll taxation. According to European Communities (2004), the compliance costs resulting from business income taxes and VAT for small and medium businesses in the European Union are about 2.6% of turnover.

Evidently, absolute compliance costs rise with business size, while the relative cost burden is remarkably higher for small businesses. Therefore, as already stated in the literature (for a review see Evans 2003 and Evans 2008), the compliance costs of taxation are mainly a problem for small businesses and self-employed people. Table 3 presents the proportion of compliance costs caused by taxes and social insurance for employees.[12]

Table 3
Tax and Social Insurance Compliance Costs (Germany, 2003)

Number of staff members	1 to 49	50 to 249	250 and more
Proportion of TC (%)	45.43	37.80	34.82
	(18.88)	(17.02)	(17.72)
Proportion of SC (%)	30.28	30.40	26.76
	(14.53)	(13.73)	(12.42)
Total (%)	75.71	68.20	61.58
	(16.18)	(16.98)	(18.87)
Cases	408	184	88

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, and the number of employees, as well as the proportion of tax-related compliance costs and social insurance related compliance costs.

As other investigations (e.g., OECD 2001, Kegels 2008) have also found, the influence of tax-related activities on the overall compliance cost burden is strong. Including payroll taxes and social insurance payments, more than 70% of the cost burden results on average from taxation. The relevance of taxes is generally higher for small businesses, while the proportion of social insurance related costs does not seem to be connected with business size.

The total compliance costs CC consist of personnel costs PC, external costs EC, and other monetary costs MC, as documented in table 4. Small businesses rely to a higher degree on external support than medium-sized businesses, whereas their proportion of other monetary expenses is lower. This result can be explained by economies of scale favoring a capital-intensive administration strategy for bigger businesses. The proportion of personnel costs is more or less constant. It consists, in the smallest size classes, mainly of the labor costs of the entrepreneur.

12 The remaining costs up to 100% result from employment and environmental law as well as statistical obligations.

Table 4
Compliance Cost Categories (Germany, 2003)

Number of staff members	1 to 49	50 to 249	250 and more
Proportion of PC (%)	53.03 (20.88)	55.25 (20.60)	51.72 (22.28)
Proportion of EC (%)	36.28 (19.74)	31.70 (20.47)	32.46 (21.30)
Proportion of MC (%)	10.69 (8.89)	13.04 (10.54)	15.82 (12.76)
Total (%)	100.00	100.00	100.00
Cases	434	196	97

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, and the number of employees.

3.2. Hypotheses and Estimation Strategy

As has been discussed, a rational decision maker *ceteris paribus* chooses a cost-optimal compliance strategy depending on the characteristics of the firm. Therefore, enterprises with a relatively low productivity of in-house tax compliance and/or a high level of tax complexity are expected to rely to a higher degree on external resources than do the other businesses in the data set. By an increased demand for external support, a relatively unproductive company partially compensates the additional costs resulting from the lack of productivity and/or higher tax complexity.

Nevertheless, a less productive company has always to bear higher compliance costs, even if the outsourcing level is cost-efficient.[13] We have to bear in mind that external support will also be used by businesses with a high in-house productivity if it makes a cost advantage possible. Hence, businesses deliberately use in-house resources to obtain a cost reduction in relation to external support. For that reason we expect that businesses with a high outsourcing level generally bear higher compliance costs than other businesses in our data set. A corresponding result has been reported by Blaufus et al. (2011), who analyze the compliance costs of German private households with employment and self-employment income.

By contrast, the use of capital-intensive compliance strategies (described by the proportion of other monetary costs) depends on the relationship be-

13 For a cost-inefficient company with insufficient demand for external support, compliance costs would be even higher.

tween the productivity parameters θ and ω as well as on the cost functions C_p and C_c. For that reason, there is no clear connection between the proportion of monetary costs and the overall compliance cost burden as long as private businesses choose a cost-optimal compliance strategy. In line with Hudson and Godwin (2000), we assume that there is no significant correlation between a capital-intensive compliance strategy and the tax-related cost burden.

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 lower compliance costs among private businesses that opt for cash accounting or e-filing. In summary, we use the following hypotheses for our empirical analysis:

1. The extent of outsourcing tax administration to external advisers correlates positively with the tax-related compliance costs in the data set.
2. The extent of using capital-intensive strategies 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 method.
4. Businesses using a simplified cash accounting method have significantly lower tax-related compliance costs.

In line with the literature (e.g., Verwaal 2000), we use a logarithmic–linear model for our statistical analysis. Furthermore, we include the following procedures to enhance our regression results:

(1) In contrast to previous studies, we measure the applied administration by the proportion of external and internal monetary costs to the overall compliance cost burden CC. As almost all businesses in our final sample have at least some external costs EC and other monetary costs MC, we do not include an additional dummy variable for the use of tax advisers or capital resources.

(2) As has been discussed, particularly 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 in which the residuals of a size-based estimation exceed twice the relevant standard deviation (see also appendix 6.1).

(3) Because of possible measurement errors concerning overall compliance costs as well as the proportion 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 recalculate the personnel costs by computing the product of working hours and two alternative measures of gross average personnel costs per hour to control for a possible

misperception of this cost category (see appendix 6.4 for a more detailed explanation and corresponding results).

The logarithmic model can be written as

$$\begin{aligned} CCost = {} & \alpha_0 + \alpha_1 \cdot Size + \alpha_2 \cdot Employment + \alpha_3 \cdot Outsourcing \\ & + \alpha_4 \cdot Capitalintensive + \alpha_5 \cdot EDIF + \alpha_6 \cdot EDIFP \\ & + \alpha_7 \cdot EDIS + \alpha_8 \cdot EDISP + \alpha_9 \cdot Cashaccounting \\ & + \alpha_{10} \cdot X + \varepsilon \end{aligned} \tag{9}$$

The variables are defined as follows:

CCost	Natural logarithm of the overall compliance costs CC, the tax-related costs TC, or the social insurance related costs SC[14]
Size	Business size, measured as the natural logarithm of turnover (for TC and CC) or as number of staff members increased by 1 (for SC)[15]
Employment	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 use a dummy variable for businesses with two or more staff members, assuming the first staff member to be the entrepreneur.
Outsourcing	An outsourcing-oriented administration strategy is measured as the natural logarithm of external costs EC divided by overall compliance costs CC, increased by 1 percentage point[16]
Capitalintensive	A capital-intensive administration strategy is measured as the natural logarithm of monetary costs MC per overall compliance costs CC increased by 1 percentage point
EDIF	Dummy for businesses using an electronic data interchange with the tax authorities
EDIFP	Dummy for businesses reporting problems regarding the electronic data interchange with the tax authorities.

14 To take into account cases without costs from social insurance, SC is increased by 1 before applying the natural logarithm. Zero values for CC and TC are excluded.

15 The number of staff members is connected more directly to the costs of wage and payroll taxation. By contrast, the turnover has a higher explanatory power for models of CC and TC. The number of staff members is increased by 1 to prevent undefined logarithmic values.

16 We increase the proportion by one percentage point to prevent undefined logarithmic values.

EDIS	Dummy for businesses using an electronic data interchange with the social insurance authorities
EDISP	Dummy for businesses reporting problems regarding the electronic data interchange with the social insurance authorities
Cashaccounting	Dummy for businesses relying on a simplified cash accounting method for tax purposes
X	Vector of further control variables (see appendix 6.3 for a detailed list)
ε	Error term

Like Hudson and Godwin (2000), we observe heteroskedasticity related to the size of the responding businesses. Therefore, we employed a WLS regression with the natural logarithm of turnover as the weighting factor (more information is given by appendix 6.2). Furthermore, we excluded missing values from the analysis to prevent problems regarding imputation.

3.3. Regression Results

Previous studies (e.g., Tran-Nam et al. 2000, Slemrod and Venkatesh 2002) have documented the remarkable effect of business size on absolute compliance costs as well as on relative compliance costs (per staff member or per unit of turnover). For that reason, a univariate analysis would be severely biased by business-size effects. However, a consideration of all available control variables results in a loss of information due to missing values. Therefore, we calculate the regressions for a simplified S model, excluding the vector of further influence factors X, and an extended E model including X. Table 5 shows the coefficients and standard errors (in parentheses) for the whole data set excluding outliers (see appendix 6.3 for the complete results of the extended model). In the models for the tax-related (TC) and social-insurance-related (SC) compliance costs, only an electronic interchange with the relevant authorities is recognized. The cash accounting method is not considered in the models for SC.

In line with the literature (e.g., Sandford et al. 1989), we identify business size as the most important influence factor for the compliance costs of taxes and social insurance payments. A 1% growth in business size leads to a 0.344% to 0.419% growth in compliance costs. As the regression coefficient is smaller than 1, it exemplifies the economies of scale within the compliance process. The high value of the constant indicates fixed-cost elements. In the SC model, the fixed-cost effect is captured by the *Employment* variable. It should be considered that compliance costs resulting from taxation (TC) are

Table 5
Regression Results for the Overall 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***	0.360***	0.344***	0.333***	0.419***	0.349***
	(0.020)	(0.033)	(0.022)	(0.029)	(0.031)	(0.046)
Employment	0.114	0.149	−0.294	−0.370	6.659***	5.892***
	(0.299)	(0.382)	(0.328)	(0.335)	(0.487)	(0.585)
Outsourcing	−0.273***	−0.283***	−0.255***	−0.233***	−0.410***	−0.428***
	(0.049)	(0.056)	(0.055)	(0.058)	(0.061)	(0.069)
Capitalintensive	−0.069	−0.050	−0.096*	−0.083	−0.005	0.027
	(0.049)	(0.056)	(0.055)	(0.058)	(0.064)	(0.070)
EDIF	0.152	0.114	−0.009	−0.024	–	–
	(0.115)	(0.131)	(0.105)	(0.109)		
EDIFP	−0.086	−0.049	0.129	0.175	–	–
	(0.224)	(0.283)	(0.203)	(0.212)		
EDIS	−0.062	−0.089	–	–	0.023	−0.014
	(0.100)	(0.116)			(0.107)	(0.121)
EDISP	0.074	0.015	–	–	0.002	−0.134
	(0.182)	(0.207)			(0.188)	(0.207)
Cashaccounting	−0.246	−0.321	−0.226	−0.292	–	–
	(0.243)	(0.349)	(0.272)	(0.310)		
Constant	3.919***	2.937***	4.026***	4.080***	0.461	0.124
	(0.427)	(0.731)	(0.475)	(0.552)	(0.519)	(0.843)
R^2 (adjusted)	0.447	0.410	0.341	0.347	0.467	0.455
Cases	655	512	604	572	632	506

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social-insurance-related compliance costs (SC); standard errors in parentheses; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor. Within the simplified S models we include only the variables listed in this table, while the extended E models include further control parameters (see appendix 6.3 for the corresponding results).

generally higher than the compliance effort of the social security system (SC) (see also table 3).

In contrast to hypothesis 1, we find a significant and negative relationship between compliance costs and the outsourcing of compliance activities to external contractors. The regression coefficient ranges from −0.233 (extended TC model) to −0.428 (extended SC model). Therefore, doubling the amount of outsourced compliance activities (for example, from 20% to 40%) reduces the corresponding compliance cost burden on average by 14.4% to 24.9%. This effect is stronger for social insurance related compliance costs and remains robust in all calculated models.[17] The use of a capital-intensive compliance strategy, however, does not have a similar effect. Only in the S model for TC are we able to identify a barely significant negative correlation. Thus, hypothesis 2 is supported by the empirical results.

17 A possible explanation for that outcome might be an overestimation of in-house personnel costs within our data set. To test for this possibility, we recalculated the personnel costs of compliance as the product of the working hours and the average labor costs. The corresponding results in appendix 6.4 support our findings.

Table 6
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***	0.302***	0.305***	0.286***	0.528***	0.422***
	(0.039)	(0.052)	(0.042)	(0.050)	(0.077)	(0.104)
Employment	0.197	0.202	−0.204	−0.228	6.569***	5.986***
	(0.264)	(0.347)	(0.292)	(0.304)	(0.451)	(0.558)
Outsourcing	−0.314***	−0.367***	−0.301***	−0.288***	−0.344***	−0.404***
	(0.056)	(0.066)	(0.064)	(0.067)	(0.073)	(0.085)
Capitalintensive	−0.093*	−0.033	−0.104	−0.074	−0.075	−0.034
	(0.056)	(0.067)	(0.064)	(0.068)	(0.076)	(0.085)
EDIF	0.128	0.140	−0.078	−0.111	–	–
	(0.143)	(0.162)	(0.122)	(0.128)		
EDIFP	−0.016	−0.032	0.266	0.367	–	–
	(0.281)	(0.376)	(0.271)	(0.284)		
EDIS	−0.178	−0.320**	–	–	−0.114	−0.233
	(0.133)	(0.159)			(0.134)	(0.160)
EDISP	−0.075	−0.205	–	–	−0.175	−0.493
	(0.248)	(0.283)			(0.273)	(0.306)
Cashaccounting	−0.333	−0.275	−0.331	−0.204	–	–
	(0.217)	(0.312)	(0.246)	(0.284)		
Constant	4.150***	4.191***	4.468***	4.779***	0.254	0.567
	(0.585)	(0.967)	(0.674)	(0.778)	(0.488)	(0.916)
R^2 (adjusted)	0.294	0.296	0.202	0.208	0.509	0.488
Cases	401	302	373	356	382	293

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social-insurance-related compliance costs (SC); standard errors in parentheses; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor. Within the simplified S models we include only the variables listed in this table, while the extended E models include further control parameters (see appendix 6.3 for the corresponding results).

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. In spite of a negative regression coefficient for *Cashaccounting*, we also do not find significant evidence that businesses using this simplified accounting method have lower cost burdens. Therefore, hypotheses 3 and 4 are not confirmed by our regressions.

An administration strategy may have a different influence on small businesses from that on medium-sized and big businesses. To allow for this possibility, we made separate regressions for small businesses with less than 50 staff members (including the entrepreneur) and for medium and big businesses.[18] Table 6 illustrates the regression results for small businesses, supporting our findings for the entire data set. The effect of outsourcing on the compliance

18 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 appropriate to calculate a separate regression for this group.

Table 7
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***	0.388***	0.407***	0.415***	0.446***	0.361***
	(0.040)	(0.071)	(0.047)	(0.060)	(0.072)	(0.097)
Outsourcing	−0.234**	−0.230**	−0.197**	−0.167	−0.505***	−0.480***
	(0.090)	(0.106)	(0.099)	(0.110)	(0.107)	(0.121)
Capitalintensive	−0.018	−0.022	−0.077	−0.084	0.093	0.148
	(0.088)	(0.107)	(0.100)	(0.108)	(0.111)	(0.127)
EDIF	0.214	0.062	0.079	0.113	–	–
	(0.195)	(0.232)	(0.187)	(0.208)		
EDIFP	−0.184	−0.005	−0.038	−0.101	–	–
	(0.369)	(0.486)	(0.322)	(0.363)		
EDIS	0.083	0.259	–	–	0.225	0.302
	(0.160)	(0.201)			(0.178)	(0.205)
EDISP	0.108	0.000	–	–	0.052	−0.059
	(0.283)	(0.337)			(0.277)	(0.309)
Constant	3.600***	1.937	2.735***	1.985*	6.913***	4.434***
	(0.750)	(1.279)	(0.867)	(1.074)	(0.492)	(1.098)
R^2 (adjusted)	0.318	0.270	0.253	0.237	0.222	0.250
Cases	254	210	231	216	250	213

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social-insurance-related compliance costs (SC); standard errors in parentheses; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor. Within the simplified S models we include only the variables listed in this table, while the extended E models include further control parameters (see appendix 6.3 for the corresponding results).

cost burden is even stronger than in the overall sample, with the exception of the models describing SC.

Table 7 contains the regression results for the medium and big enterprises. Taking into account that all businesses in these size classes have employees, the variable *Employment* is left out. We find similar results to those of the previous models, but the effect of outsourcing tax administration is weaker and not significant in all cases. Hence, there is a clearly stronger effect of outsourcing on compliance costs in the case of small businesses than in those of medium and big businesses.

4. Discussion

In the empirical analysis we found strong evidence that overall tax compliance costs of businesses with a high proportion of external costs are significantly lower. This outcome contradicts our hypothesis 1 that businesses with a high degree of outsourcing bear higher compliance costs. Now, what do we do with this result? According to our model in section 2, a high degree of outsourcing can be interpreted as a proxy for a low in-house productivity of a business and/or a high complexity of tax returns if businesses behave

cost-efficiently. Correspondingly, Blaufus et al. (2011) obtain a positive and significant effect of outsourcing in the case of German private households.[19]

However, this conclusion holds only in the case of a cost-efficient compliance strategy. To understand what happens if a business chooses a cost-inefficient strategy, we assume that unproductive and productive businesses outsource compliance activities to a similar extent. In this case, the proportion of external tax compliance costs would be lower for unproductive businesses than for the more productive businesses in the data set. This is because the unproductive businesses would pay the same price for the outsourcing of compliance activities, but spend a considerably higher amount of resources on in-house tax compliance. Under these conditions, businesses with low in-house productivity could reduce their compliance cost burden by increasing their demand for external support, implying a higher ratio of external costs to overall compliance costs.

Thus, the observed negative relationship of outsourcing and compliance costs can be interpreted as evidence for cost-inefficient behavior of businesses with low in-house compliance productivity and/or high complexity compared to the other businesses in the data set. It has to be considered that in a world of rational businesses, there should be no possibility to obtain a cost advantage over other businesses by using external support, as all businesses utilize a cost-efficient compliance strategy.

Presumably, our result is not driven by a lower quality of the "output" of external advisers. Due to the experience and the accountability of tax advisers, it is not probable that outsourced tax returns or financial statements are of lower quality. Indeed, Bloomquist et al. (2007) do not find a higher error rate for U.S. tax returns prepared by tax advisers. Furthermore, outsourcing should be positively correlated with tax planning, which implies, *ceteris paribus*, a lower tax payment.[20] The outcome is also not driven by self-selection regarding the decision to choose an external adviser. Due to the exclusion of cases with missing values, our final sample contains only five cases without any external support.

In the following, we discuss potential explanations for insufficient demand for external advice. Koellinger et al. (2007) give empirical evidence for overconfidence of self-employed entrepreneurs. This argument fits well with our observation that the effect of outsourcing is especially strong in case of small businesses. While medium and big businesses should be more professional, the decision making of small businesses could be biased by overconfidence. In

19 A significant result would not obtained if the analysis is restricted to self-employed taxpayers. Therefore, the analysis of Blaufus et al. (2011) does not contradict our outcome.

20 For example, Slemrod and Blumenthal (1996) determine a relatively high proportion of external costs within the tax-planning activity. As documented by Collins et al. (1990) and other authors, tax planning is also a reason for outsourcing.

our model, a systematic overestimation of the businesses' capabilities results in higher presumed productivity parameters θ and ω for in-house compliance strategies. This leads to an insufficient demand for external support.

In a dynamic environment, we would expect businesses to correct this faulty evaluation of their own capabilities by learning if they are able to control for the efficiency of their strategy. As substantiated by the literature (Klein-Blenkers 1980), however, there seems to be a deficit of taxpayers in perceiving their compliance cost burden. The neglect of internal compliance activities could distort the choice between the underestimated in-house tax compliance costs and the well-known costs of an external tax adviser. In an analytical notation, this aspect can be documented by a cost perception parameter $0 < \xi < 1$. The criterion of a perceived cost optimum converts in this case to $C_c'/\omega = C_p'/\theta = p_e/\xi$.

A similar explanation would result from a perception error regarding the tax deductibility of external-adviser costs. For example, Boylan and Frischmann (2006) provide empirical evidence that taxpayers have an incorrect perception of marginal tax rates. If adviser costs are compared with the compliance performance of the entrepreneur, this could lead to an overestimation of net tax adviser costs.

An alternative argument, based on rational-choice theory, could rely on the fact that cost-optimal outsourcing is limited. If a considerable proportion of compliance activities had to be done in-house, productive and unproductive businesses would have to choose similar levels of outsourcing. As has been elucidated above, this would imply a negative relationship between the proportion of external costs and the overall compliance costs. A corresponding effect could also be caused by mistrust of taxpayers towards external advisers. Due to the information asymmetry between the tax adviser and the taxpayer, their relationship may be negatively affected by a principal–agent problem. Because of the obligatory transaction costs for controlling the adviser, it may be rational for private taxpayers to keep at least some control over their tax affairs.

Furthermore, there may be an incentive for partially noncompliant businesses to deal with their tax affairs without external support. According to Rice (1992), the compliance level of small businesses is lower than that of other size classes. In addition, Erard and Ho (2003) find evidence for a negative correlation between noncompliance and the existence of an external confidant. Hence, it would be reasonable for a partially noncompliant taxpayer not to initiate an external adviser into all business matters.

With regard to capital-intensive compliance strategies, we do not find a significant effect on tax compliance costs. In line with our hypothesis 2, we may therefore assume that German businesses in our data set use capital-intensive

strategies, such as tax administration software, to an adequate extent. This assumption is not only supported by the lack of significance, but also by the relatively small regression coefficient of *Capitalintensive*.

Contrary to our hypotheses 3 and 4, we find no significant support for a cost reduction by using a simplified cash accounting method or by an electronic data interchange with the tax and social insurance authorities. Concerning the electronic data interchange, this outcome may be caused by start-up costs, counteracting potential cost reductions of the electronic submission method. The first German e-filing projects started in 1999. In 2003, there was still an ongoing transition. However, taking into account empirical evidence pointing to low submission costs relative to overall tax compliance costs (DeLuca et al. 2007), the insignificance of e-filing could also result from a lack of substantial relief for the taxpayer when using an electronic data interchange.

Regarding the simplified cash accounting method, we find consistently negative regression coefficients, but also high standard errors.[21] This could result from the fact that a significant proportion of the respondents had also to prepare commercial balance sheets for legal reasons. The additional costs of preparing a tax balance sheet on the basis of a commercial balance sheet might be comparable to the costs of preparing an annual account based on a cash accounting method. As an alternative explanation, potential cost reductions due to cash accounting might have been too low compared to the variance of the overall cost burden.

5. Conclusion

In this paper, we have analyzed 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 data set of 1,220 German businesses to investigate this hypothesis in an econometric WLS model. Deviating somewhat from the literature, we found evidence that outsourcing tax compliance activities to external advisers is negatively related to compliance costs, especially in the case of small businesses. This result can be interpreted as evidence for cost-inefficient compliance strategies implying an insufficient use of external advisers.

21 There could be a bias due to the fact that not all businesses within our data set had the opportunity to choose cash accounting. However, we find no evidence for a divergent compliance cost burden for businesses that were able to opt for cash accounting. As can be demonstrated by the regression results in appendix 6.3, neither the legal form nor a professional occupation has a significant effect. Furthermore, preliminary estimates for businesses eligible for cash accounting also did not provide significant evidence for cost reduction by the use of this simplified accounting method.

An explanation for this cost inefficiency could be overconfidence of private businesses regarding their own tax administration capabilities. However, alternative interpretations for that outcome seem to be possible as well. For example, there could be limitations with regard to the outsourcing of specific compliance activities. Under these circumstances, unproductive businesses would have to use external support to a similar degree to businesses with a high productivity level.

Our findings suggest that a higher usage of external support could reduce the burden of tax and social-insurance compliance to a significant extent. From this perspective, it could be an appropriate cost-reduction strategy to promote paid preparation, for example by a general deductibility of tax preparation fees[22] or by handing out vouchers for tax advice to entrepreneurs and young businesses. In addition, it could be useful to enhance the customer relations of the fiscal authorities. If for example the insufficient demand for external support is driven by overconfidence of private businesses, a more customer-friendly tax administration could partially mitigate this problem by reducing the complexity of tax returns, especially for the self-employed and for small businesses.

We could not identify a cost reduction for capital-intensive compliance strategies (such as 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, but also by the lack of a significant cost reduction due to the use of e-filing methods. In the case of cash accounting, we find negative correlation coefficients, but also high standard errors.

Our regression results give reason for concern about the amount of potential cost reductions due to e-filing and cash-based accounting for business taxpayers and the economy as a whole. Thus, more ambitious instruments could be necessary for a significant reduction of the tax compliance burden (Bankman 2008). These may include partially prefilled tax declarations of private households and businesses (for experiences see Vaillancourt 2011), the standardization of e-government instruments for withholding taxes and social-insurance contributions, a simplification of the rules for cash-based accounting, and the adaptation of tax forms and software tools to businesses' needs.

It has also to be considered that electronic filing instruments may be used for the standardization and extension of accounting information in favor of the fiscal authorities. This includes for example the tax form EÜR for busi-

22 In Germany, tax adviser fees are only deductible if they can be regarded as work-related or business-related expenses. Adviser fees for private matters (for example, child benefits) are not deductible from the tax base.

nesses choosing cash accounting and the projected introduction of electronic balance sheets in Germany, which have been widely criticized within the German public (Bayerischer Industrie- und Handelskammertag 2010, BDO 2011). In both cases, the electronic form includes a comprehensive body of additional accounting information that has to be transmitted electronically. While such an approach should reduce the administrative and auditing costs of the authorities, it will probably result in a higher cost burden for private businesses and, therefore, cancel the intended cost reduction by the use of electronic submission methods.

It has to be acknowledged that our evidence is limited to a cross section of 1,220 German businesses extracted in the year 2003. Therefore, further research will be necessary to confirm and expand our findings. This includes replication studies for other countries or reference groups (e.g., private taxpayers) as well as investigations of potential reasons for somewhat inefficient decision making of small businesses (e.g., by corresponding survey designs). It should also be considered that our data set includes almost exclusively businesses demanding external support. Hence, variation is restricted to the extent of tax-preparer usage.

Valuable insights could in principle be attainable by panel-data instruments controlling for the heterogeneity of firms. However, in the current situation there is no panel-data source available that includes tax compliance costs of private businesses. Therefore, the generation of new data sets on compliance costs will also be an important and necessary means to enhance our understanding of potential strategies to reduce the burden of tax compliance.

6. Appendix

6.1. Outlier Correction and Missing Values

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

- TC and CC: *Size* measured as the natural logarithm of the turnover. No further independent variables are integrated. Z is taken as zero.
- SC: *Size* measured as the natural logarithm of the number of staff members (including the entrepreneur) increased by 1. The control variable Z is defined as the dummy variable for *Employment*.

In case of the TC and CC models, we observe heteroskedasticity of the residuals in relation to business size. In these models, we use an estimator weighted by the corresponding parameter for *Size* (the natural logarithm of turnover). We exclude all cases in which the residuals exceed twice the

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 regarding imputation methods. Tables 8–10 present the descriptive statistics of the data set, excluding outliers and missing values related to busi-

Table 8

Absolute and Relative Compliance Costs (Germany, 2003, Outliers and Missing Values Excluded)

Number of staff members	1 to 49	50 to 249	250 and more
CC per business (€)	34,866 (37,197)	82,883 (95,033)	268,938 (380,637)
CC per staff member (€)	2,923 (3,135)	872 (1,019)	317 (429)
CC per turnover (%)	2.91 (3.63)	0.82 (0.92)	0.36 (0.64)
Cases	401	173	81

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, the number of employees, turnover, the use of electronic submission methods and related problems, and the accounting method used for tax purposes. We exclude cases that are identified as outliers in relation to overall compliance costs CC.

Table 9

Tax and Social Insurance Compliance Costs (Germany, 2003, Outliers and Missing Values Excluded)

Number of staff members	1 to 49	50 to 249	250 and more
Proportion of TC (%)	45.38 (18.86)	37.46 (16.65)	35.15 (17.46)
Proportion of SC (%)	30.57 (14.66)	30.71 (13.96)	28.03 (12.47)
Total (%)	75.94 (16.36)	68.17 (16.63)	63.18 (18.41)
Cases	377	163	74

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, the number of employees, turnover, the use of electronic submission methods and related problems, and the accounting method used for tax purposes, as well as the proportion of tax-related and social insurance related compliance costs. We exclude cases that are identified as outliers in relation to overall compliance costs CC.

Table 10

Compliance Cost Categories (Germany, 2003, Outliers and Missing Values Excluded)

Number of staff members	1 to 49	50 to 249	250 and more
Proportion of PC (%)	52.33	55.12	50.34
	(20.53)	(20.23)	(22.36)
Proportion of EC (%)	36.99	32.00	34.55
	(19.51)	(19.94)	(21.17)
Proportion of MC (%)	10.68	12.89	15.11
	(8.81)	(10.52)	(12.74)
Total (%)	100.00	100.00	100.00
Cases	401	173	81

Notes: In calculating the mean values (standard errors in parentheses), we include only cases with information on personnel compliance costs, external compliance costs, other monetary expenses, the number of employees, turnover, the use of electronic submission methods and related problems, and the accounting method used for tax purposes. We exclude cases that are identified as outliers in relation to overall compliance costs CC.

ness size. Evidently, the average values of compliance costs are lower than in the unadjusted data set. That holds especially true for the bigger size classes.

The composition of CC is described in tables 9 and 10. We find no considerable deviations from the results when outliers and missing data are included in the data set.

6.2. Analysis of the Residuals

According to the Gauss–Markov theorem, an OLS regression requires a linear model, an expected value of zero for the error term, the absence of multicollinearity, and a homoskedastic distribution of the residuals. Our model fulfils the first three conditions,[23] but violates the assumption of homoskedasticity. Table 11 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.

We find evidence for a significant (99% level) positive correlation between business size and the estimated residuals. The F-values and t-values are considerably higher for the models based on turnover. For that reason, we

23 The fulfillment of the first and the second condition results from the logarithmic model taking into account a constant factor. The existence of multicollinearity can be investigated by variance inflation factors (VIFs). Appendix 6.3 presents the VIFs for the extended models. We find no empirical support for a significant degree of multicollinearity.

Table 11
Breusch–Pagan Test Results

Model	CC (turnover)	CC (staff)	TC (turnover)	TC (staff)	SC (turnover)	SC (staff)
R^2 (adjusted)	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

Notes: Breusch–Pagan results on heteroskedasticiy including F-values, t-values, and adjusted R^2.

Table 12
Kolmogorov–Smirnov Test 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	1.006 (0.263)	0.986 (0.285)	0.807 (0.532)	0.980 (0.292)	0.905 (0.385)	1.043 (0.227)
Average labor costs (2003)	0.990 (0.281)	0.919 (0.367)	0.879 (0.423)	1.036 (0.233)	0.918 (0.369)	1.014 (0.255)

Notes: Kolmogorov–Smirnov results for normality regarding the regression models of this contribution. We show the Kolmogorov–Smirnov z and the significance level (in parentheses).

use a WLS model with the natural logarithm of the turnover as the weighting factor for our econometric analysis.[24]

We apply a t-test to examine the significance of the regression coefficients. The test requires normality of the regression residuals. Table 12 shows the Kolmogorov–Smirnov results – with KS Z-value and significance in parentheses – on normality for the residuals. The hypothetical normal distribution is not disproved by the results of table 12.

6.3. Complete Results of the Extended Regression Models

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

Age — Natural logarithm of business age increased by 1; this variable accounts for possible start-up costs of young businesses, which are documented by Hansford et al. (2003).

24 As an alternative approach, we used an OLS regression with robust standard errors. The results were very similar to the outcomes of our WLS model.

Sector	Dummy variables for the sector including *trader*, *manufacturing business*, *building business*, *business service*, and *other service*. An explicit variable for *construction business* is omitted to prevent multicollinearity. In addition, we consider dummies for *crafts enterprise* and *liberal profession*.
Legal form	Dummy variables for form of organization including *individual enterprise*, *partnership*, *incorporated company*, and the combination of a limited partnership and a limited-liability company (*GmbH & Co. KG*). An explicit variable for *company* is omitted to prevent multicollinearity. As the legal form of a business has no considerable effect on the payroll obligations of its employees, we neglect these variables in the models for social insurance related compliance costs.
State	Dummy variables for the Federal State of the business headquarters' 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 omitted to prevent multicollinearity.

Furthermore, the data set contains variables regarding employment type and fluctuation. These variables are included in the models for CC and SC, but omitted in the models for TC. Employment-related compliance activities should in general be allocated to the social insurance related compliance costs.[25]

Part time	Natural logarithm of the number of part-time employees as a fraction of the total number of staff members, increased by 1%
Casuals	Natural logarithm of the number of casual employees as a fraction of the total number of staff members, increased by 1%
Trainees	Natural logarithm of the number of trainees as a fraction of the total number of staff members, increased by 1%

25 Taking into account the high proportion of social insurance related compliance costs, it seems likely that the respondents of the questionnaire allocated general expenses and overhead costs of the wage taxation system to the social insurance related compliance costs.

Disabled — Natural logarithm of the number of disabled employees as a fraction of the total number of staff members, increased by 1%

Fluctuation — Dummy variable representing the fluctuation in the number of employees; the value is 1 if the number of employees has increased or decreased in the last three years.

Foreigners — Dummy variable for businesses "feeling" burdened by the employment of foreigners; it is expected that a perceived burden results from specific obligations regarding the wage and payroll taxes of foreigners.

Table 13 describes the overall results for the extended regression models, including the standard errors (in parentheses). As the risk of multicollinearity rises with the number of variables considered, the variance inflation factors are also included [in brackets]. We find no empirical support for the assumption that multicollinearity is a serious problem.

Table 14 and table 15 describe the complete regression results for small businesses, including standard deviations (in parentheses) and variance inflation factors [in brackets].

Table 13

Complete Regression Results for the 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]

Table 13
Continued

Target variable	CC	TC	SC
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 service	0.342** (0.152) [1.789]	0.354** (0.150) [1.746]	0.313 (0.195) [1.758]
Other service	0.404*** (0.145) [2.183]	0.153 (0.143) [2.062]	0.440** (0.184) [2.176]
Crafts enterprise	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]

Table 13
Continued

Target variable	CC	TC	SC
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 (adjusted) Cases	0.410 512	0.347 572	0.455 506

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social insurance related compliance costs (SC); standard errors (in parentheses); variance inflation factors [in brackets]; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor.

Table 14
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 service	0.322* (0.175) [2.082]	0.394** (0.174) [2.037]	0.254 (0.232) [2.049]

Table 14
Continued

Target variable	CC	TC	SC
Other service	0.253 (0.171) [2.430]	0.083 (0.168) [2.272]	0.274 (0.226) [2.311]
Crafts enterprise	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]
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]

Table 14
Continued

Target variable	CC	TC	SC
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 (adjusted)	0.296	0.208	0.488
Cases	302	356	293

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social insurance related compliance costs (SC); standard errors (in parentheses); variance inflation factors [in brackets]; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor.

Table 15
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 service	0.378 (0.291) [1.709]	0.134 (0.291) [1.529]	0.387 (0.371) [1.672]
Other service	0.753*** (0.280) [2.403]	0.302 (0.273) [2.087]	0.793** (0.338) [2.510]
Crafts enterprise	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]	–

Table 15
Continued

Target variable	CC	TC	SC
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 (adjusted) Cases	0.270 210	0.237 216	0.250 213

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social insurance related compliance costs (SC); standard errors (in parentheses); variance inflation factors [in brackets]; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor.

Table 16

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	0.319***	0.326***	0.282***	0.271***	0.335***	0.312***
	(0.025)	(0.039)	(0.027)	(0.034)	(0.038)	(0.053)
Employment	0.377	0.189	−0.315	−0.433	8.188***	7.785***
	(1.070)	(1.187)	(1.147)	(1.212)	(1.346)	(1.402)
Outsourcing	−0.297***	−0.285***	−0.243***	−0.219***	−0.416***	−0.421***
	(0.053)	(0.063)	(0.058)	(0.063)	(0.064)	(0.073)
Capitalintensive	−0.046	−0.018	−0.080	−0.066	0.062	0.085
	(0.054)	(0.061)	(0.061)	(0.064)	(0.068)	(0.075)
EDIF	0.087	0.014	0.050	0.046	–	–
	(0.137)	(0.158)	(0.121)	(0.128)		
EDIFP	−0.146	−0.031	−0.001	0.027	–	–
	(0.258)	(0.309)	(0.220)	(0.233)		
EDIS	0.046	0.052	–	–	0.181	0.106
	(0.120)	(0.140)			(0.125)	(0.140)
EDISP	0.082	−0.041	–	–	−0.156	−0.304
	(0.210)	(0.234)			(0.204)	(0.228)
Cashaccounting	−0.343	−0.895	−0.101	0.043	–	–
	(0.364)	(0.627)	(0.417)	(0.493)		
Constant	4.866***	3.754***	5.154***	5.321***	−0.507	−1.629
	(1.128)	(1.375)	(1.214)	(1.319)	(1.364)	(1.572)
R^2 (adjusted)	0.329	0.303	0.227	0.209	0.299	0.321
Cases	461	370	423	402	454	370

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social-insurance-related compliance costs (SC); standard errors in parentheses; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor. Within the simplified S models we include only the variables listed in this table, while the extended E models include further control parameters (see appendix 6.3 for a list of these parameters).

6.4. Regressions for Recalculated Costs

In addition to personnel costs, external costs, and other monetary costs, the data set contains information on the working effort of entrepreneurs and employees for tax compliance. This data can be used to control our regression results for errors by using an alternative estimation of overall compliance costs CC, tax-related costs TC, and social insurance related costs SC. Initially, we weight the working effort of the staff members of each business with the gross average labor costs of 48.76 € taken from our data set.[26] The average personnel cost per hour is considerably higher than the German average labor costs in 2003. This is not unexpected, in that tax and social-insurance-related compliance work is typically executed by entrepreneurs, management personnel, or professionals. Table 16 contains the regression

26 The gross average personnel costs per hour have been calculated as the average of the personnel costs per hour of all businesses within our data set. We also considered cases that have been interpreted as outliers in our original models. Ignoring these cases, we would obtain a value of 48.55 €. Thus, the average value of labor cost is robust with regard to outliers.

Table 17
Regression Results for Average Labor Costs in 2003

Target variable	CC (S model)	CC (E model)	TC (S model)	TC (E model)	SC (S model)	SC (E model)
Size	0.323*** (0.025)	0.328*** (0.039)	0.286*** (0.027)	0.274*** (0.034)	0.340*** (0.038)	0.316*** (0.053)
Employment	0.374 (1.072)	0.198 (1.169)	−0.314 (1.150)	−0.427 (1.215)	7.834*** (1.349)	7.435*** (1.402)
Outsourcing	−0.187*** (0.058)	−0.172** (0.068)	−0.135** (0.063)	−0.105 (0.068)	−0.306*** (0.070)	−0.300*** (0.079)
Capitalintensive	−0.004 (0.054)	0.027 (0.062)	−0.038 (0.061)	−0.022 (0.064)	0.096 (0.068)	0.127* (0.075)
EDIF	0.086 (0.137)	0.011 (0.158)	0.049 (0.121)	0.046 (0.128)	–	–
EDIFP	−0.150 (0.259)	−0.017 (0.309)	−0.001 (0.221)	0.034 (0.234)	–	–
EDIS	0.047 (0.120)	0.053 (0.141)	–	–	0.179 (0.125)	0.104 (0.140)
EDISP	0.084 (0.211)	−0.039 (0.235)	–	–	−0.154 (0.204)	−0.292 (0.228)
Cashaccounting	−0.340 (0.366)	−0.869 (0.629)	−0.097 (0.419)	0.057 (0.494)	–	–
Constant	4.824*** (1.129)	3.726*** (1.376)	5.096*** (1.215)	5.293*** (1.320)	−0.165 (1.366)	−1.273 (1.570)
R^2 (adjusted)	0.325	0.295	0.224	0.211	0.281	0.302
Cases	461	370	423	402	454	370

Notes: Dependent variable: logarithm of overall compliance costs (CC), tax-related compliance costs (TC), or social-insurance-related compliance costs (SC); standard errors in parentheses; *, **, *** denote significance at the 10%, 5%, 1% level. We use a WLS estimator with the logarithm of turnover as weighting factor. Within the simplified S models we include only the variables listed in this table, while the extended E models include further control parameters (see appendix 6.3 for a list of these parameters).

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

In order to control for a potential overestimation of labor costs per hour, we also calculated alternative values using the average German labor cost of 27.89 € in 2003.[27] Because tax work is regularly executed by entrepreneurs, management personnel, or professionals, a considerable underestimation of the true labor cost per hour is expected. Even under these assumptions, we find significant negative effects for outsourcing tax and social-insurance obligations. The result holds especially for social insurance related costs SC.

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

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