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ORIGINAL PAPER

Why do not all firms engage in tax avoidance?

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Abstract
Empirical evidence suggests that there is substantial cross-firm variation in tax avoidance. However, this variation is not well understood. This paper provides a theoretical background for testing, and thus explaining, cross-firm differences in tax avoidance. We develop a formal model with two agents to analyze the incentives that lead firms to engage in tax avoidance. The tax avoidance decision is a function of moral hazard, tax-planning costs, and the potential to increase earnings. If the potential to increase earnings is low, the tax-planning decision is determined by moral hazard problems. In contrast, when this potential is high, the tax-planning decision is mainly driven by tax-planning costs, such as reputational and political costs. One implication of our model is that moral hazard can (partly) explain why some firms do not engage in tax avoidance: Severe problems of moral hazard make tax avoidance less likely. Our model can be a basis for testing differences in tax avoidance between different types of firms.

Keywords Moral hazard · Tax avoidance · Tax planning

JEL Classification D21 · H26 · H32

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1 Introduction

Tax avoidance and aggressive tax planning have attracted the interest of media, academia, and policymakers.[1] Tax-planning activities generally increase after-tax cash flows (e.g., due to the optimization of the effective tax rate) and thus ultimately enhance firm value (e.g., Desai and Dharmapala 2009a). Engaging in tax-planning activities thus seems to be a reasonable strategy for every firm. However, empirical studies show that there is substantial cross-sectional variation in the extent to which firms engage in such practices. In contrast to what is widely assumed, the effective tax rates that some firms pay are close to or even above the statutory tax rate (Dyreng et al. 2008). Moreover, empirical studies that use the effective tax rate as a dependent variable typically report R-squared values below 15%.[2] Related to this, Gallemore et al. (2014, p. 1103) conclude that "[w]hile the evidence indicates there is wide variation in tax avoidance across firms, the extant literature has a difficult time explaining this variation." This paper aims to explain theoretically part of the the so-called "under-sheltering puzzle" (Weisbach 2002) in order to shed light on the perplexing empirical observation that not all firms engage equally, if at all, in tax avoidance.[3]

According to the recently proposed agency perspective of corporate tax avoidance (Desai and Dharmapala 2009a), most firms cannot be regarded as individual actors and therefore corporate tax compliance should be analyzed in a principal-agent framework (Slemrod 2004). In a related study, Chen et al. (2010, p. 42) argue that "the nature and extent of agency conflicts, such as the costs arising from hidden actions of managers, can affect the level of tax aggressiveness." Desai and Dharmapala (2006, 2009a, b) examine more closely the interrelation between moral hazard, the generation of earnings, and tax avoidance in an attempt to explain why not all firms engage in tax avoidance. These authors assume that the relation between opportunities for tax avoidance and opportunities for the diversion of rents is always positive. Being able to divert rents, however, constitutes an important counterforce to the otherwise unhampered engagement in tax-avoidance activities.

In this paper, we build on Desai and Dharmapala's idea (2006, 2009a, b) that the tax-planning decision is influenced by moral hazard. In contrast to them, we assume that after-tax earnings will be influenced by the decisions of the tax manager through her impact on the effective tax rate (ETR) and by the decisions of the CEO through her effect on pre-tax earnings. Further, we argue that owners use incentives

[1] Throughout the paper, the terms "tax avoidance" and "tax planning" are used synonymously to describe legal tax-planning activities.

[2] In the following papers, the highest reported R-squared ranges from 9.4 to 14.9% for cash-effective tax rates: Armstrong et al. (2012), Badertscher et al. (2013), Chen et al. (2010), Cheng et al. (2012), Dyreng et al. (2008), Dyreng et al. (2010), Hope et al. (2013), Kubick et al. (2015), Rego (2003), Rego and Wilson (2012). Dyreng et al. (2010) obtained an R-squared of 23.6% when including various fixed effects.

[3] Dyreng et al. (2019) provide an alternative explanation for this puzzle. They argue that firms can use their market power to pass on the tax burden to other stakeholders. In our model, we implicitly assume that the ability to pass on taxes to employees or consumers does not differ across firms. In contrast to Dyreng et al. (2019), we specifically consider agency issues.

to mitigate moral hazard that is associated with both types of decisions, with the ultimate goal of maximizing after-tax profits and shareholder value. Our approach thus responds to the criticism that "the theory on corporate tax avoidance in an agency framework is relatively young and is not well developed" (Hanlon and Heitzman 2010, p. 145). The ultimate aim of this paper is to develop a theoretical model of tax avoidance that embeds typical hierarchical corporate structures.

We develop a principal-agent-model with one principal (the firm owners) and two agents (a CEO and her subordinated tax manager), in which the agents provide unobservable effort towards generating earnings and towards tax-planning activities. We apply a two-tier hierarchy in the following way: The principal offers an incentive contract to the CEO. The CEO is incentivized on the basis of after-tax earnings (e.g., Armstrong et al. 2012; Graham et al. 2014). The CEO then offers an incentive contract to the tax manager, who is compensated on the basis of the outcome under her control, namely the ETR. This implies that the tax manager will earn higher wages if she is successful in tax planning (e.g., Armstrong et al. 2012). The general and intuitive outcome of our model is that a firm's decision to engage in tax planning rests on the balancing of expected benefits and costs associated with these activities.

In particular, the decision to engage in tax planning depends on the non-trivial interaction between (1) firm-level factors, such as the *probability of successful tax planning*, *reputational costs*, and *political costs*, (2) the need of providing monetary incentives to the tax manager and the CEO to exert effort for tax planning and generating earnings (*incentivization costs*), and (3) the effect of the CEO's effort on pre-tax earnings (the *potential to increase earnings*). These three factors, however, interact. Our model shows that firms with high firm-level costs, such as reputational or political costs, but low incentivization costs tend to engage in more aggressive tax planning if the potential to increase earnings is low. The reverse holds if the potential to increase earnings is high. In other words, if there is significant potential to increase earnings when the CEO exerts effort, the costs of incentivizing the managers matter less than the potential reputational or political costs the firm might face. Conversely, if this potential is limited, the incentivization costs become more important for the tax-planning decision than reputational or political costs.

To illustrate our model outcome, we apply the model to two specific cases, public versus private and family versus non-family firms. Both comparisons are relevant as more than half of GDP in OECD countries is generated in private firms.[4] Similarly, family firms account for more than half of GDP and jobs in the majority of countries.[5] The interpretation of these two cases serves as example for other comparisons across firms. In our case, one interpretation is unambiguous (public versus private firms), while the other (family versus non-family firms) is ambiguous. When comparing private and public firms, private firms are more likely to engage in tax planning than public firms because they face lower political and reputational costs as well as lower incentivization costs due to less separation of ownership and control. At the same time, they have a higher probability of being successful with their tax

[4] Source: http://siteresources.worldbank.org/CGCSRLP/Resources/SME_statistics.pdf.

[5] Source: http://www.ffi.org/page/globaldatapoints.

planning activities. Since these factors in our model point in the same direction, we would generally predict private firms to be on average more aggressive tax planners than public firms.[6]

When comparing family firms and non-family firms, the model's implications are ambiguous. Family firms face higher reputational costs than non-family firms, which reduces the likelihood that they engage in tax-planning activities. At the same time, the greater concentration of ownership and control in family firms reduces the magnitude of the moral hazard problem (Berle and Means 1932; Francis and Smith 1995; Shleifer and Vishny 1997) and thus the need of providing monetary incentives to agents. This increases the propensity of family firms to engage in tax avoidance. Our analysis shows that the final decision on whether to engage in tax avoidance critically depends on the firm's potential to increase earnings. Specifically, we find that if the potential to increase earnings is low, firms with low incentivization costs, such as family firms, are more likely to engage in tax planning. In contrast, if the potential to increase earnings is high, the tax-planning decision seems to be more determined by the extent of political and reputational costs, whereas incentivization costs become less important. In such cases, family firms are less likely to engage in tax planning. The application of our model to this case shows that in theory, the tax avoidance decision is not necessarily a trivial cost-benefit comparison as the resulting cost-benefit calculus and the relevance of certain costs depends on the potential to increase earnings.

Our analysis thus contributes to the recent analytical literature on delegated tax planning in a moral-hazard setting (Chen and Chu 2005; Crocker and Slemrod 2005; Desai and Dharmapala 2006; Ewert and Niemann 2014). Our approach with a two-tier hierarchy and two agents differs in several dimensions. Previous works, such as Chen and Chu (2005) and Crocker and Slemrod (2005) consider illegal tax minimization and have a normative focus. Chen and Chu (2005) analyze the efficiency of internal control mechanisms, while the primary focus of Crocker and Slemrod (2005) is to derive implications for policy makers who try to reduce illegal tax minimization. Ewert and Niemann (2014) investigate the determinants of tax avoidance in a principal-agent-model and consider corporate and individual income taxation. Desai and Dharmapala (2006) analyze the trade-off between tax avoidance and the diversion of rents by a manager and identify under which conditions stronger incentives and a reduced diversion of rents are associated with increased or decreased tax avoidance. They also examine how this link may depend on whether there are weaker or stronger governance structures. However, Desai and Dharmapala (2006) assume that earnings, governance structures, and the contract are exogenous, which implies that the manager is the only decision-maker in their model. Thus, in their study, there is no strategic interaction between owners and manager(s); moreover, the authors assume, but do not explicitly model, a setting of moral hazard.

[6] Since private firms have a higher success probability for aggressive tax planning activities, firms might have to pay higher wages to the tax manager. This effect occurs because tax managers are paid partially based on their success in tax planning e.g., (Armstrong et al. 2012). This effect may reduce the propensity of tax planning in private firms. However, it is unlikely that this effect dominates in our model.

Our model's results imply that specifically considering the strategic interaction between owners and managers is important for the model outcomes. In contrast to Desai and Dharmapala (2006, 2009a, b), our model shows that greater opportunities for rent diversion make tax avoidance less attractive. The reason for this difference is that Desai and Dharmapala (2006) assume that tax avoidance opens up opportunities for the diversion of rents in the first place and do not endogenously solve the underlying moral hazard problem. In our approach, the existence of moral hazard and therefore of opportunities for rent diversion make tax avoidance less attractive. A firm may need to increase compensation as an incentive to deal with the problems of moral hazard it faces and this increase should be proportional to the severity of moral hazard. As a result, tax avoidance becomes less likely.

Our paper also has implications for the empirical literature on tax avoidance (e.g., Dyreng et al. 2008, 2010; Gallemore and Labro 2015; Gupta and Newberry 1997; Kubick et al. 2015; Rego 2003; Richardson and Lanis 2007) as it sheds light on why not all firms might engage in tax planning or have the same level of tax avoidance (e.g., Dyreng et al. 2008; Hanlon and Slemrod 2009; Weisbach 2002). We show in an analytical model that there is an interactive effect of firm and governance characteristics on the level of tax planning. More specifically, our model implies that the impact of separating ownership from control on tax avoidance depends on the potential to increase earnings. This may have implications for future empirical work on tax avoidance.

2 Definition and costs of tax planning

2.1 Definition of tax planning

Before elaborating on the various costs in greater detail, we need to clarify how tax planning is understood in this paper since there is no standard definition of this term (Hanlon and Heitzman 2010). Desai and Dharmapala (2009b) describe tax-planning activities as "transactions that have no purpose other than tax avoidance" and, referring to Michael Graetz, define tax shelters as something "done by very smart people that, absent tax considerations, would be very stupid" (Desai and Dharmapala 2009b, p. 170). We restrict tax planning to legal activities and exclude all illegal activities. While firms may evade taxes, a criminal offense, the incentives to evade taxes substantially differ from legally avoiding taxes, for example, because of fines, penalties, and detection risk. We focus on explaining why some firms engage in legal tax planning activities.[7]

Although, in principle, our model is open to other interpretations that have been suggested in the literature (Hanlon and Heitzman 2010), we define tax planning as costly legal activities that firms pursue to optimize their tax burden. However, tax planning includes a legal gray area given that some tax-planning activities may not

[7] Including penalties and detection risk would be possible in our model, for example, by including expected fines in the cost of tax avoidance.

be deemed acceptable by government agencies. In fact, there are several legal activities that may not be accepted by the tax authorities, which makes their outcomes uncertain. This is why listed U.S. firms are mandated to disclose uncertain tax benefits (UTB) in their financial statements.

Our outcome measure of tax planning in the model is the ETR, which is commonly used in empirical studies (for an overview see, e.g., Hanlon and Heitzman 2010). Since we will use a single-period model to focus on moral hazard, earnings are equal to cash and there are no accruals. Hence, GAAP and Cash ETRs are the same in our model. This way, we do not capture reductions in tax payments, for example, via bonus depreciation. However, our model conceptually captures other tax avoidance strategies in an abstract way. For example, cross-border profit shifting activities might be overturned by tax authorities. In our setting, a lower effective tax rate can be achieved either by reducing taxable income while holding pre-tax earnings constant or by shifting taxable profits to a low-tax country. For example, consider a firm with earnings of 100 and a tax rate of 30%. The firm can either shift the entire profit to a low-tax country with a tax rate of, e.g., 15% (i.e., the total tax base remains constant) or reduce the taxable income in the high-tax country to 50 while keeping earnings constant at 100 (i.e., the total tax base is reduced). Both tax-planning alternatives result in an effective tax rate of 15% while consolidated pre-tax earnings are kept constant. In our model, we represent these two potential effects by the difference in effective tax rates.

2.2 Costs of tax planning

Firms face a variety of costs when engaging in tax planning. Some of the monetary costs of tax avoidance, such as expenses for tax consulting or for running a tax department, are direct costs. These costs may depend on firm size and other financials (e.g., Rego 2003). In addition to these, there are potential costs that depend on the characteristics of corporate governance and ownership. These include listing status, family influence, and the magnitude of moral hazard problems a firm faces. Among these additional costs, reputational costs and political costs are firm-level costs and incentivization costs are manager-level costs. In the following, we discuss these costs in more detail.

2.2.1 Reputational costs

Reputational costs capture the idea that firms and their owners can suffer psychological costs if their brand name, firm name, or owner name(s) are associated with negative publicity or public perception as a result of tax-planning activities (Graham et al. 2014). Such activities could also trigger a backlash from stakeholders, such as consumers or shareholders, which would have indirect and undesirable monetary effects (Bankman 2004; Graham et al. 2014; Hanlon and Slemrod 2009). Although stakeholders are likely to be heterogeneous in their views on tax avoidance, some stakeholders like firms to pay taxes (Bankman 2004; Chyz et al. 2013). After all, taxes are funds that governments (ideally) spend in the interest of these stakeholders.

If firms try to avoid taxes, at least some stakeholders may feel that they are being short-changed.

Some earlier works stressed that reputational concerns may matter as a factor in a firm's tax avoidance decision (Bankman 2004). For example, Ernst and Young (2011) report that 89% of the largest companies they had surveyed responded that they were concerned about the media coverage of taxation. The study stresses that media reports on tax affairs can hurt "brand reputation and—in the worst case—shareholder value, even when such coverage is unwarranted or inaccurate" (Ernst and Young 2011, p. 6). An illustrative example is the case of Starbucks in the United Kingdom, which is mentioned by Austin and Wilson (2015): Reuters uncovered that while Starbucks reported zero profits for tax purposes in the U.K., at the same time it portrayed its profits as far higher towards analysts and investors.[8] After a barrage of public accusations of tax avoidance by a number of politicians, Starbucks U.K. declared willingness to voluntarily pay a large sum of additional taxes, although the company had not apparently violated any legislation. This concession by Starbucks U.K. shows how important the public perception of a firm as a good citizen, and therefore as a proper tax-payer, may be to many companies.

While Hanlon and Slemrod (2009) and Austin and Wilson (2015) report a number of significant indications that reputational costs matter, Gallemore et al. (2014, p. 1105) conclude that they do "not observe a reputational effect of tax sheltering." However, Hanlon and Heitzman (2010) have already pointed out the difficulties in isolating reputational costs in tax-planning strategies on the basis of archival data: Firms to whom reputation matters most will not invest in tax planning in the first place. For this reason, Graham et al. (2014) conduct a survey of 600 corporate tax executives. The authors identify reputational costs as the second most important factor that determines a firm's tax-planning decision, with 69% of the surveyed executives rating reputational concerns as important. Similarly, Austin and Wilson (2015) show that firms that face a potentially large reputational damage are less likely to avoid taxes. Furthermore, there is experimental evidence that provides empirical support for reputational costs of tax avoidance (e.g., Hardeck and Hertl 2014; Antonetti and Anesa 2017). In sum, anecdotal, survey, and experimental evidence suggests that reputational concerns do play a role in determining how firms decide what extent of legal tax avoidance they should engage in.

2.2.2 Political costs

The second category of firm-level costs are political costs (Watts and Zimmerman 1986, 1990). There are many dimensions of political costs that can occur for firms. First, political costs arise when firms' revenues depend on the government, either directly because the firm contracts with the government or indirectly because the firm heavily depends on government regulation (e.g. oil and gas industry, gambling industry). To give a more precise example, for firms that operate as federal contractors, the risk of seeing their business with the government shrink is a motive for refraining from

[8] http://uk.reuters.com/article/us-britain-starbucks-tax-idUKBRE89E0EX20121015.

tax avoidance (Mills et al. 2013). Second, avoiding scrutiny by government agencies is another motive that leads firms to refrain from tax planning (Han and Wang 1998; Key 1997; Ramanna and Roychowdhury 2010). If the relationship between a firm and the tax authority degenerates into distrust, this firm can expect to be under constant surveillance (Badertscher et al. 2009). In this case, an increase in costs can result from, e.g., devoting more resources to the preparation of financial statements or losing the favor of the tax authorities and thus having fewer opportunities for tax avoidance in the future. Finally, political costs arise as tax avoidance can trigger public outcry and consequently tax law changes (e.g., the OECD BEPS initiative) or intensified tax audits (e.g., the implementation of large taxpayer units).

With regard to political costs, so far the literature has focused mainly on political visibility and accounting accruals (Fields et al. 2001; Han and Wang 1998; Watts and Zimmerman 1990). However, the basic line of argumentation these studies follow can be straightforwardly generalized to cases of tax avoidance—a link Zimmerman (1983) has already made. Indeed, accruals are often used in tax avoidance (Fields et al. 2001) and Zimmerman (1983) regards the (change in) ETR as an important element of political costs. In a similar vein, Mills et al. (2013) argue that in the U.S., federal contractors are sensitive to political costs and find that, all else being equal, these firms pay higher federal taxes, so their results provide strong support for the hypothesis that tax avoidance can entail significant political costs.

2.2.3 Incentivization costs

The final category we consider results from the need to provide monetary incentives to agents in situations of moral hazard. In contrast to the other two cost categories, which represent firm-level costs, costs of providing monetary incentives, denoted as *incentivization costs*, are incurred because of the delegation of tasks to a professional management. The need to provide agents with monetary incentives differs, for example, depending on the degree of ownership concentration and the overlap of ownership and management. To be more precise, the same effort requires stronger monetary incentives for lower degrees of ownership concentration or less overlap of ownership and management. Given that tax planning is delegated to an agent—typically, the tax manager (Crocker and Slemrod 2005)—a firm needs to provide sufficient incentives to motivate the tax manager to exert high effort. The magnitude of these agent-level costs depends on how much a firm needs to pay a manager so that she exerts effort towards tax planning. Incentivization costs are a measure of how difficult it is to motivate managers to exert effort in a setting of moral hazard and can thus be viewed as an indicator of the severity of the moral-hazard problem a firm faces.

3 Model assumptions

We base our model on a two-tier hierarchy, which we illustrate in Fig. 1. Firm owners hire a CEO to engage in the generation of earnings and to contract with a tax manager whose responsibility is tax planning. As in standard models of moral

hazard, we assume that the CEO's interest might differ from that of the firm owners. The tax manager's interest might in turn differ from that of the CEO (and the firm owners). CEO and tax manager are assumed to behave in an opportunistic way that maximizes solely their individual utility. In order to align interests, firm owners in their relationship with the CEO and then also the CEO in her relationship with the tax manager need to implement an effective incentive system.

The CEO is responsible for after-tax earnings of the firm.[9] This involves responsibility for generating earnings by means of exerting own effort and for providing the tax manager with incentives. Therefore, she coordinates pre-tax earnings generation and incentives for tax planning in order to achieve optimal overall results. Accordingly, in our model her compensation will be based on after-tax earnings, reflecting her responsibility for both, the generation of pre-tax earnings and for providing the tax manager with incentives. Such a model structure is consistent with empirical evidence (Armstrong et al. 2012). We perceive after-tax earnings in our model as the net earnings of the firm that can be paid out to the owners. Since we use a single-period model, these earnings reflect shareholder value, which the firm owners in their role as the principal strive to maximize. In other words, the CEO's performance measure, namely after-tax earnings, directly reflects shareholder value in our setting.[10]

In case of tax planning, we assume that the ETR serves as an appropriate performance measure to evaluate the tax manager's effort (Armstrong et al. 2012; Crocker and Slemrod 2005; Graham et al. 2014). Her salary then correlates negatively with the resulting ETR (Crocker and Slemrod 2005). Among others, Armstrong et al. (2012) and Graham et al. (2014) provide empirical evidence to support this assumption. The tax manager's main responsibility therefore is the ETR (Robinson et al. 2010; Shackelford and Shevlin 2001).

From the firm owners' perspective, the idea that the responsibilities for the ETR and for earnings are separated is supported by the literature. Specifically, Armstrong et al. (2012) show that while tax directors have incentives to manage the ETR, there are no such incentives for the CEO. In our model we reflect these findings by using two agents, one responsible for the ETR and the other responsible for the earnings figure. However, owners are aware of this structure and anticipate what will happen in the internal hierarchy between CEO on the one side and the tax manager on the other side when designing their contract with the CEO.

In practice, the decisions on tax planning and earnings generation will often be taken in a simultaneous manner throughout the typical operations of a firm. In any given year, the tax department is responsible for the task of tax planning, while at the same time, the other departments are involved in performing the task of generating earnings. At the end of the fiscal year, the outcomes (i.e., the ETR and earnings) are

[9] These are the consolidated after-tax earnings of the firm and all its subsidiaries. We do not model a certain group structure. Whenever, we speak about the "firm", we imply that this is the entire consolidated group.

[10] We acknowledge that we abstract from modeling different compensation packages, e.g., a combination of fixed pay and variable pay in our model. We leave this for future research.

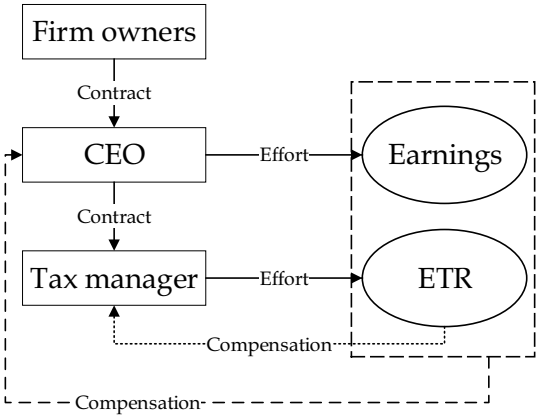

Fig. 1 Two-tier hierarchy

observed. In the case of listed firms, for example, these outcomes are disclosed to the public in the form of information on the ETR and on the firm's profitability. A different and also highly relevant setting involves a sequential order of tax-planning activities and the generation of earnings. Such a scenario emphasizes that tax accounts are typically among the last accounts to close before earnings announcements. The reason for this is the length of the time it takes to complete IRS audits (Dhaliwal et al. 2004). Hence, the generation of earnings might precede the tax-planning decision (e.g., Chen and Chu 2005; Crocker and Slemrod 2005; Desai and Dharmapala 2006).

In order to account for the various ways how firms engage in tax planning and the generation of earnings, our model allows for varying sequences of these activities. In particular, our model can be applied to simultaneous decisions (Model: *S*) and sequential decisions where tax-planning succeeds the generation of earnings (Model: *ET*). In reality, it is not clear whether the sequence is a choice variable or not. While there might be arguments that a firm's business model may exogenously determine the sequence of decisions, there are also cases in which the sequence is at the firm's discretion. For example, some business models may allow firms to first observe the success of earnings generation (e.g., the success of a patent application) before optimizing the tax strategy. For these reasons, we keep the model as flexible as possible. Specifically, when interpreting the model, we first discuss both sequences separately as if they were exogenously given. In subsequent steps of our interpretation, we endogenize the sequence, that is, we treat the sequence as a choice variable of firms. If not already in the short-run, we would expect the sequence of decision to be endogenous at least in the long-run. The possible timing of events is depicted in Fig. 2.[11]

We build on a standard hidden-action model (Schmitz 2005), to which we introduce hierarchical contracting responsibilities. At the initial stage $\tau = 0$, the principal (i.e.,

[11] Our model does not include an interest rate, because all parties' final payoffs are realized at $\tau = 2$ or $\tau = 3$, respectively. We do not consider any interactions that occur thereafter.

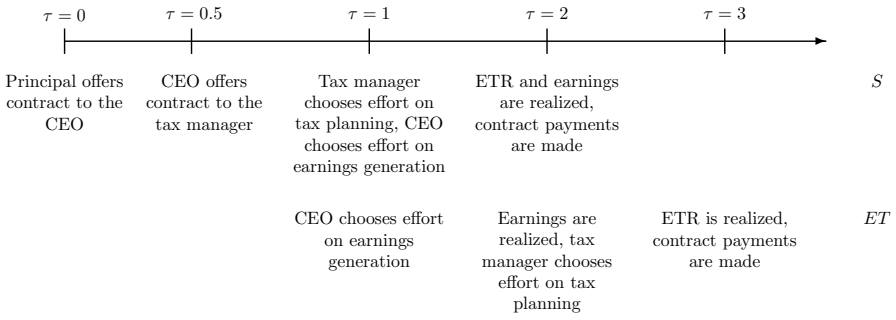

Fig. 2 Timelines

the firm owners) contracts with an agent, the CEO, who performs productive effort $a_x \in \{0, 1\}$ on the generation of earnings, and designs a contract with a second agent, the tax manager, who is responsible for tax planning activities $a_t \in \{0, 1\}$. Both agents can thus provide either high (1) or low (0) effort on their productive tasks. The tax manager's effort costs[12] are given by $\gamma(a_t, s, m)$, where we assume $\gamma(1, s, m) = \gamma(s, m)$ and $\gamma(0, s, m) = 0$; that is, the tax manager incurs no effort costs if she exerts low (standard) effort for tax-planning activities. The idea that a tax manager's effort affects the tax-planning outcome is consistent with the manager fixed effect shown in Dyreng et al. (2010) and with the role of managerial ability in tax avoidance (Koester et al. 2016).

The CEO's effort costs for generating earnings are given by $\kappa(a_x, s, m)$, where $\kappa(1, s, m) = \kappa(s, m)$ and $\kappa(0, s, m) = 0$. In both effort cost functions, $\kappa(\cdot)$ and $\gamma(\cdot)$, the parameter s denotes the listing status, parameter m the family status, where higher values of s and m signify firms with stronger private or family rather than public or non-family characteristics.[13] We expect that incentivization costs are lower for private than for public firms ($\frac{\partial \kappa(a_x,s,m)}{\partial s} < 0$ and $\frac{\partial \gamma(a_t,s,m)}{\partial s} < 0$) and lower for family than for non-family firms ($\frac{\partial \kappa(a_x,s,m)}{\partial m} < 0$ and $\frac{\partial \gamma(a_t,s,m)}{\partial m} < 0$) and discuss this assumption in more detail in Sect. 7.

The tax-planning activities can result in either a low tax rate $t = t_l$ for the company or in a high tax rate $t = t_h$. We model successful tax planning as a decrease in the effective tax rate from t_h to t_l. The tax manager's effort impacts the probability of the outcome of the tax-planning activity: if the tax manager exerts effort $a_t = 1$, the outcome of the tax-planning activity is favorable (i.e., $t = t_l$) with probability $p_1(s)$. The probability $p_1(s)$ is smaller than 1 because the outcome of tax-planning activities involving, e.g., certain holding structures or tax-optimized transfer-pricing

[12] The effort costs associated with tax planning include all costs that organizing and restructuring entail, such as networking, organizing majorities, and convincing others (see, e.g., Feller and Schanz 2017).

[13] We model a continuum of private/public because firms can have publicly traded equity and/or debt. Put differently, there are firms who are not listed (fully private), firms with publicly traded debt but private equity, or firms for which both, debt and equity are traded (fully public). While this is actually stepwise, we simplify the model and use a continuous variable for listed. Similarly, we model family firms as a continuum following the approach in Astrachan et al. (2002).

regimes, is typically uncertain. Aggressive tax strategies may not be accepted by the tax authority and entail a risk of unfavorable tax settlements in a tax audit (e.g., Bauer and Klassen 2014; Dyreng et al. 2014; Mills et al. 2010). If the tax manager exerts low effort (i.e., $a_t = 0$), the outcome of the tax-planning activity can still be favorable for the firm owners. In that case, the tax rate will be low with probability $p_0(s) < p_1(s)$, either because of favorable developments in the regulatory environment or because there are tax-planning opportunities of which the firm can take advantage without much effort.

We assume that the success probabilities of tax planning activities depend on firm- and/or industry-specific characteristics and particularly highlight the role of the listing status in our model since this is a governance-related variable. Because of their reduced financial reporting requirements, non-listed firms have better opportunities to hide their (aggressive) tax planning activities and are therefore more likely to be successful tax planners than public firms. All else equal, the latter are under more scrutiny by media or tax authorities. For example, there is evidence that the IRS uses public firm disclosures such as FIN48 disclosures (Bozanic et al. 2017). These public FIN48 disclosures are not available for private firms. However, listing status is just one example and one can easily think of other factors that influence on the success probabilities of tax planning. More specifically, these success probabilities may also depend on individual tax manager characteristics. As argued by Feller and Schanz (2017), some tax managers have more power in the firm because they are more successful in their tax planning activities.[14] This results in the following likelihood structure for tax rates:

	Probability Low Tax Rate	**Probability High Tax Rate**
High Effort	$\text{Prob}[t = t_l \mid a_t = 1] = p_1(s)$,	$\text{Prob}[t = t_h \mid a_t = 1] = 1 - p_1(s)$,
Low Effort	$\text{Prob}[t = t_l \mid a_t = 0] = p_0(s)$,	$\text{Prob}[t = t_h \mid a_t = 0] = 1 - p_0(s)$.

The earnings-generation activity results in either high or low pre-tax earnings x; that is, $x \in \{x^H, x^L\}$. Here, the CEO's effort choice has an impact on the probability of high earnings. Specifically, if the CEO exerts $a_x = 1$, the probability of high earnings is q_1. However, even if the CEO exerts low effort $a_x = 0$, earnings can still be high with a positive probability q_0, where $q_0 < q_1$. The rationale behind this specification is that earnings are also influenced by economic conditions and by the competitive environment in which the firm operates. Therefore, the firm may obtain high earnings even if the CEO exerts low effort; in the latter case, however, the probability is lower than it would be if high effort was invested. This results in the following likelihood structure for earnings x:[15]

[14] Note that such managers will earn higher wages in our model consistent with the argument in Feller and Schanz (2017) that more powerful tax managers, i.e., the ones with higher success rates, earn higher wages.

[15] Our model thus separates operational risk (q_1) and tax risk ($p_1(s)$) and assumes that these risks are not correlated. This is in line with the empirical observation that firms face different types of uncertainty (Stein and Stone 2013). For example, firms increase their cash holdings to use them as a buffer for tax uncertainty (Hanlon et al. 2016). While controlling for general firm risk (q_1), Jacob et al. (2019) show that tax uncertainty ($p_1(s)$) can delay large investments. In other words, firms face a tax risk (i.e., the risk of large unfavorable tax payments) in addition to general firm risk (Bauer and Klassen 2014).

	Probability High Earnings	**Probability Low Earnings**
High Effort	$\text{Prob}[x = x^H \mid a_x = 1] = q_1$,	$\text{Prob}[x = x^L \mid a_x = 1] = 1 - q_1$,
Low Effort	$\text{Prob}[x = x^H \mid a_x = 0] = q_0$,	$\text{Prob}[x = x^L \mid a_x = 0] = 1 - q_0$.

The CEO's pay is based on after-tax earnings x_{at}, which can embrace the following realizations: $x_{at} = \{x^H(1-t_l), x^L(1-t_l), x^H(1-t_h), x^L(1-t_h)\}$. Note that wage costs are tax deductible and will therefore reduce the tax base and recall the twofold function of the CEO's contract: To provide her with incentives to (a) exert own effort and (b) incentivize the tax manager in accordance with the owners' interests.

At the firm level, the principal incurs different types of costs that are associated with the tax-planning decision as described above. The direct costs of tax planning, k, such as the costs for running a tax department, are incurred if the firm needs the infrastructure to engage in aggressive tax planning. These costs are likely to vary with, e.g., firm size or degree of internationalization, but are independent of the outcome of tax planning (t_l or t_h) and of other corporate governance characteristics, such as listing or family status, or the severity of moral hazard problems. In contrast, whether reputational and political costs are incurred depends on the outcome of the tax-planning activity. We assume that reputational and political costs $\delta(s, t_l, m)$ will be incurred only when the tax rate is low (t_l). The idea behind this premise is that stakeholders can only observe the tax-planning outcome, t_l or t_h, but not the actual effort. In line with such an assumption, in practice, the ETR is typically used as an observable measure of tax avoidance (Dyreng et al. 2008; Hanlon and Heitzman 2010). We assume political and reputational costs to be lower for private than for public firms $\left(\frac{\partial\delta(s,t_l,m)}{\partial s} < 0\right)$ and higher for family than for non-family firms $\left(\frac{\partial\delta(s,t_l,m)}{\partial m} > 0\right)$. We relegate the reader to Sect. 7 for further motivation of this assumption.

We specify contracting as follows: At $\tau = 0$, the principal offers wage profile $w^{CEO} = \{w(t_l, x^H), w(t_l, x^L), w(t_h, x^H), w(t_h, x^L)\}$ to the CEO, where, e.g., $w(t_l, x^H)$ indicates the wage payment the CEO receives when the tax rate is low (t_l) and pre-tax earnings are high (x^H). The CEO offers wage profile $w^{TAX} = \{w(t_l), w(t_h)\}$ to the tax manager, where $w(t_l)$ indicates the wage payment for the tax manager if tax planning was successful and, as a consequence, the ETR is low. Wages must be non-negative because we impose constraints of limited liability.[16] What is more, all parties are assumed to be risk-neutral and there is no pre-contractual information asymmetry between the parties. The agents have no wealth and their reservation utilities are set to zero.

4 Tax planning in the first-best setting

When effort choices are observable, the participation and limited liability constraints bind. The principal can motivate four combinations of efforts, $(a_t, a_x) = \{(1,1), (1,0), (0,1), (0,0)\}$, where a_t denotes effort incentivization in

[16] Hence, we implicitly assume that there are no losses. Hence, firms cannot run into the problem of an asymmetric tax treatment of profits and losses.

terms of tax avoidance and a_x denotes effort incentivization in terms of earnings generation.[17] For example, the combination $(a_t, a_x) = (0, 1)$ denotes the case where the principal motivates high effort on the generation of earnings, but without stipulating the motivation of high effort on tax planning. The agents receive a compensation equal to their effort costs, i.e., the tax manager receives a compensation $w^{TAX} = \gamma(s, m)$, if she exerts high effort on tax planning, and zero compensation otherwise. The CEO receives $w^{CEO} = \kappa(s, m)$, if she exerts high effort on the generation of earnings, and likewise zero compensation otherwise. The direct costs of tax planning k are only incurred if the principal wants the tax manager to exert effort, i.e., if she motivates $a_t = 1$. Reputational and political costs $\delta(s, t_l, m)$ on the other side solely depend on the outcome of tax planning, i.e., the tax rate. Reputational and political costs can therefore also arise in cases where the principal does not want the tax manager to exert high effort on tax planning, but a favorable outcome (i.e., a low tax rate) is nonetheless realized.

To see under what circumstances tax planning is beneficial, we distinguish situations where high and low effort on the generation of earnings is motivated. In the first situation, where high effort on the generation of earnings is motivated, we compare the principal's payoffs with and without tax planning, i.e., case (1, 1) to case (0, 1). Accordingly, in the second situation, we compare the principal's payoff if she only wants the tax manager to exert high effort with the setting in which both agents are not provided with any incentives, i.e., case (1, 0) to case (0, 0). This leads us to the following proposition:

Proposition 1 *In the first-best setting, motivating high effort on tax-planning activities is beneficial for the firm, if the following conditions are fulfilled*:

$$\begin{aligned} k + [p_1(s) - p_0(s)]\delta(s, t_l, m) + \{[1 - p_1(s)](1 - t_h) + p_1(s)(1 - t_l)\}\gamma(s, m) \\ < [p_1(s) - p_0(s)](t_h - t_l) \cdot [q_1 x^H + (1 - q_1)x^L - \kappa(s, m)] \end{aligned} \tag{1a}$$

if the principal motivates $a_x = 1$ *and*

$$\begin{aligned} k + [p_1(s) - p_0(s)]\delta(s, t_l, m) + \{[1 - p_1(s)](1 - t_h) + p_1(s)(1 - t_l)\}\gamma(s, m) < \\ [p_1(s) - p_0(s)](t_h - t_l) \cdot [q_0 x^H + (1 - q_0)x^L] \end{aligned} \tag{1b}$$

if the principal motivates $a_x = 0$.

Proof See the Appendix. □

The expressions involve the cost-benefit trade-off discussed in literature (e.g., Dyreng et al. 2019). The right sides of expressions (1a) and (1b) comprise the potential benefits of tax planning. Those benefits are realized with greater probability when tax planning is done aggressively instead of the execution of only routine

[17] Note that in a first-best setting, where effort choices are observable, the hierarchical structure does not play a role for the results. We therefore assume that the principal directly contracts with both agents.

activities ($p_1(s) - p_0(s) > 0$). Benefits themselves are due to a reduction of the ETR ($t_h - t_l$) and their magnitude also depends on expected earnings, which differ according to whether the principal wants the CEO to exert effort (1a) or not (1b).

The costs of aggressive tax planning on the left sides of expressions (1a) and (1b) comprise (1) the direct costs of tax planning, (2) political and reputational costs, and (3) the wage costs to compensate the tax manager for her exertion of effort. As we discussed more extensively above, in contrast to direct costs of tax planning, political and reputational costs only occur whenever a low tax rate t_l is observed. However, the probability of a low tax rate is increased whenever there is aggressive tax planning. The necessity to compensate the tax manager for her effort costs is the last important determinant of the tax planning decision and needs some further elaboration. Effort is observable in the first-best situation. Therefore, whenever the tax manager is mandated to engage in aggressive tax planning, additional wage costs γ arise. However, one needs to consider that wages are tax deductible. Since the outcome of aggressive tax planning is uncertain, the expected ETR in cases of aggressive tax planning calculates as $\{[1 - p_1(s)]t_h + p_1 \cdot t_l)\}$. Wage costs of compensating the tax manager for engaging in aggressive tax planning are thus reduced by $\gamma(s, m)$ times this ratio.

We note that the agents cannot extract any rents in the first-best setting. As a consequence, the overall profit of the firm is higher than in the second-best case. We will use the insights from the first-best case as a reference point for our subsequent analyses.

5 Tax planning in the second-best setting

In the following, we separately analyze the two different sequences described in Fig. 2 in order to identify conditions under which it is beneficial for the firm owners to engage in tax-planning activities when the sequence of effort decisions is given (i.e., simultaneous decisions or sequential decisions). As a final step, we endogenize the sequence and perform a global comparison of settings.

5.1 Simultaneous choices

As in the first-best setting, the principal can again motivate four combinations of effort, $(a_t, a_x) = \{(1, 1), (1, 0), (0, 1), (0, 0)\}$, but now she cannot observe the agents' efforts. The CEO in turn cannot observe the tax manager's effort. Only outcomes are observable. This leads to a two-stage hierarchical moral hazard problem between firm owners and CEO at stage 1, and between CEO and tax manager at stage 2.

We solve the model by using backward induction and start at the lower hierarchical level, i.e., with the contracting relationship of CEO and the tax manager. The CEO must ensure that the tax manager participates in the contract and is willing to provide desired effort. The incentive compatibility constraint makes sure that the tax manager's expected utility when exerting effort is at least as high as when she slacks off. The participation constraint is automatically fulfilled if we

impose restrictions of limited liability, i.e., wage payments cannot be negative. In equilibrium, only the incentive compatibility constraint and constraints of limited liability bind. As the CEO does not want to reward the tax manager for low effort, she sets the wage $w(t_h)$ equal to zero. Calculating the wage payment $w(t_l)$ then gives the tax manager's optimal compensation scheme presented in Lemma 1.

Lemma 1 *The optimal wage profile that the CEO offers the tax manager is given by*

$$w^{TAX} = \left\{ \frac{\gamma(s,m)}{p_1(s) - p_0(s)}, 0 \right\}.$$

Proof See the Appendix. □

In a next step, we move to the second-last stage of the game. At this stage, the CEO is willing to exert high effort on the generation of earnings if her expected utility when exerting high effort is larger than the expected utility when slacking off. Since this condition differs depending on whether the CEO motivates the tax manager to exert high effort on tax planning or not, her resulting incentive compatibility constraint is twofold. Moreover, the firm owners need to make sure that the CEO provides the tax manager with the desired incentives and is willing to transfer corresponding pay. The resulting contracting constraints ensure that for both cases, i.e., whether the CEO is motivated to provide high or low effort towards the generation of earnings, the CEO's expected utility when providing the tax manager with incentives exceeds her expected utility when she does not provide any incentives and therefore also does not transfer any pay. Therefore, the optimal contract for the CEO provides her with incentives (1) to invest effort on the generation of earnings and (2) to design the appropriate (i.e., in the firm owners' interest) contract for the tax manager. As a consequence, if firm owners are interested in tax planning effort, but not in the generation of earnings, they still need to pay the CEO a positive amount in order to motivate her to appropriately design the contract with the tax manager. On the other hand, the contracting constraints only bind if the firm owners want the CEO to provide the tax manager with incentives to exert high effort on tax planning. Formulating the resulting constraints and solving for the respective wage payments $w(t, x)$ yields the optimal wage profile that the principal offers to the CEO. Lemma 2 summarizes the results.

Lemma 2 *The optimal wage profile that the firm owners offer the CEO is given by*

$$w^{CEO} = \left\{ \frac{p_1(s) \cdot \gamma(s,m)}{[p_1(s) - p_0(s)]^2} + \frac{\kappa(s,m)}{q_1 - q_0}, \frac{p_1(s) \cdot \gamma(s,m)}{[p_1(s) - p_0(s)]^2}, \frac{\kappa(s,m)}{q_1 - q_0}, 0 \right\}.$$

Proof See the Appendix. □

For analyzing under what circumstances tax planning proves beneficial, we again compare the firm owners' payoffs in cases (1, 1) and (0, 1), representing a situation where they desire high effort on the generation of earnings. In addition,

we compare payoffs for cases (1, 0) and (0, 0) to capture a situation, in which only low effort on the generation of earnings is motivated. Proposition 2 summarizes the results.

Proposition 2 *In a simultaneous setting, when effort choices are unobservable, the firm owners benefit from inducing the CEO to motivate tax-planning activities if the following conditions are fulfilled:*

$$k + [p_1(s) - p_0(s)] \cdot \delta(s, t_l, m) + p_1(s) \cdot (1 - t_l) \cdot \frac{p_1(s) \cdot \gamma(s, m)}{[p_1(s) - p_0(s)]^2} < [p_1(s) - p_0(s)] \cdot (t_h - t_l) \cdot \left\{ q_1 \cdot \left[x^H - \frac{\kappa(s, m)}{q_1 - q_0} \right] + (1 - q_1) \cdot x^L \right\} \tag{2a}$$

if $a_x = 1$ *is motivated and*

$$k + [p_1(s) - p_0(s)] \cdot \delta(s, t_l, m) + p_1(s) \cdot (1 - t_l) \cdot \frac{p_1(s) \cdot \gamma(s, m)}{[p_1(s) - p_0(s)]^2} < [p_1(s) - p_0(s)] \cdot (t_h - t_l) \cdot [q_0 \cdot x^H + (1 - q_0) \cdot x^L] \tag{2b}$$

if $a_x = 0$ *is motivated.*

Proof See the Appendix. □

The tax-planning decision is a function of the costs of tax planning, shown on the left sides of expressions (2a) and (2b), and of the expected benefits of tax planning, shown on the right sides of the same expressions. The expected net tax savings comprise the difference in ETRs in cases of successful and unsuccessful tax planning $(t_h - t_l)$ and the tax base, which reflects the expected earnings net of the wage costs of generating earnings, i.e., $q_1 \cdot \left[x^H - \frac{\kappa(s, m)}{q_1 - q_0} \right] + (1 - q_1) \cdot x^L$ in case of high effort on earnings generation (2a) and $q_0 \cdot x^H + (1 - q_0) \cdot x^L$ in case of low effort on earnings generation (2b). Ultimately, the likelihood to obtain the benefits is increased if the firm engages in aggressive tax planning $(p_1(s) - p_0(s) > 0)$.

Concerning the costs of tax planning, the wage necessary to motivate the CEO to efficiently contract with the tax manager such that the tax manager engages in aggressive tax planning amounts to $\frac{p_1(s) \cdot \gamma(s, m)}{[p_1(s) - p_0(s)]^2}$ whenever a low ETR is observed. High effort leads to a low ETR with probability $p_1(s)$. The wage costs that are incurred for incentivizing the tax manager are reduced by the multiplier $(1 - t_l)$, because the tax manager's remuneration is tax deductible. Political and reputational costs arise whenever a low ETR is observed as discussed above. The likelihood of a low ETR increases if the firm owners opt to provide incentives for aggressive tax planning $(p_1(s) - p_0(s) > 0)$. Direct costs of tax planning k are incurred whenever aggressive tax planning is motivated.

These observations allow us to identify some of the factors that underlie potential differences across firms. One of these factors related to the benefits of aggressive tax planning is the increase in probability of a low ETR. A second factor is the magnitude of the expected benefits from tax planning which is expressed as the difference in tax rates in our model. In other words, before a firm engages in tax-planning activities, it considers the extent to which its tax rate can be reduced; that is, the difference $t_h - t_l$. The larger this difference is, the higher is the propensity of firms to engage in aggressive tax planning. Again, this difference varies across firms and/or industries. For example, multinational firms have easier access to cross-border profit-shifting opportunities, while purely domestic firms have fewer tax-planning opportunities (Dyreng and Lindsey 2009; Rego 2003). Further, in some industries, firms can more easily reduce their ETRs by relocating intangible assets to low-tax countries than in more tangible asset-intense industries.

Finally, the net benefits for firms of reducing their tax rates are a function of the tax base. The tax base amounts to the expected pre-tax earnings after wage costs. Because control is delegated to professional management, this creates a situation of moral hazard. The impact of moral hazard concerning the CEO's effort can most clearly be exemplified by having a closer look at the impact of the wage costs $\frac{\kappa(s,m)}{q_1 - q_0}$ for inducing the CEO to exert high effort on the generation of earnings on the tax base in inequality (2a). On the one hand, wage costs—as in the first-best setting represented by inequality (1a)—linearly increase in the incentivization costs. On the other hand, in the second-best situation of moral hazard, wage costs are also influenced by the CEO's opportunity to increase the likelihood of high pre-tax earnings and therefore higher personal reward through exerting own effort. Smaller differences $q_1 - q_0$ signify a more severe moral hazard problem because in such settings, higher pay is required to motivate the CEO to exert high effort. More severe moral hazard regarding the generation of earnings in turn will reduce the tax base, shrink the advantages of aggressive tax planning, and thus make the latter less likely. Conversely, a reduction in the wage costs of the CEO increases the tax base and consequently increases the advantages of aggressive tax planning. In that respect, as our comparison of first-best and second-best cases reveals, firm owners facing a less pronounced moral hazard problem regarding the generation of earnings and thus lower wage costs should be more willing to engage in aggressive tax planning.

It is worth pointing out that in addition to the tax rate effect described above, which is subject to the provision of effort by the tax manager, expressions (2a) and (2b) further suggest that for a stronger effect of high effort provision by the CEO on earnings (i.e., as $\Delta_x = x^H - x^L$ increases), the likelihood of tax planning increases. This *potential to increase earnings* does not only depend on the individual manager's effort but also on her skills, on firm-specific characteristics such as cost efficiency, and on industry specifics such as the level of competition.

Turning now to the costs, as represented on the left side of inequalities (2a) and (2b), we find that direct, political, and reputational costs are similarly reflected in the tax planning decision as in the first-best situation. However, differences between the first-best and second-best situations caused by moral hazard arise because now the tax manager's effort is unobservable. As a consequence, for incentivization

purposes, she needs to be rewarded based on observable tax planning outcomes. The associated costs of motivating high effort on tax planning are particularly important. Comparing necessary pay to the tax manager in the first-best and second-best settings (inequalities (2a) or (2b) and inequalities (1a) or (1b), respectively), we see that $\frac{p_1(s)\cdot\gamma(s,m)}{[p_1(s)-p_0(s)]^2} > \gamma(s,m)$, illustrating the higher costs of tax planning in the second-best situation. Again, unlike in the first-best setting, not only personal effort costs, but also the potential increase in the likelihood for a positive outcome of the tax planning activity, i.e., in this case a low ETR, through the exertion of effort is relevant. The smaller the effect of exerting effort in terms of increased likelihood for personal reward, the higher the pay that is necessary to incentivize the tax manager to exert high effort. Therefore, the difference in probabilities $p_1(s) - p_0(s)$ can serve as a measure for the severity of the underlying moral hazard problem concerning the delegation of tax planning responsibility to a tax manager. The intensity of moral hazard varies depending on firm characteristics such as ownership structures or the degree of separation between ownership and control. Hence, different firm owners will face different incentivization costs depending on the degree of moral hazard problems.

Finally, the hierarchical structure with owners providing incentives for the CEO who, in turn, incentivizes the tax manager, makes incentivizing the tax manager more expensive than in a one-tier hierarchy in which owners directly contract with the tax manager. The accumulation of costs of moral hazard resembles the double marginalization effect known from industrial economics. As a consequence, the costs of providing the tax manager with incentives increase by $\frac{p_1(s)}{[p_1(s)-p_0(s)]^2} - 1 > 0$ times $\gamma(s,m)$. In this sense, the effect of moral hazard on the required costs to involve the tax manager in aggressive tax planning is therefore larger than the costs of moral hazard with respect to the generation of earnings, where the effort cost parameter $\kappa(s,m)$ is weighted by the ratio $\frac{1}{q_1-q_0} > 1$. Thus, from the owners' perspective, it would be less expensive to directly contract with the tax manager than to have the CEO do the contracting on their behalf. This makes aggressive tax planning more attractive to firm owners in the former than in the latter case.

5.2 Generation of earnings precedes tax planning

We now turn to a setting in which the firm owners first motivate the CEO to perform effort on earnings and then only decide on tax planning after they know about the outcome of the CEO's activities. Due to the hierarchical structure of our model, firm owners need to make sure via payments to the CEO that the CEO implements the decision rule that is in their individual interest. There are two types of decision rules: (1) high effort on tax planning should be exerted if the earnings outcome was good (i.e., $x = x^H$) and (2) high effort on tax planning should be exerted if the earnings outcome was bad (i.e., $x = x^L$). We focus on the first case, i.e., firm owners induce the CEO to motivate the tax manager to exert high effort on tax planning only if the CEO's earnings generation activity was successful, as the second case

can never be optimal from the firm's point of view.[18] Note that in this part of the analysis, we focus on cases in which firm owners want the CEO to exert own effort and for simplicity neglect cases in which firm owners refrain from providing her with additional incentives to be productive herself.[19]

When formulating the model, the relationship between tax manager and CEO at stage two remains unaltered and results in the tax manager's wage structure given in Lemma 1. However, as a consequence of the above considerations, the CEO's incentive compatibility constraint(s) changes. If the earnings generation was successful, which happens with probability q_1, the CEO needs to pay the tax manager $w(t_l)$ whenever a low ETR is observed. In contrast, if the CEO was not successful with her effort, which happens with probability $(1 - q_1)$, there is no reward for the tax manager independent of the resultant ETR. In other words, there is better information available to the CEO in her contracting relationship with the tax manager because she knows that whenever low pre-tax earnings are observed, there are no incentives for the tax manager. As a consequence, in such situations there will be no payment to the tax manager even if a low ETR emerges since the CEO knows that the low ETR is due to luck rather than hard work of the tax manager.

Firm owners anticipate this constellation when designing their contract with the CEO at stage one. Hence, they pay the CEO zero wage if earnings are low, i.e., x^L is realized. Whenever that is the case, there is no reason to reward the CEO and also no wish to engage in aggressive tax planning. The contracting constraint therefore only binds for successful earnings generation. Setting up the corresponding conditions and solving for the wage parameters yields the optimal wage profile that the firm owners offer to the CEO. Lemma 3 summarizes the result.

Lemma 3 *The optimal wage profile that the firm owners offer the CEO in the case of sequential decisions and unobservable effort choices is given by*

$$w^{CEO} = \left\{ \frac{p_1(s)[1 - p_0(s)]\gamma(s,m)}{[p_1(s) - p_0(s)]^2} + \frac{\kappa(s,m)}{q_1 - q_0}, 0, \frac{\kappa(s,m)}{q_1 - q_0} - \frac{p_1(s)p_0(s)\gamma(s,m)}{[p_1(s) - p_0(s)]^2}, 0 \right\}. \tag{3}$$

Proof See the Appendix. □

We compare the case of conditional tax planning incentivization $(1(x^H), 0(x^L), 1)$ with the case in which the CEO is never incentivized to motivate the tax manager to perform high effort on tax planning $(0(x^H), 0(x^L), 1)$[20] to derive the following Proposition:

[18] See the "Appendix" for a formal proof of this statement.

[19] The analysis of the second case can be done equivalently but does not substantially change the results in the sequential case.

[20] Note that the principal's expected payoff in this case is identical to the principal's expected payoff in the simultaneous case (0, 1).

Proposition 3 *In a sequential setting with unobservable effort choices, when the incentives for tax planning are made contingent on the successful outcome of the earnings generation, the principal benefits from tax-planning activities if the following condition is fulfilled:*

$$\begin{aligned} & k + [p_1(s) - p_0(s)]\delta(s, t_l, m) \\ & + \frac{p_1(s) \cdot (1 - t_l)\gamma(s, m) \cdot \{p_1(s) \cdot [1 - p_0(s)](1 - t_l) - p_0(s) \cdot [1 - p_1(s)](1 - t_h)\}}{[p_1(s) - p_0(s)]^2} \\ & < [p_1(s) - p_0(s)](t_h - t_l)[x^H - \frac{\kappa(s, m)}{q_1 - q_0}] \end{aligned} \tag{4}$$

Proof See the Appendix. □

The condition in expression (4) can be interpreted as follows. The left-hand side is the sum of the agent-level and firm-level costs of tax planning. The effect of reputational and political costs as well as direct costs is the same as in the simultaneous setting. However, the wage costs for the CEO to motivate efficient contracting with the tax manager are different from the simultaneous setting. Expected wage costs are lower in the sequential than in the simultaneous setting. The difference amounts to $\frac{p_0(s)p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2} > 0$. In the sequential setting, the CEO only incentivizes tax planning whenever the prior earnings realization is high. Conversely, the principal does not induce the CEO to incentivize the tax manager when the prior earnings outcome was low. In other words, the CEO can infer from the realization of earnings and her own consequential behavior in terms of providing the tax manager with incentives whether a favorable tax outcome is due to high effort from the tax manager or solely based on favorable economic conditions. In the latter case, the CEO does not transfer any payment to the tax manager. Such a distinction is not possible in the simultaneous case, in which the CEO needs to pay the tax manager a positive wage whenever she observes a low ETR. The owners anticipate this behavior and design their incentive contract with the CEO accordingly. Thus, tax planning becomes less costly, i.e., more beneficial in the sequential than in the simultaneous case.

There are also differences in the benefits of tax planning across the two cases, simultaneous versus sequential tax planning, as one can see by comparing the right sides of inequalities (2a) and (2b) with those of inequality (4). Since tax planning only takes place whenever high earnings are observed in the sequential case, the benefits of tax planning are defined by the potential to lower the ETR $(t_h - t_l)$ on the one side and earnings x^H net of the wage costs for incentivizing the CEO to exert own effort $\frac{\kappa(s,m)}{q_1 - q_0}$ on the other side. As a result, benefits of tax planning are higher in the sequential case compared to the simultaneous case.

The decision to engage in aggressive tax planning boils down to a non-trivial cost-benefit comparison. It is a function of (1) the wages paid to the tax manager to engage in aggressive tax planning, (2) wages paid to the CEO so that she exerts high effort on the generation of earnings and efficiently designs the contract with

the tax manager, (3) the increase in expected reputational and political costs as well as direct costs, and (4) the potential to increase earnings as well as the potential to reduce the ETR through exerting high effort.

Overall, the analysis of the sequential setting supports the conclusions from the simultaneous case. Our model implies that moral hazard affects the tax planning decision in addition to the reputational and political costs of tax planning. In particular, the costs of providing appropriate incentives to managers directly affect a firms' tax-planning decisions. We find that aggressive tax-planning activities are less likely in firms where there are high costs for providing the top management (the CEO) with incentives to exert high effort on the generation of earnings. The same applies to the wage costs necessary for the tax manager to have her engage in aggressive tax planning. However, our analysis also reveals that while the costs for incentivizing high effort on the generation of earnings are comparable, wage costs for incentivizing aggressive tax planning systematically differ between cases of simultaneous and sequential tax planning. Owners will anticipate the subsequent relationship between the CEO and the tax manager when designing their contract for the CEO. Since there is better information available to the CEO in the sequential than in the simultaneous setting, the owners are able to incentivize aggressive tax planning at a lower cost in the sequential compared to the simultaneous case. As a result, aggressive tax planning looks more attractive in the sequential case and the impact of moral hazard on tax planning is reduced.

6 The determinants of the tax planning decision

The previous analyses show how firms optimally decide whether to engage in tax planning when the sequence of the decisions is given, i.e., when the process of tax-planning and earnings activities is somehow predefined in the firm. However, on the basis of our analysis so far, we are now in a position to globally compare cases in order to identify an optimal tax-planning approach not only for given sequences, but also when the sequence itself can be chosen by firm owners. This comparison also allows us to further shed light on the cross-sectional differences of firms' tax-planning decisions. For this purpose, we vary the incentivization costs for the agents (i.e., $\gamma(s,m)$ and $\kappa(s,m)$)[21] as well as the firm-level costs (i.e., $\delta(s,t_l,m)$). Moreover, we split the analysis in a setting where the potential to increase earnings by motivating the CEO to exert high effort is high (i.e., Δx is large) and low (i.e., Δx is small).

First, firm owners incur costs for providing incentives to the two agents so that each expends effort on her task. Note that the incentive provision for the tax

[21] As we have argued in Sect. 5, the severity of the moral hazard problem can also be represented by the difference in probabilities, i.e., $p_1(s) - p_0(s)$ and $q_1 - q_0$. However, to isolate the agent-level costs, we approximate costs of moral hazard by varying $\kappa(s,m)$ and $\gamma(s,m)$. The reason for doing so is twofold: first, probabilities may reflect further external influence (e.g., the success probabilities might also depend on the competitive environment of the firm). Second, since probabilities also play a role in our formal representation of, e.g., disclosure costs, their variation would simultaneously imply a change of agent-level and firm-level costs, which is undesirable when we want to discern effects.

manager occurs through contracting with the CEO. Hence, the firm owners provide incentives to the CEO for her productive effort and for the implementation of the optimal contract with the tax manager. These incentivization costs depend on the severity of the moral hazard problems. More severe moral hazard problems require stronger monetary incentives for the same amount of effort. Higher values of $\kappa(s,m)$ and $\gamma(s,m)$ lead to the same effect in our theoretical model, which is why they represent higher incentivization costs as a consequence of less concentrated ownership structures and/or less overlap of ownership and management. Firm-level costs represent the sum of political and reputational costs incurred for successful tax planning.

Second, the tax planning decision depends on the firm's potential to increase earnings, i.e., Δx. This is because the incentivization costs have a smaller influence on decision-making when the potential gains from motivating the CEO are high, i.e., Δx is large. Given that this effect is related primarily to agent-level costs and does not alter the effect of firm-level costs to a similar extent, the potential to increase earnings by exerting effort explains cross-sectional differences in tax planning. In contrast, the difference $\Delta t = t_h - t_l$, which could be interpreted as the potential to decrease ETRs, affects the impact of the agent-level and firm-level costs. The larger the difference, the more attractive the option of aggressive tax planning. This applies to all types of firms.

Figure 3 depicts the principal's payoff in all previously described cases for the following parameter values: $x^H = 100$, $t_h = 0.3$, $t_l = 0.1$, $p_1(s) = 0.7$, $p_0(s) = 0.3$, $q_1 = 0.7$, $q_0 = 0.3$, and $k = 1$.[22] In part I (low potential to increase earnings) we use $x^L = 90$ and in part II (high potential to increase earnings) we use $x^L = 10$. The severity of moral hazard problems expressed by the variation in incentivization costs and the firm-level costs range between 0 and 3.5 and 0 and 10 respectively.

Figure 3 shows that for less severe moral hazard problems and low firm-level costs, firms are more likely to engage in aggressive tax planning. The optimal strategy of the principal, however, depends on whether the potential to increase earnings, i.e., Δx is high or low. Consider first the case of a high potential to increase earnings (right part of the figure). If moral hazard problems are not severe and firm-level costs for tax planning are low, the principal chooses the sequential setting in which she always motivates the generation of earnings, but wants the tax manager to engage in aggressive tax-planning activities only if the outcome of the earnings generation was favorable, i.e., if $x = x^H$. In this situation, the principal benefits from introducing a sequence to the decisions and motivates the tax manager only selectively if the expected benefits are large enough to cover the additional incentivization costs. If moral hazard problems become more severe and firm-level costs increase, the principal will still motivate the CEO to provide high effort, but does not want her to motivate the tax manager to exert high effort. Then, intuitively, there is no difference between the sequential case $(0(x^H), 0(x^L), 1)$ or the simultaneous case (0,1) and thus also no benefit from introducing a sequence in decisions.

[22] The tax rates used in our example are close to the 25th percentile and the 75th percentile of the one-year cash-effective tax rate distribution from the sample of listed U.S. firms that Dyreng et al. (2008) use.

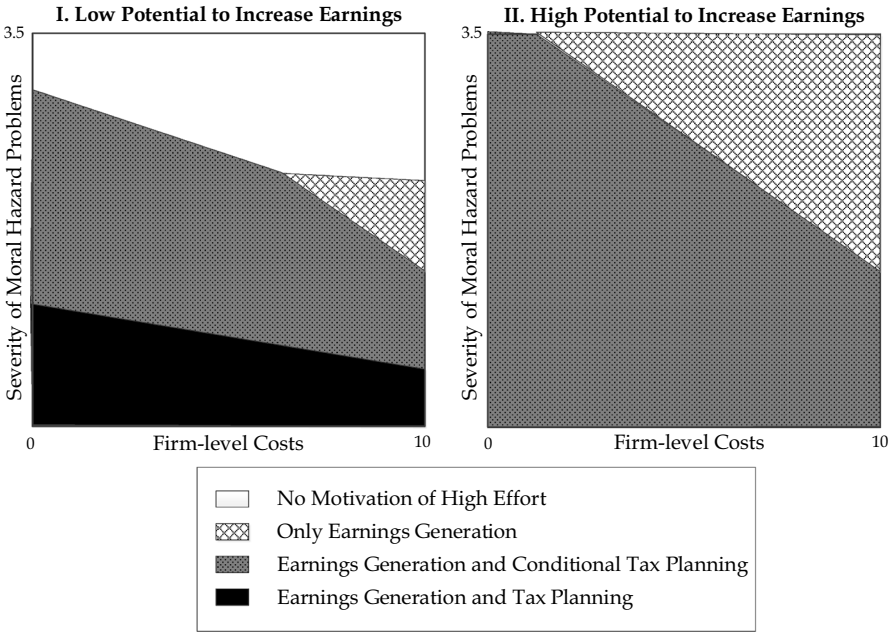

Fig. 3 Comparison of cases

If the potential to increase earnings is low (left part of the figure), the severity of moral hazard expressed as incentivization costs become more relevant as the expected benefit from exerting high effort on the generation of earnings is lower compared to the case with a high potential to increase earnings. For less severe moral hazard problems and low firm-level costs, the principal wants both agents simultaneously to provide high effort. This area does not exist in the high potential to increase earnings case because there the information on the earnings outcome prior to the tax planning decision is more valuable. If the difference in earnings outcomes is small anyway, the informational value is reduced and simultaneous decisions become more attractive. If the severity of moral hazard problems and firm-level costs increase, we find that the principal switches to a sequential setting in which she wants tax planning to be done aggressively only if earnings generation has been successful. Here, the principal implements a scheme that postpones the tax-planning decision until information on earnings is available. As a result, tax planning occurs less frequently than in the simultaneous setting. If the severity of moral hazard problems further increases, we now find a different situation compared to the case with a high potential to increase earnings: If firm-level costs are low or high and moral hazard problems are severe, the principal now maximizes her payoff by not motivating high effort on any activity. Only for a medium severity of moral hazard problems and high firm-level costs, the principal chooses a situation in which she still motivates the CEO to exert effort on the generation of earnings, but refrains from tax planning.

To summarize, the interaction of firm-level costs and moral hazard is not trivial: Our model suggests that the effects of firm-level costs and the costs of moral hazard depend on the CEO's potential to increase earnings. If this potential is low (high), agency issues become more (less) important relative to other firm level costs in the optimal tax avoidance decision.

7 Tax planning in different types of firms

7.1 Cross-sectional differences in tax avoidance

The objective of this section is to demonstrate how our model can be applied to specific comparisons across firms. As we outline in Sect. 2, the agent-level and firm-level costs of tax planning vary across firms. In this section, we compare private and public firms as well as family and non-family firms. In general, our model implications can be transferred to other settings in which the interplay of moral hazard, firm-level costs, and the potential to increase earnings is relevant. The two following cases illustrate the application for one rather clear case (public versus private firms) and one ambiguous case (family versus non-family firms).

7.1.1 Public versus private firms

When we hold firm size and further not directly governance-related characteristics such as degree of internationalization constant, a number of other governance-related factors explain differences in tax planning behavior between public and private firms. The first of these factors is mandatory disclosure. In other words, avoiding taxes is harder for firms required to disclose substantial amounts of information to the public (Hope et al. 2013). Hence, the probability of success ($p_1(s)$ and $p_0(s)$) is higher for private firms than for public firms, i.e., $\frac{dp_1(s)}{ds} > 0$ and $\frac{dp_0(s)}{ds} > 0$. This effect matters irrespectively of whether a firm engages in aggressive tax planning or not. However, we assume it to be more pronounced whenever a firm pursues aggressive tax planning, i.e., the difference $\Delta p = p_1(s) - p_0(s)$ is increasing in s.

Second, greater exposure to public scrutiny and, thus, higher political and reputational costs $\delta(s, t_l, m)$ distinguish public from private firms, for example through the disclosure of balance-sheet information. Dyreng et al. (2016) show that many firms avoid tax-related scrutiny and that public pressure had led firms that had come under greater scrutiny to increase their tax expenses. Dyreng et al. (2016) stress that not all firms are equally sensitive to the repercussions of political and reputational costs. Hence, these are higher for public than for private firms. In our model, this implies that $\frac{\partial \delta(s, t_l, m)}{\partial s} < 0$.

Third, the degree of ownership concentration and of the overlap of ownership and management in a firm differs between private and public firms. Concentrated ownership mitigates problems of moral hazard because less diversified owners with larger

shareholdings have stronger incentives to monitor management closely (Berle and Means 1932; Francis and Smith 1995; Shleifer and Vishny 1997). Furthermore, a greater overlap of ownership and management means less delegation and thus less severe problems of moral hazard (Ang et al. 2000; Fama and Jensen 1983; Jensen and Meckling 1976). Both reduce the costs of moral hazard. Importantly, both are more pronounced in private firms than in public firms. Hence, we expect that incentivization costs are lower for private firms than for public firms, i.e., $\frac{\partial \kappa(s,m)}{\partial s} < 0$ and $\frac{\partial \gamma(s,m)}{\partial s} < 0$.[23]

Collectively, since the analysis of our model suggests that all factors point in the same direction, we conclude that private firms unambiguously are more likely to engage in aggressive tax planning than public firms. The higher reputational and political costs in public firms as well as the need for installing higher-powered incentives make aggressive tax planning less beneficial for public vis-à-vis private firms.

7.1.2 Family versus non-family firms

Differences between the tax-planning decisions of family firms and non-family firms are also likely for a number of reasons. First, reputational costs $\delta(s, t_l, m)$ depend on the family status of a firm. Compared to non-family firms, the members of family firms have closer ties to each other and to the firm. These ties stem from socioemotional factors—a phenomenon that has been recently described as the "socioemotional wealth" of family firms (Gómez-Mejía et al. 2007, p. 106). Consequently, if the organization's reputation is tarnished, the personal reputation of family owners also suffers. Hence, family firms tend to avoid actions that could cost them their reputation (Gómez-Mejía et al. 2011). Given that aggressive tax planning can lead to negative publicity and harm a firm's reputation (Bankman 2004), we argue that family firms face higher reputational costs than non-family firms, i.e., $\frac{\partial \delta(s,t_l,m)}{\partial m} > 0$, thereby decreasing the likelihood that family firms avoid taxes.

A second difference between family firms and non-family firms relates to the degree of ownership concentration and the overlap of ownership and management. Both of these characteristics are more pronounced in family firms than in non-family firms (Chrisman et al. 2004; Villalonga and Amit 2006). We therefore argue that family firms face lower incentivization costs than non-family firms, i.e., $\frac{\partial \kappa(s,m)}{\partial m} < 0$ and $\frac{\partial \gamma(s,m)}{\partial m} < 0$. Since decreasing $\kappa(s,m)$ and $\gamma(s,m)$ make tax planning more likely, this increases the likelihood that family firms engage in tax planning.

The differences between family and non-family firms are thus ambiguous. As discussed in Sect. 6, our model reveals that the potential to increase earnings Δx has an

[23] However, a higher success probability of aggressive tax planning does not only increase the probability for a smaller tax burden, it may also increase expected wage costs. This effect does, however, dominate the other forces so that the overall result is unambiguous.

impact on the dominance of one of the two effects. Therefore, cross-sectional differences in tax avoidance between family firms and non-family firms stem from three factors: (1) The severity of moral hazard problems and the resulting incentivization costs, which make family firms *more* likely to engage in tax planning than non-family firms, (2) firm-level costs, which make family firms *less* likely to engage in tax planning than non-family firms, and (3) the potential to increase earnings. To illustrate this, we re-use Fig. 3 and identify areas with typical characteristics of family and non-family firms. Taking all of the previously derived factors into account, the combinations of parameter values that typically represent family firms are located in the lower right corner of the two coordinate systems depicted in Fig. 3. In contrast, the combinations of parameter values that represent non-family firms are typically located in the upper left corner of Fig. 3. Based on Fig. 3, we can illustrate the interaction of the potential to increase earnings with incentivization costs on the one hand and reputational costs on the other hand.

Family firms are more likely to engage in tax avoidance when the potential to increase earnings is low (left part in Fig. 3) than when it is high (right part). In the former case (low potential to increase earnings), lower incentivization costs seem to be the driving factor for the decision to engage in aggressive tax planning: Low incentivization costs make aggressive tax planning less costly and therefore more attractive to family firms. In contrast, when the potential to increase earnings is high, the threat of reputational damage can outweigh the advantage of lower incentivization costs. In this case, family firms are less likely to engage in tax planning than in the case of low potential to increase earnings. Figure 3 illustrates this: While we observe unconditional tax avoidance among family firms in the low potential to increase earnings case (the black area), family firms avoid taxes in the high potential to increase earnings only if effort on earnings generation has been successful (the gray area). As this is not necessarily the case, family firms become less likely to avoid taxes as the potential to increase earnings increases.

The result reverses if we now consider non-family firms, which are typically located in the upper left corner of Fig. 3. Non-family firms generally tend to engage in more aggressive tax planning activities if the potential to increase earnings is high (compare the steeper border between the gray and the white/shaded areas of the figure). The reason is that non-family firms face more severe problems of moral hazard and thus obtain higher benefits from tax planning when the potential to increase earnings is high. As a consequence, firm-level costs then seem to matter less in the decision to engage in aggressive tax-planning.

7.2 Limitations and extensions

As every paper, our study has limitations. Our model relies on certain assumptions, some of which concern the relationship between specific firm characteristics and cost parameters. While these assumptions might be grounded in empirical and anecdotal evidence, there are some key limitations we want to highlight. Our primary purpose was to examine why some firms are prone to tax avoidance while others are not on the basis of factors whose impact on tax planning

and whose interaction might provide new insights into the cross-sectional differences that are documented in the literature. Given our research question and the call for an agency perspective on corporate tax avoidance, we concentrate on factors that relate to corporate governance. Future research can build on our work to further interpret the model also along other dimensions related to moral hazard or the potential to increase earnings.

Another limitation concerns the assumptions on which we based the application of our model to particular firms. We again based these assumptions on the (empirical) literature. For example, we assumed that family firms face less severe moral-hazard problems and thus lower incentivization costs than non-family firms. In practice, however, in family firms there may be conflicts between economic goals and goals related to the family among different groups of owners (e.g., Lee and Rogoff 1996), which non-family firms are unlikely to face. Nevertheless, such conflicts potentially also have an impact on a firm's decision to engage in or refrain from aggressive tax avoidance.

Next, we have simplified the institutional differences across types of firms in our interpretation. We acknowledge that the degree of decentralization may systematically differ between public and private firms as well as family and non-family firms. Our study allows to compare, e.g., family with non-family firms or public with private firms under the assumption that all other characteristics are equal. On the other hand, we have purposefully captured the relevant differences as simply as possible to keep our analysis tractable. An example is the effect institutional differences may have on incentivization costs. One might argue that explicitly modeling monitoring mechanisms, the existence of an advisory board, or an overlap of ownership and management would have been more realistic.

We also acknowledge that we simplified the model along several other dimensions. For example, we only use a single-period model, which precludes us from examining the difference between Cash and GAAP ETRs that can arise because of accruals. Further, we did not specifically model different types of compensation, e.g., stock options, bonus payments, etc. We leave all such extensions to future research.

Finally, we want to highlight one model extension which we have examined but not reported in the paper: For some firms, it is reasonable to assume that the CEO is also responsible for tax planning. In this case, the complexity of the model setup is reduced as there is only one agent. In unreported analytical analyses, we obtain qualitatively similar results with reduced costs of moral hazard for providing incentives on tax planning when having only one manager being responsible for tax and earnings generation. This analysis is, for example, important for smaller firms without a designated tax department.

8 Conclusion

In this paper, we develop a formal model of a firm's tax-planning decision to shed light on the puzzling empirical result that not all firms equally engage in tax avoidance. We use a hidden-action model with limited liability and two

agents to show that a firm's decision whether to engage in tax avoidance or not partly hinges on moral hazard. We find that tax planning depends on the interaction of the following three factors: (1) firm-level costs, (2) incentivization costs, and (3) the potential to increase earnings. Firms with high firm-level costs, such as reputational or political costs, but low incentivization costs tend to engage in more aggressive tax planning if the potential to increase earnings is low. The opposite holds true if the potential to increase earnings is high. In other words, if there is significant potential to increase earnings by exerting effort, the costs of incentivizing the managers matter less than the possible reputational or political costs the firm might face.

Our model provides a theoretical framework for testing cross-firm differences in tax planning. The model shows that in addition to moral hazard, the factors that determine the degree of tax avoidance are tax planning costs and the potential to increase earnings. These findings contribute to research on the empirically observed differences in tax avoidance strategies between different types of firms, such as between public and private and between family and non-family firms. A main implication of our model is that empirical studies that investigate how firms decide whether to pursue or refrain from tax avoidance should take into account differences in the structure of ownership, the degree of separation of ownership and control within firms, the potential to increase earnings, and the interaction of these factors (e.g., Armstrong et al. 2012; Badertscher et al. 2013; Chen et al. 2010; Rego and Wilson 2012).

Our paper provides several avenues for future research. Specifically, analytical studies could expand the simple model by generalizing contract structures. The managers' incentive contracts in our model had a discrete structure, so further theoretical works could focus on more general and detailed compensation contracts that also allow for the consideration of risk aversion. Future empirical work could also test the insights from this paper. If the potential to increase earnings is low, a firm's tax planning decision is determined by its moral hazard problems. In contrast, when the potential to increase earnings is high, a firm's tax planning decision is mainly driven by costs of tax planning such as reputational and political costs.

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Appendix A: Proofs

Proof of Proposition 1 The principal's payoff in the four possible scenarios of motivating tax planning and the generation of earnings is:

$$\begin{aligned}
\Pi_{11}^{FB} &= p_1(s)\left[(1-t_l)\left\{q_1x^H + (1-q_1)x^L - \kappa(s,m) - \gamma(s,m)\right\} - \delta(s,t_l,m)\right] \\
&\quad + [1-p_1(s)](1-t_h)\left\{q_1x^H + (1-q_1)x^L - \kappa(s,m) - \gamma(s,m)\right\} - k, \\
\Pi_{01}^{FB} &= p_0(s)\left[(1-t_l)\left\{q_1x^H + (1-q_1)x^L - \kappa(s,m)\right\} - \delta(s,t_l,m)\right] \\
&\quad + [1-p_0(s)](1-t_h)\left\{q_1x^H + (1-q_1)x^L - \kappa(s,m)\right\}, \\
\Pi_{10}^{FB} &= p_1(s)\left[(1-t_l)\left\{q_0x^H + (1-q_0)x^L - \gamma(s,m)\right\} - \delta(s,t_l,m)\right] \\
&\quad + [1-p_1(s)](1-t_h)\left\{q_0x^H + (1-q_0)x^L - \gamma(s,m)\right\} - k, \\
\Pi_{00}^{FB} &= p_0(s)\left[(1-t_l)\left\{q_0x^H + (1-q_0)x^L\right\} - \delta(s,t_l,m)\right] \\
&\quad + [1-p_0(s)](1-t_h)\left\{q_0x^H + (1-q_0)x^L\right\}.
\end{aligned}$$

The difference $\Pi_{11}^{FB} - \Pi_{01}^{FB}$ represents the principal's payoff when high tax planning and high earnings generation are motivated less the principal's payoff if only high earnings generation is motivated and can be used to obtain the condition under which tax planning is beneficial if the principal has motivated high earnings generation. Setting $\Pi_{11}^{FB} - \Pi_{01}^{FB} > 0$ and rearranging the terms yields the condition in Eq. (1a). We repeat the procedure for $\Pi_{10}^{FB} - \Pi_{00}^{FB} > 0$, i.e., the principal's payoff with and without motivating high tax planning in case only normal effort is expended towards the generation of earnings to obtain the condition in Eq. (1b). □

Proof of Lemma 1 We solve the model using backward induction. The tax manager at the lowest hierarchical level and thus the last stage of the game is willing to exert high effort for tax-planning activities if the following incentive compatibility constraint is met:

$$p_1(s)w(t_l) + [1-p_1(s)]w(t_h) - \gamma(s,m) \geq p_0(s)w(t_l) + [1-p_0(s)]w(t_h).$$

Generally, if the CEO wants to implement low effort, she will choose to pay the lowest possible wage. Due to limited liability constraints, this is equal to zero.[24] Hence, the CEO will set $w(t_h) = 0$, which reduces the above incentive compatibility constraint to

$$p_1(s)w(t_l) - \gamma(s,m) \geq p_0(s)w(t_l).$$

In equilibrium, the incentive compatibility constraint will be binding. Solving for the wage payment $w(t_l)$ yields the optimal wage profile stated in connection with Lemma 1. □

[24] Note that this also fulfills the tax manager's participation constraint.

Proof of Lemma 2 The CEO is willing to exert high effort towards the generation of earnings if the following incentive compatibility constraint is fulfilled that depends on whether the tax manager is motivated to exert high effort ($i = 1$) or not ($i = 0$).

$$\begin{aligned} & q_1\big(p_i(s)w(t_l, x^H) + [1 - p_i(s)]w(t_h, x^H)\big) \\ & \quad + (1 - q_1)\big(p_i(s)w(t_l x^L) + [1 - p_i(s)]w(t_h, x^L)\big) - \kappa(s, m) \\ & \geq q_0\big(p_i(s)w(t_l, x^H) + [1 - p_i(s)]w(t_h, x^H)\big) \\ & \quad + (1 - q_0)\big(p_i(s)w(t_l, x^L) + [1 - p_i(s)]w(t_h, x^L)\big), i = 1, 0. \end{aligned}$$

Moreover, the principal needs to ensure that the CEO is willing to transfer the wage payment to the tax manager if the tax manager has been motivated to perform high effort and was successful in her tax planning activities. This is represented by the following constraints for either high earnings motivation ($j = 1$) or low earnings motivation ($j = 0$):

$$\begin{aligned} & p_1(s)\big(q_j w(t_l, x^H) + (1 - q_j)w(t_l, x^L) - w(t_l)\big) \\ & \quad + [1 - p_1(s)]\big(q_j w(t_h, x^H) + (1 - q_j)w(t_h, x^L) - w(t_h)\big) \\ & \geq p_0(s)\big(q_j w(t_l, x^H) + (1 - q_j)w(t_l, x^L)\big) \\ & \quad + [1 - p_0(s)]\big(q_j w(t_h, x^H) + (1 - q_j)w(t_h, x^L)\big), j = 1, 0. \end{aligned}$$

The principal is not interested to pay anything to the CEO if earnings generation and tax planning have not been successful. As a consequence, she sets $w(t_h, x^L) = 0$. In connection with $w(t_h) = 0$, this reduces the incentive compatibility and contracting constraints for the CEO to the following expressions:

$$\begin{aligned} & q_1\big(p_i(s)w(t_l, x^H) + [1 - p_i(s)]w(t_h, x^H)\big) \\ & \quad + (1 - q_1)\big(p_i(s)w(t_l, x^L)\big) - \kappa(s, m) \\ & \geq q_0\big(p_i(s)w(t_l, x^H) + [1 - p_i(s)]w(t_h, x^H)\big) \\ & \quad + (1 - q_0)\big(p_i(s)w(t_l, x^L)\big), i = 1, 0 \end{aligned}$$

and

$$\begin{aligned} & p_1(s)\big(q_j w(t_l, x^H) + (1 - q_j)w(t_l, x^L) - w(t_l)\big) \\ & \quad + [1 - p_1(s)]\big(q_j w(t_h, x^H)\big) \\ & \geq p_0(s)\big(q_j w(t_l, x^H) + (1 - q_j)w(t_l, x^L)\big) \\ & \quad + [1 - p_0(s)]\big(q_j w(t_h, x^H)\big), j = 1, 0. \end{aligned}$$

Which of the four constraints binds, depends on the effort profile that the principal wants to implement. Solving the respective system of equations for the possible scenarios yields the wage profile for the CEO as stated in Lemma 2. □

Proof of Proposition 2 The principal's payoff in the second-best case with simultaneous effort choices is:

$$
\begin{aligned}
\Pi_{11} &= p_1(s)\big[(1-t_l)\big\{q_1(x^H - w(t_l,x^H)) + (1-q_1)(x^L - w(t_l,x^L))\big\} - \delta(s,t_l,m)\big] \\
&\quad + [1-p_1(s)](1-t_h)\big\{q_1(x^H - w(t_h,x^H)) + (1-q_1)(x^L - w(t_h,x^L))\big\} - k, \\
\Pi_{10} &= p_1(s)\big[(1-t_l)\big\{q_0(x^H - w(t_l,x^L)) + (1-q_0)(x^L - w(t_l,x^L))\big\} - \delta(s,t_l,m)\big] \\
&\quad + [1-p_1(s)](1-t_h)\big\{q_0(x^H - w(t_h,x^L)) + (1-q_0)(x^L - w(t_h,x^L))\big\} - k, \\
\Pi_{01} &= p_0(s)\big[(1-t_l)\big\{q_1(x^H - w(t_h,x^H)) + (1-q_1)(x^L - w(t_h,x^L))\big\} - \delta(s,t_l,m)\big] \\
&\quad + [1-p_0(s)](1-t_h)\big\{q_1(x^H - w(t_h,x^H)) + (1-q_1)(x^L - w(t_h,x^L))\big\}, \\
\Pi_{00} &= p_0(s)\big[(1-t_l)\big\{q_0(x^H - w(t_h,x^L)) + (1-q_0)(x^L - w(t_h,x^L))\big\} - \delta(s,t_l,m)\big] \\
&\quad + [1-p_0(s)](1-t_h)\big\{q_0(x^H - w(t_h,x^L)) + (1-q_0)(x^L - w(t_h,x^L))\big\}.
\end{aligned}
$$

Inserting the optimal wage profiles for the tax manager and the CEO from Lemmas 1 and 2 yields the principal's expected payoff in the four settings:

$$
\begin{aligned}
\Pi_{11}^{\dagger} &= \big[p_1(s)(1-t_l) + \big[1-p_1(s)\big](1-t_h)\big]\left(q_1 x^H + (1-q_1)x^L - \frac{q_1\kappa(s,m)}{q_1-q_0}\right) \\
&\quad - p_1(s)\left(\delta(s,t_l,m) + (1-t_l)\frac{p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2}\right) - k, \\
\Pi_{10}^{\dagger} &= \big[p_1(s)(1-t_l) + \big[1-p_1(s)\big](1-t_h)\big]\left(q_0 x^H + (1-q_0)x^L\right) \\
&\quad - p_1(s)\left(\delta(s,t_l,m) + (1-t_l)\frac{p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2}\right) - k, \\
\Pi_{01}^{\dagger} &= \big[p_0(s)(1-t_l) + \big[1-p_0(s)\big](1-t_h)\big]\left(q_1 x^H + (1-q_1)x^L - \frac{q_1\kappa(s,m)}{q_1-q_0}\right) \\
&\quad - p_1(s)\delta(s,t_l,m), \\
\Pi_{00}^{\dagger} &= \big[p_0(s)(1-t_l) + \big[1-p_0(s)\big](1-t_h)\big]\left(q_0 x^H + (1-q_0)x^L\right) - p_0(s)\delta(s,t_l,m).
\end{aligned}
$$

Subtracting $\Pi_{10}^{\dagger}$ from $\Pi_{11}^{\dagger}$ and subtracting $\Pi_{00}^{\dagger}$ from $\Pi_{01}^{\dagger}$ and rearranging the terms gives the conditions (2a) and (2b) in Proposition 2. □

Proof of Lemma 3 In a sequential setting, the incentive constraint for the tax manager at the last stage of the game does not change and is the same as presented in connection with Lemma 1. The CEO is willing to perform high effort on earnings given the success-dependent following motivation of the tax manager, if the following constraint is fulfilled:

$$
\begin{aligned}
&q_1\big(p_1(s)[w(t_l,x^H) - w(t_l)] + [1-p_1(s)]w(t_h,x^H)\big) + (1-q_1)w(t_h,x^L) - k \\
&\quad \geq q_0\big(p_1(s)[w(t_l,x^H) - w(t_l)] + [1-p_1(s)]w(t_h,x^H)\big) + (1-q_0)w(t_h,x^L).
\end{aligned}
$$

Moreover, the CEO is willing to transfer the wage to the tax manager, if the following constraint is fulfilled:

$$p_1(s)[w(t_l, x^H) - w(t_l)] + [1 - p_1(s)]w(t_h, x^H)$$
$$\geq p_0(s)w(t_l, x^H) + [1 - p_0(s)]w(t_h, x^L).$$

Note that the moral hazard problem with respect to the contracting decision of the CEO only occurs in case of successful generation of high earnings. Hence, besides the wage $w(t_h, x^L)$, the principal also sets the wage $w(t_l, x^L)$ equal to zero, because she does not want the CEO to motivate the tax manager to perform high effort if earnings were low. In equilibrium, both constraints are binding and solving the respective system of equations gives the wage profile of the CEO stated in connection with Lemma 3. □

Proof of Proposition 3 The principal's payoff in the second-best case with sequential effort choices when high earnings generation effort is motivated and tax planning only if earnings generation has been successful, is given by:

$$\begin{aligned}\Pi^{\dagger}_{101} = q_1 \Bigg[& p_1(s) \Bigg\{ (1 - t_l) \left(x^H - \frac{\kappa(s,m)}{q_1 - q_0} - [1 - p_0(s)] \frac{p_1 \gamma(s,m)}{[p_1(s) - p_0(s)]^2} \right) - \delta(s, t_l, m) \Bigg\} \\ & + [1 - p_1(s)](1 - t_h) \left(x^H - \frac{\kappa(s,m)}{q_1 - q_0} + p_0(s) \frac{p_1(s)\gamma(s,m)}{[p_1(s) - p_0(s)]^2} \right) - k \Bigg] \\ & + (1 - q_1) \big(p_0(s) \big[(1 - t_l)x^L - \delta(s, t_l, m) \big] + [1 - p_0(s)](1 - t_h)x^L \big).\end{aligned}$$

The respective reference case to compare with would be a case in which high earnings generation effort is motivated, but no tax planning. In this case, the contracting constraints do not bind and the CEO is paid a positive wage equal to $w^{CEO} = \dfrac{\kappa(s,m)}{q_1 - q_0}$ if high earnings are realized. The corresponding principal's payoff is:

$$\begin{aligned}\Pi^{\dagger}_{001} = q_1 \Bigg[& p_0(s) \Bigg\{ (1 - t_l) \left(x^H - \frac{\kappa(s,m)}{q_1 - q_0} \right) - \delta(s, t_l, m) \Bigg\} \\ & + [1 - p_0(s)](1 - t_h) \left(x^H - \frac{\kappa(s,m)}{q_1 - q_0} \right) \Bigg] \\ & + (1 - q_1) \big[p_0(s) \big\{ (1 - t_l)x^L - \delta(s, t_l, m) \big\} + [1 - p_0(s)](1 - t_h)x^L \big].\end{aligned}$$

Subtracting $\Pi^{\dagger}_{001}$ from $\Pi^{\dagger}_{101}$ and rearranging the terms gives the condition presented in connection with Proposition 3. □

Proof of the Non-Optimality of Case $(0(x^H), 1(x^L), 1)$

In Sect. 5.2 we analyze the sequential setting with the decision rule that high tax planning effort should be motivated if the earnings outcome was good. One could also think of the alternative decisions rule, i.e., that high tax planning effort should be motivated if the earnings outcome was bad, resulting in a case with the effort profile

$(0(x^H), 1(x^L), 1)$. We now demonstrate that this case can never be optimal from the principal's perspective. The wage profile offered to the CEO in this case would be

$$w^{CEO} = \left\{0, \frac{p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2}, \frac{p_1(s)p_0(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2} + \frac{\kappa(s,m)}{q_1-q_0}, 0\right\}$$

and the resulting principal's payoff is

$$\begin{aligned}\Pi_{011} = q_1\Bigg(&p_0(s)\Bigg([t_h-t_l]x^H - \frac{\kappa(s,m)}{q_1-q_0} + \{(1-t_h) - p_0(s)[t_h-t_l]\}\frac{p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2}\\ &-\delta(s,t_l,m)\Bigg)\\ &+(1-t_h)(x^H - \frac{\kappa(s,m)}{q_1-q_0})\Bigg)\\ &+(1-q_1)\Bigg(p_1\Bigg([t_h-t_l]x^L - (1-t_l)\frac{p_1(s)\gamma(s,m)}{[p_1(s)-p_0(s)]^2} - \delta(s,t_l,m)\Bigg)\\ &+(1-t_h)x^L - k\Bigg).\end{aligned}$$

The general decision whether to engage in effort motivation for tax planning depends on the benefits and costs. In a situation where incentivization costs are low, the principal prefers simultaneous decisions and high effort motivation in both tasks (case (1,1)). When incentivization costs rise, the principal will switch to a sequential setting in which he motivates tax planning only for successful earnings generation (case $(1(x^H), 0(x^L), 1)$) as this provides a higher positive impact on the principal's payoff through the tax-base effect (the total benefits of tax planning are given by the reduced tax rate multiplied with earnings). When incentivization costs rise further, the principal switches to a simultaneous setting where he never motivates tax planning, but only earnings generation (case (0,1)). Hence, the border between the cases $(1(x^H), 0(x^L), 1)$ and (0,1) could be the only region where the above mentioned case $(0(x^H), 1(x^L), 1)$ could be theoretically optimal. The border between the region where the simultaneous case (0,1) becomes better than the sequential case $(1(x^H), 0(x^L), 1)$ is given by

$$\Delta_1 = \Pi_{101} - \Pi_{01}.$$

From the inequality $\Delta_1 < 0$, conditions for the parameters $\kappa(\cdot)$, $\gamma(\cdot)$, $\delta(\cdot)$ and k can be derived for which the simultaneous case dominates the sequential setting. Applying these conditions to the comparison

$$\Delta_2 = \Pi_{011} - \Pi_{01}$$

shows that the case $(0(x^H), 1(x^L), 1)$ can never be better than the simultaneous case (0,1) under conditions where this simultaneous case is better than the sequential case $(1(x^H), 0(x^L), 1)$, i.e., $\Delta_2 < 0$ for the conditions derived from $\Delta_1 < 0$. In this scenario, incentivization costs for tax planning are such that the principal would never motivate tax planning at all. □

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