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Paul Demeré, Michael P. Donohoe, Petro Lisowsky. "The economic effects of special purpose entities on corporate tax avoidance." Contemporary Accounting Research, <https://doi.org/10.1111/1911-3846.12580>  
<https://hdl.handle.net/2144/40216>

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# The economic effects of special purpose entities on corporate tax avoidance\*

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## Abstract

This study provides the first large-sample evidence on the economic tax effects of special purpose entities (SPEs). These increasingly common organizational structures facilitate corporate tax savings by enabling sponsor-firms to increase tax-advantaged activities and/or enhance their tax efficiency (i.e., relative tax savings of a given activity). Using path analysis, we find that SPEs facilitate greater tax avoidance, such that an economically large amount of cash tax savings from research and development (R&D), depreciable assets, net operating loss carryforwards, intangible assets, foreign operations, and tax havens occur in conjunction with SPE use. We estimate that SPEs help generate over \$330 billion of incremental cash tax savings, or roughly 6% of total U.S. federal corporate income tax collections during the sample period. Interaction analyses reveal that SPEs enhance the tax efficiency of intangibles and R&D by 61.5% to 87.5%. Overall, these findings provide economic insight into complex organizational structures supporting corporate tax avoidance.

**Keywords:** organizational structure; special purpose entity; tax avoidance

**JEL Classification:** H25; L22; M40

\*Accepted by Jeffrey Hoopes. ‡Corresponding author: 1206 S. Sixth Street, MC-706, Champaign, IL 61822; mdonohoe@illinois.edu. We appreciate helpful comments from participants at the American Taxation Association Midyear Meeting, the American Accounting Association Annual Meeting, the National Tax Association Annual Conference, the Berlin-Vallendar Conference on Tax Research, and the PhD seminar at the EIASM/University of Münster Conference on Current Taxation. We also thank workshop participants at Arizona State University, Boston University, Fordham University, University of Connecticut, University of Illinois at Urbana-Champaign, Vienna University of Economics and Business, as well as Andrew Bauer, Jenny Brown, Hye Sun Chang, Keith Czerney, Will Deméré, Katharine Drake, Brian Gale, Danielle Green, Jost Heckemeyer, Jeff Hoopes, Ryan Huston, Hansol Jang, Laura Li, Jeremy Lill, Sean McGuire, Tom Neubig, Tom Omer, George Plesko, Liora Schulman, Jaron Wilde, and two anonymous reviewers. Special thanks to Richard Crowley and Josh Lee for programming assistance, and Mei Feng, Jeff Gramlich, and Sanjay Gupta for providing special purpose entity data. Paul Deméré gratefully acknowledges financial support from the AICPA Accounting Doctoral Scholars Program. Michael Donohoe gratefully acknowledges financial support from the PricewaterhouseCoopers Faculty Fellowship. Petro Lisowsky appreciates financial support from the PricewaterhouseCoopers Faculty Fellowship and Professor Ken Perry Fellowship while he was at the University of Illinois at Urbana-Champaign.

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/1911-3846.12580

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## 1. Introduction

Academic research and government reports study the tax effects of firm attributes, ownership type, and managerial incentives (see Treasury 1999; Graham 2000; Hanlon and Heitzman 2010; GAO 2011; OECD 2011; and JCT 2011). However, few studies evaluate firms' organizational structures, while those that do examine their *determinants* rather than their *effects* (Shevlin 1987; Beatty et al. 1995; Feng et al. 2009; Donohoe et al. 2013; Dyreng et al. 2015). Empirical evidence on the tax effects of organizational structures is important because existing knowledge about tax revenue losses attributable to such structures is largely anecdotal; yet, lawmakers, regulators, and watchdog agencies continue to voice concern about their effects (OECD 2015a, 2015b; United Nations 2015; European Parliament 2016; Eurodad 2017; Tax Justice 2017). In particular, concerns have been raised over the link between special purpose entities (SPEs) and tax avoidance; for example, in the “Panama papers” and “Luxleaks” disclosures (Keena 2014; Brennan and Paul 2016; O'Donovan et al. 2016; European Parliament 2017; Nesbitt et al. 2017). As a result, regulators consider SPEs a major source of international tax treaty abuse (OECD 2015a) and call for changes in their tax and financial reporting (JCT 2003; Basel 2009; OECD 2013, 2015b). This study provides much-needed large-sample empirical evidence on this issue by examining whether, how, and the extent to which increasingly common components of organizational structures—SPEs—facilitate corporate tax avoidance.<sup>1</sup>

SPEs are separate legal entities created by a sponsor-firm to perform narrow, predefined business activities or series of transactions (Feng et al. 2009).<sup>2</sup> Corporate use of SPEs is large and

<sup>1</sup> Tax avoidance refers to the reduction of explicit taxes per dollar of income (Dyreng et al. 2008). It represents a continuum that can include benign or egregious tax savings activities (Atwood et al. 2012; Lisowsky et al. 2013).

<sup>2</sup> SPEs are also known as variable interest entities (VIEs) or special purpose vehicles (SPVs). We use the term “SPE” to refer to all such entities.

growing. Zion and Carcache (2003) report that nearly a quarter of all Compustat firms and one-half of S&P 500 firms use at least one SPE. In our sample, the number of SPE users has increased by more than 400% from 1997 to 2014. While SPEs are commonly used in financial arrangements such as leases and securitizations, anecdotes suggest companies also use them to facilitate tax avoidance (JCT 2003). To this end, critics consider special purpose entities a “series of dirty words” in taxation (Forbes and Sharma 2008), while other groups, including researchers (Mills et al. 2002), tax authorities (Internal Revenue Bulletin 2011-39), and regulators (FASB 2003; JCT 2003, 2011; OECD 2013, 2015a, 2015b; United Nations 2013, 2015; European Parliament 2016) suspect SPEs contribute to the continuing decline in global corporate tax revenues.

SPEs are organizational structures that do not directly generate tax savings, but instead act as a vehicle to facilitate tax savings in two ways. The first way is by allowing sponsors to increase the *amount* of tax-advantaged activities.<sup>3</sup> For example, by separating high risk assets from the sponsor, SPEs can enable greater (1) debt capacity, resulting in more interest deductions (Mills and Newberry 2005), (2) external financing, leading to more research and development (R&D) deductions and tax credits (Shevlin 1987); and (3) synthetic leases, increasing depreciation deductions (Zechman 2010). The second way that SPEs facilitate tax savings is by enhancing tax *efficiency*, or the relative tax savings from existing tax-advantaged activities (i.e., holding *amount* constant). For example, SPEs allow firms to (1) shift profits to lower-tax jurisdictions (Drucker 2007; Dyreng et al. 2013), (2) design and operate tax shelters (Graham and Tucker 2006; Wilson 2009; Lisowsky 2010), and (3) structure intercompany transactions that result in tax credit and loss duplication (JCT 2003; Sheppard 2017).

<sup>3</sup> A tax-advantaged activity reduces tax costs independent of taxpayer motives. For example, the debt-tax shield of leverage and tax credits from R&D expense reduce taxes, but do not necessarily result from intentional tax planning. We discuss this concept further in Section 2, and map empirical proxies to such activities in Section 3.

It is important to understand how SPEs change the amount or efficiency of tax-advantaged activities because it sheds light on firms' tax-motivated strategies (Scholes et al. 2014). Different methods of facilitating tax savings likely vary in the degree to which tax avoidance is a primary or secondary managerial goal (e.g., using SPEs to enhance the tax savings from tax shelters versus using SPEs to finance R&D that also happens to result in tax credits), and thus can be used to infer managers' focus on taxes. Tax avoidance can also vary in aggressiveness and riskiness, and thus understanding how it is facilitated can help inform investors and stakeholders about potential future costs (e.g., tax audits and deficiencies). Finally, different methods of facilitating tax savings differ in how desirable they are to policymakers, with some methods acting to further policy objectives (e.g., using SPEs to finance R&D that also results in tax credits) and other methods enabling egregious tax avoidance.

Despite our focus on taxes, some experts argue that obtaining tax savings is *not* the main objective of SPEs (e.g., asset financing), suggesting these organizational structures play only a minor role in corporate tax avoidance (Soroosh and Ciesielski 2004). Even when tax savings are a primary objective, SPEs may not be optimal once non-tax costs are considered (Scholes et al. 2014). For example, in addition to setup costs, SPEs can reduce information quality (Feng et al. 2009), increase regulatory scrutiny (Internal Revenue Bulletin 2011-39; Inland Revenue 2013), enhance public pressure (Dyregang et al. 2016), and result in large tax penalties (Wilson 2009).

To provide a baseline for our main analyses, we first investigate whether SPEs are associated with corporate tax avoidance in a large-sample setting. We regress forward-looking GAAP and cash effective tax rates (ETRs) estimated over a three-year horizon ( $t$  to  $t+2$ ) on both a binary and continuous measure of SPEs derived from Exhibit 21 of Form 10-K during 1997-2014. We alternatively use industry fixed-effects to interpret firm-level associations between SPEs and

tax avoidance, and firm fixed-effects as a generalized difference-in-differences framework to measure the within-firm effect of *changes* in SPE use on ETRs; that is, the *incremental* tax savings attributable to SPEs. We find consistent evidence that both the number and use of SPEs are negatively associated with future GAAP and cash ETRs, suggesting that SPEs facilitate tax avoidance incremental to other determinants.

In our main analyses, we explore three research questions to investigate whether and under what circumstances the tax effects of SPEs are economically significant. First, to what extent are specific firm attributes used in conjunction with SPEs for tax avoidance? Second, how large are the tax savings facilitated by SPEs? Third, for which firm attributes do SPEs enhance tax *efficiency*, or relative tax savings? Directly measuring the amount and efficiency of tax savings facilitated by SPEs empirically answers how and to what extent organizational structures enable corporate tax avoidance.

To address these three questions, we first use path analysis to decompose the relation between SPEs and ETRs into direct and indirect paths. While traditional single-model regression analysis gauges overall effects, path analysis considers the existence and relative importance of alternative (indirect) paths of influence that jointly create overall effects (Bhattacharya et al. 2012). As a class of structural equation models, path analysis allows us to investigate the extent to which SPEs incrementally increase the *amount* of tax-advantaged attributes, and provides a focused setting in which to estimate the total tax savings facilitated by SPEs.

We find that several tax-advantaged attributes are used in conjunction with SPEs to avoid corporate taxes. Specifically, we estimate that SPEs facilitate 6.1% of the cash tax savings from depreciable assets, 3.9% from net operating loss (NOL) carryforwards, 2.3% from foreign operations, and 37.5% of the cash tax savings from intangible-related transactions. Thus, the path

analysis addresses our first research question by showing how SPEs can help firms increase the *amount* of several specific tax-advantaged attributes in an economically meaningful way.

For our second research question, the path analysis suggests that SPEs facilitate economically significant tax savings. We find that firms using the mean number of SPEs (5.87) have cash ETRs that are 3.3 percentage points lower than non-users. At the firm-level, SPE users realize on average \$22.2 million more in cash tax savings per year than firms not using SPEs. In aggregate, we estimate total cash tax savings of over \$330 billion for our sample, or about 6% of total U.S. federal corporate income tax collections during the sample period.<sup>4</sup> These estimates are considerably larger than those for other complex planning strategies, including tax shelters (Wilson 2009), tax havens (Dyreng and Lindsey 2009), round-tripping (Hanlon et al. 2015), and financial derivatives (Donohoe 2015).

To address our third research question, we use interaction (i.e., moderation) analysis to estimate the extent to which SPEs enhance the relative tax savings (i.e., tax *efficiency*) of tax-advantaged attributes. Interactions allow us to examine if specific attributes generate more or less tax savings when used with SPEs. While the *path* analysis reveals that an economically large portion of tax savings from depreciable assets, NOL carryforwards, foreign operations, and tax havens occur in conjunction with SPEs, the *interaction* analysis suggests that SPEs do not enhance the relative tax efficiency of these transactions. However, SPEs appear to enable a greater amount *and* efficiency of total tax savings for intangible assets and R&D, with tax efficiency gains of 61.5% to 87.5% for these attributes.

This study contributes to the literatures on SPEs (Shevlin 1987; Beatty et al. 1995; Feng et

<sup>4</sup> U.S. federal corporate income tax collections totaled approximately \$5.5 trillion from 1997 to 2016 (<https://www.irs.gov/statistics/soi-tax-stats-collections-and-refunds-by-type-of-tax-irs-data-book-table-1>). While our core firm-year sample spans 1997-2014, we use data through 2016 to calculate forward-looking ETR measures.

al. 2009) and corporate tax avoidance (see Hanlon and Heitzman 2010) in five ways. First, we differ from traditional tax avoidance research in that we consider whether, how, and the extent to which tax avoidance is facilitated by increasingly common and uniquely complex organizational *structures*. In doing so, we identify some of the attributes used *in conjunction with* such structures to generate tax savings, which is relevant to market participants as they analyze firms' tax profiles (Weber 2009), and tax authorities as they evaluate enforcement efforts to combat declining corporate tax revenues (Fox and Luna 2005; Inland Revenue 2013; Bozanic et al. 2017; Dyreng et al. 2017). Second, by providing the first large-sample estimates of the total tax savings facilitated by SPEs, we clarify inconclusive anecdotal evidence routinely cited by experts (e.g., Zion and Carcache 2003; Soroosh and Ciesielski 2004; Forbes and Sharma 2008) and researchers (e.g., Chasteen 2005; Desai and Dharmapala 2006; Feng et al. 2009; Zechman 2010), and help move the literature beyond the notion that firms simply *can* use SPEs to facilitate tax savings. Third, our results provide policymakers with a clearer picture of how firms use SPEs to generate tax savings. Although there are anecdotes of SPEs enabling egregious tax avoidance, we demonstrate that common forms of SPE-related tax avoidance seem to support desirable policy goals, such as tangible asset investment and R&D. Fourth, while prior research finds that tax incentives are an important, but not leading, determinant of SPE use, we show that SPEs are linked to economically significant tax savings nonetheless. Finally, we are the first to use path and interaction analysis to (1) evaluate the effects of organizational structure and (2) separate amount from efficiency effects to get at the "how" of corporate tax avoidance. As such, our study answers the call from Wilde and Wilson (2018) for research that identifies specific mechanisms that firms use to avoid taxes, and can guide future research examining the effects of corporate organizational structures.

## 2. Background and research questions

### 2.1 Corporate tax avoidance

Prior research extensively examines cross-sectional variation in firm attributes to identify the determinants of corporate tax avoidance. For example, studies show that tax avoidance is greater in firms with more leverage, international operations, R&D, intangibles, and financial derivatives (e.g., Gupta and Newberry 1997; Graham and Tucker 2006; Rego 2003; Lisowsky 2009; Donohoe 2015). Other studies examine the link between tax avoidance and ownership type (e.g., Chen et al. 2010; Cheng et al. 2012; Badertscher et al. 2013), or tax avoidance and managerial incentives (Phillips 2003; Lisowsky 2009; Rego and Wilson 2012; Chi et al. 2017). A particular manager, especially a tax director, also matters in generating tax savings (Armstrong et al. 2012; Dyreng et al. 2010), while internal tax departments, external tax advisors, and tax authorities can increase or constrain corporate tax avoidance (Robinson et al. 2010; Hoopes et al. 2012; Beck and Lisowsky 2014; Klassen et al. 2016; Klassen et al. 2017). Overall, these studies provide important insights into *what* companies and managers do—and to some extent *why*—to generate tax savings.

However, there is a noticeable void in the literature pertaining to *how* corporations facilitate tax avoidance. It is well-known that firms employ complex structures, such as corporate and pass-through subsidiary entities, some with multiple tiers, to operate and invest in various activities and locations (GAO 2011; OECD 2011; Donohoe et al. 2013). What is less-known is whether, how, and how much corporations use these structures to avoid tax. Only recently do some studies examine the link between organizational structure and tax avoidance, but the focus is on multinational corporations (Dyreng and Lindsey 2009; Hope et al. 2013; Lewellen and Robinson 2014; Wagener and Watrin 2014; Blouin and Krull 2015; Amberger and Kohlhase 2017). In other words, no study identifies or estimates the tax effects of organizational structure *regardless* of

firms' domestic or multinational activities. The lack of empirical evidence on these issues is largely due to challenges researchers face with (1) identifying organizational structures, and (2) separating the tax avoidance effects of firm attributes from the organizational structures that facilitate the attributes. Our examination of SPEs used by U.S. public corporations in a path and interaction analysis framework addresses these challenges.

## **2.2 Special purpose entities (SPEs)**

SPEs are created by a sponsor-firm for a specific business purpose or series of transactions (Feng et al. 2009). Although SPEs serve many purposes, they are often used to obtain external financing. For example, a sponsor might contribute “high-risk” assets, such as construction or R&D projects, to a SPE, which is legally separate from the sponsor by name, financial reports, and legal liability. The SPE can then obtain financing via equity or securitized debt, increasing the financing ability of the entire corporate group.<sup>5</sup> Along these lines, prior research finds higher leverage in firms that use SPEs (Mills and Newberry 2005; Feng et al. 2009), and suggests that separating assets with different risks and matching them with investor risk preferences can lead to more favorable financing (Shevlin 1987; Beatty et al. 1995). In asset securitizations, the sponsor uses SPEs to create new types of financing that can reduce capital costs, provide incentives to use debt over equity, and attract different types of investors (Schwarcz 1994; Landsman et al. 2008).

Corporate use of SPEs has flourished for at least two reasons. First, from a tax perspective, the U.S. Supreme Court permitted sponsor-firms to deduct SPE expenses from taxable income after 1974, increasing the tax planning capabilities of SPEs.<sup>6</sup> Second, from a financial reporting perspective, “bright-line” tests in ARB No. 51 (AICPA 1959) made it relatively easy for sponsors

<sup>5</sup> See Hartgraves and Benston (2002), Chasteen (2005), and Feng et al. (2009) for further details.

<sup>6</sup> *Snow v. Commissioner*, 416 U.S. 500 (1974), allowed limited partners to deduct partnership expenses from taxable income. A corporation that is a limited partner in a SPE structured as a partnership can thus deduct SPE expenses.

to avoid the consolidation of SPEs (Soroosh and Ciesielski 2004; Callahan et al. 2012, 2013).<sup>7</sup> As a result, SPEs became a popular way to move debt, expenses, and high-risk assets off-balance-sheet to enhance profitability and reduce perceptions of risk.

For these reasons, Feng et al. (2009) investigate the use, determinants, and earnings effects of SPEs. Using a novel measure of SPEs, they find a two-and-a-half fold increase in the share of firms using at least one SPE during 1997-2004. They also show that SPE activity increases with a firm's intangible assets and marginal tax rate (MTR), and decreases with foreign activity and the quality of governance. Firms also use more SPEs when facing higher financial reporting pressures, primarily those related to debt obligations. Finally, they document that SPEs arranged for financial reporting purposes (rather than economic reasons) are linked to earnings management.

Not surprisingly, the ability of SPEs to help sponsors "manage" financial reports has led to high-profile cases of earnings manipulation and fraud. For example, some sponsors used SPEs to create related-party income not eliminated in the consolidation process. This type of manipulation was largely behind the Enron fraud, which involved income overstatements of \$591 million during 1997-2000 (Thomas 2002). SPEs have also played a role in other scandals, such as Dynegy (Desai and Dharmapala 2006), PNC Financial (SEC 2002), and Olympus (Verschoor 2012). In the cases of Enron and Dynegy, SPEs were also used to avoid corporate taxes (McGill and Outslay 2004). More recently, SPEs were an integral factor in the financial crisis (Kothari and Lester 2012).

### ***2.3 Tax advantages of SPEs***

Tax avoidance represents a continuum of tax planning strategies, which vary in their level of aggressiveness. Some strategies are fairly benign and further policy goals (e.g., R&D credits),

<sup>7</sup> ARB No. 51 required consolidation of an entity in the sponsor's financial statements if the sponsor held more than 50% of the outstanding voting shares of the entity. Many sponsors simply limited their ownership of SPE voting shares to less than 50% and used other mechanisms, such as lease agreements and debt covenants, to maintain effective control of the SPE while avoiding financial statement consolidation (Chasteen 2005).

while others are aggressive or perhaps illegal tax shelters (Lisowsky et al. 2013; Donohoe 2015). Although SPEs can promote tax planning along the entire continuum, their mere inclusion in a firm's organizational structure does *not* automatically generate tax savings. For example, while SPEs often use pass-through forms that are not subject to entity-level income taxes, their income/losses "flow through" to the sponsor corporation's consolidated tax return and thus may not alter the firm's total tax liability. Similarly, tax savings are seemingly generated when non-consolidated SPEs face higher tax rates than the sponsor; but, different tax rates do not necessarily result in tax savings when the entire group (sponsor and SPE) is viewed as a consolidated whole. Thus, SPEs generate incremental tax savings only when paired with tax-advantaged firm attributes.

Specifically, SPEs *facilitate* tax savings by allowing sponsors to (1) increase the amount of tax-advantaged attributes the firm enjoys, and/or (2) enhance tax efficiency (i.e., relative tax savings holding the amount of attributes constant). To increase the amount of tax-advantaged attributes, SPEs can increase a sponsor's debt capacity by holding high-risk assets, which, in turn, can lead to greater tax deductible interest expense and fewer cash tax payments (Graham 2000; Blouin et al. 2010). Due to their ability to attract financing, SPEs can also acquire and hold depreciable assets, R&D projects (Shevlin 1987; Beatty et al. 1995), and securitized assets (Landsman et al. 2008), which further increase a sponsor's depreciation deductions, tax credits, and bad debt deductions, respectively.

To enhance the tax efficiency of a firm's attributes, SPEs can facilitate transfer pricing and profit shifting to low-tax jurisdictions. For example, in the "Double Irish With a Dutch Sandwich" strategy pioneered by Apple, Inc., a sponsor uses a SPE to relocate intangibles (e.g., patents) to other countries (e.g., Ireland) to benefit from lower tax rates and advantageous tax treatments of intangibles (Forbes and Sharma 2008; Duhigg and Kocieniewski 2012). These strategies are so

popular that the OECD (2013) now views legal ownership of intangibles as merely a reference point for determining actual ownership, and considers SPEs a major source of international tax treaty abuse in Action 6 of its Base Erosion and Profit Shifting Project (OECD 2015a).

U.S. domestic firms can similarly enhance the tax efficiency of tax-advantaged attributes by using SPEs in low-tax states. Gupta and Mills (2002) find that firms operating in multiple states reduce taxes by exploiting differences in state tax rates and rules. One example is Wal-Mart's use of captive real estate investment trusts, a specific type of SPE, to shift profits from high-tax states into low-tax states (Drucker 2007). In addition, Dyreng et al. (2013) find that corporate subsidiaries in Delaware and opportunities to shift profits between states are associated with lower state ETRs, and Fox and Luna (2005) show a decrease in state tax collections as the number of limited liability companies (a common legal form of SPEs) in a state increases.

On the more aggressive side, SPEs can enhance the relative tax savings of tax shelters. In the early 2000s, the IRS caught some firms using SPEs to accelerate the cost recovery of fixed assets, resulting in greater tax depreciation deductions (JCT 2003). More complex shelters used SPEs to generate "double deductions" for a single loss. For instance, using losses from prior asset sales (along with dividends subject to the dividends received deduction), Enron Corp. sold low tax basis SPEs (sometimes to other Enron SPEs) at a loss. These transactions resulted in federal tax savings of \$2.2 billion, about 93% of which was facilitated by SPEs (see JCT 2003).

These examples illustrate how SPEs can increase the amount of tax-advantaged attributes or enhance their relative tax savings. Interpreting the tax effects of SPEs is also nuanced. Most amount-increasing tax savings of SPEs arise in conjunction with other non-tax benefits (e.g., greater debt capacity), while efficiency-increasing effects reflect a tax-motivated business strategy

to achieve tax savings (Scholes et al. 2014). We provide more examples in Online Appendix A.<sup>8</sup>

#### *2.4 Tax disadvantages of SPEs*

Despite the potential for tax planning, SPEs might not facilitate economically large tax savings. SPEs enable a variety of transactions, many of which are not tax-advantaged or for which tax savings is not the primary goal. Such transactions can include securitizations (Landsman et al. 2008), synthetic leases with similar book/tax reporting (Zechman 2010; Callahan et al. 2013), and asset-backed commercial paper conduits (Bens and Monahan 2008). Also, many firms use parent-subsidiary organizational structures, particularly in states with favorable laws, to limit legal liability (Davis et al. 2002). More generally, Feng et al. (2009) find that financial reporting pressures, governance, and other non-tax factors drive SPE use, implying that tax avoidance may not be a primary goal. Aside from setup costs, SPEs can reduce information quality (Feng et al. 2009) and increase regulatory scrutiny (Internal Revenue Bulletin 2011-39) and public pressure (Dyreng et al. 2016). Thus, SPEs are not necessarily an optimal tax planning tool once all non-tax costs are considered (Scholes et al. 2014).

SPEs can even lead to *higher* taxes, especially if *ex post* events affect the realization of expected tax savings. For instance, tax authorities can disallow tax positions upon audit and levy severe penalties. Wilson (2009) finds that interest and penalties arising from tax shelters account for 49% of total assessed deficiencies. Transfer prices in cross-border transactions can also be adjusted by tax authorities upon audit. If a jurisdiction does not allow for an offsetting adjustment, double-taxation of the same transaction can be a costly outcome (Wittendorff 2010).

#### *2.5 Research questions*

Limited prior research examines the tax-related determinants of SPE use. Shevlin (1987)

<sup>8</sup> Please see “Online Appendix A: Examples of SPE-facilitated tax avoidance: Amounts and Efficiency,” as an addition to the online article.

and Beatty et al. (1995) evaluate whether firms with *low* MTRs are more likely to use R&D limited partnerships (a specific type of SPE) under the hypothesis that such firms can transfer tax benefits to affiliates facing higher MTRs. Both studies find evidence consistent with this hypothesis, suggesting that incentives for tax avoidance (in the form of MTRs) explain SPE use. However, neither study examines or estimates the tax savings facilitated by SPEs.

In contrast, Feng et al. (2009) find an association between *high* MTRs and SPE use. Aside from considering the more recent period of 1997-2004 (versus 1975-1984 in Shevlin (1987) and 1978-1992 in Beatty et al. (1995)), the opposite results in Feng et al. (2009) could be explained by different types of SPEs. They may also suggest a change in how sponsors use SPEs over time, reflecting the changing role of corporate tax departments over this period (Donohoe et al. 2014). However, Feng et al. similarly do not examine or estimate the tax savings facilitated by SPEs.

While these three studies offer evidence on the tax *incentives* for SPE use, we are interested in whether SPEs affect tax *outcomes* (i.e., total tax expense and cash taxes paid). On the one hand, there is considerable anecdotal evidence that SPEs can be (and are) used to facilitate tax avoidance (Section 2.3), suggesting a positive relation between SPEs and tax avoidance. On the other hand, there are reasons why such a relation may not exist. First, some anecdotes relate to egregious tax avoidance and evasion (JCT 2003; Brennan and Paul 2016), suggesting that SPE-related tax avoidance could be somewhat rare. Second, SPE-related tax avoidance can be costly (JCT 2003; Feng et al 2009), particularly if subject to detection risk and penalties (Wilson 2009). Third, SPEs have been demonized for playing a role in financial reporting scandals and the financial crisis (Thomas 2002; JCT 2003; Desai and Dharmapala 2006; Forbes and Sharma 2008). Finally, Shevlin (1987) and Beatty et al. (1995) find that the tax benefits of SPEs are transferred *away* from firms to investors, implying a negative relation between SPEs and tax avoidance. Thus, before

addressing our research questions (described below), in Section 4.2 we provide an empirical baseline by testing whether SPE use is positively or negatively related to tax avoidance.

Our three related research questions are novel because prior research usually considers the tax effects of different firm attributes rather than how organizational structures facilitate such attributes. As separate legal entities, SPEs do not directly generate tax savings, but instead facilitate tax savings via the amount and efficiency effects discussed earlier. Accordingly, our questions consider both of these effects, as well as the incremental tax savings from SPEs.

First, Section 2.3 highlights several tax-advantaged activities involving SPEs. However, no empirical evidence exists on the extent to which these activities are systematically facilitated by SPEs. For this reason, and because tax-advantaged activities vary in the degree to which they can generate tax savings, we first examine the extent to which SPEs enable sponsors to conduct a greater amount of such activities, as proxied by firm attributes. Our first research question is:

RQ1: To what extent do firms use tax-advantaged attributes *in conjunction with* SPEs for tax avoidance?

Second, we seek to measure the magnitude of total tax savings facilitated by SPEs, which could be economically large as some anecdotes suggest (Section 2.3), or small due to the non-tax costs and objectives of SPEs (Section 2.4). Our second research question is as follows:

RQ2: How economically significant are the total corporate tax savings facilitated by SPEs?

Third, due to the paucity of research on the tax outcomes of SPEs, only anecdotes indicate which transactions generate more tax savings when conducted in conjunction with SPEs. Because the use of SPEs to increase the relative tax savings of various activities likely reflects firms' motivation to enhance tax avoidance, we also evaluate the extent to which SPEs enhance the tax efficiency of tax-advantaged firm attributes. We state our final research question as follows:

RQ3: For which tax-advantaged attributes do SPEs enhance relative corporate tax savings?

### 3. Research design

#### 3.1 Measures of SPE use

Prior research uses a variety of methods to identify SPEs, which often rely on unique data from sponsor directories (Shevlin 1987), DealScan transactions (Zechman 2010), or searches of financial statement footnotes (Beatty et al. 1995; Landsman et al. 2008; Callahan et al. 2013). Although these methods can identify specific sets of SPE transactions (low Type I error), they do not always capture the full range of SPEs (high Type II error) because SPEs facilitate a wide variety of transactions and their existence is disclosed voluntarily in such data sources.

To identify SPEs, we follow Feng et al. (2009) by developing a Python script that counts the total number of subsidiaries listed in Exhibit 21 (a mandatory filing) whose names contain “Limited Partnership,” “Limited Liability Partnership,” “Limited Liability Corporation,” or “trust” for all electronically-filed Form 10-Ks. Because the SEC’s Office of Chief Accountant and many anecdotes indicate that SPEs are primarily organized as one of these types of pass-through entities (Feng et al 2009), the script does not count *corporate* subsidiaries.<sup>9</sup> The advantages of their approach include its (1) ability to identify virtually all SPEs; (2) mitigation of selection bias by relying on mandatory disclosures; and (3) computational ease. We first obtain Exhibit 21 disclosures from the Filing Exhibits database in the Wharton Research Data Services (WRDS) SEC Analytics Suite. We then fill any missing observations with data kindly provided to us by Feng et al. This approach ensures we identify the vast majority of SPE users. Should our approach fail to identify a SPE user (e.g., due to disclosure of SPEs elsewhere in the 10-K), the tax effects we observe will likely be understated because SPE users will be incorrectly classified as non-users.

<sup>9</sup> A list of subsidiaries must be disclosed to the SEC as Exhibit 21 to Form 10-K. We also include subsidiaries whose names contain the abbreviations “L.P.,” “LP,” “LLP,” “L.L.P.,” “LLC,” or “L.L.C.” Consistent with Feng et al. (2009), we do not include non-English-language pass-through subsidiaries.

In addition, while some SPEs might not be consolidated in a firm's financial reports, SEC regulations require the disclosure of consolidated as well as non-consolidated entities in Exhibit 21.<sup>10</sup> Because these regulations remain relatively unchanged since implementation, our approach captures SPE use consistently across time.

Feng et al. (2009) extensively validate this measure to ensure it captures SPEs. They find that the number of SPEs in Exhibit 21 is associated with press mentions of SPE use, asset securitizations, and the voluntary mention of SPEs in financial statements. In separate untabulated tests, we find empirical and anecdotal evidence that further validates the Feng et al. (2009) measure. We find that the observations we classify as SPE users are more than twice as likely as non-users to (1) mention SPEs, (2) use SPE-related euphemisms (e.g., "tax avoidance structure," "structural tax planning," "tax-favorable entity structures," etc.), or (3) discuss the entities used for securitization transactions in their 10-Ks. We find similar results for the total number of SPEs. We also examine the JCT (2003) Report on Enron and find 22 SPEs that are mentioned in conjunction with Enron's aggressive tax avoidance projects. Of these, four SPEs would not appear on Enron's last Exhibit 21 due to short life or not being created until a later time period. Of the remaining 18 SPEs, 17 (94.4%) were reported on Enron's Exhibit 21, suggesting that Exhibit 21 identifies SPEs that facilitate tax avoidance. Finally, we consider one firm, Ashford Hospitality Prime, Inc., that reports both an Exhibit 21 and a separate SPE listing. Using our methodology, we would correctly classify 38 of their 41 SPEs, suggesting that our SPE measurement has a low Type

<sup>10</sup> Under SEC Regulation S-K [Reg. §229.601(b)(21)], a registrant must provide a list of all its subsidiaries, whether or not they are consolidated for income statement or balance sheet reporting purposes. However, it also permits omission of subsidiaries that are not "significant subsidiaries," as defined under SEC Regulation S-X [Reg. §210.1-02(w)]. A "significant subsidiary" is any subsidiary for which the: (1) registrant's debt and equity investments in the subsidiary exceed 10% of the registrant's consolidated assets at the end of the fiscal year; (2) registrant's (and its other subsidiaries') share of the total assets of the subsidiary exceeds 10% of the registrant's consolidated assets at the end of the fiscal year; or (3) registrant's (and its other subsidiaries') share of the pre-tax income of the subsidiary exceeds 10% of the registrant's consolidated pre-tax income for the fiscal year.

II error rate (7.3%) and can reliably capture SPE use.

Overall, we construct two measures of SPE use: (1) the log of (one plus) the total number of SPE subsidiaries (*SPETOT*); and (2) a binary variable (*SPEBIN*) that equals one for firm-years with a SPE subsidiary (0 otherwise). Consistent with Feng et al. (2009), we winsorize *SPETOT* at the top 1% to reduce the influence of outliers. Both of our measures are highly correlated ( $\rho > 0.98$ ) with those of Feng et al. across common years (untabulated).

### 3.2 Measures of tax avoidance

We use two forward-looking ETRs estimated over three years ( $t$  to  $t+2$ ) to measure tax avoidance: (1) GAAP ETR (*GETR*), total tax expense scaled by pre-tax book income less special items; and (2) cash ETR (*CETR*), cash taxes paid scaled by pre-tax book income less special items (Dyreng et al. 2008).<sup>11</sup> *GETR* captures tax strategies that generate permanent differences between book and taxable income, while *CETR* captures tax strategies that generate both permanent and temporary differences between book and tax (i.e., that affect book income and defer cash taxes to later periods). We use forward-looking ETRs to capture the diverse effects of SPEs along the entire tax avoidance continuum, which can occur contemporaneously or with some delay.<sup>12</sup>

### 3.3 Empirical model

We estimate the following baseline regression models for firm  $i$  at time  $t$ :

$$ETR_{it \text{ to } t+2} = \alpha + \beta_1 SPE_{it} + \sum_{j=2}^{11} \beta_j TAA_{jit} + \sum_{j=12}^{20} \beta_j CTRL_{jit} + \delta_t + Firm_i + \epsilon_{it}, \quad (1)$$

$$ETR_{it \text{ to } t+2} = \alpha + \beta_1 SPE_{it} + \sum_{j=2}^{11} \beta_j TAA_{jit} + \sum_{j=12}^{20} \beta_j CTRL_{jit} + \delta_t + Industry_i + \epsilon_{it}, \quad (2)$$

where *ETR* is either the future-period *GETR* or *CETR*. The variable of interest, *SPE*, is alternately *SPETOT* and *SPEBIN*. If SPEs facilitate corporate tax avoidance, we expect  $\beta_1 < 0$ .

<sup>11</sup> Our results are robust to (1) scaling ETRs by pre-tax operating cash flows, mitigating earnings management as an alternative explanation, and (2) using the tax avoidance measures developed by Henry and Sansing (2018).

<sup>12</sup> Consistent with McGuire et al. (2012), we drop observations with negative ETR denominators as unprofitable firms are unlikely to have a significant tax liability. Our results are robust to controlling for special items.

Eq. (1) includes year and firm fixed-effects, while Eq. (2) replaces the firm fixed-effects with industry fixed-effects. Both models have advantages in our setting. Eq. (2) can better capture long-term tax strategies, as firm fixed-effects might remove some of the effect of SPEs on tax avoidance, particularly when SPE-related tax strategies have longer horizons and are less time-variant. However, including firm and year fixed-effects in Eq. (1) creates a generalized difference-in-differences model, where  $\beta_1$  is the difference-in-differences estimator of interest.  $\beta_1$  thus captures the effect of *changes* in SPE use on ETRs by using each firm as its own control, and can be interpreted as the *incremental* effect of SPEs on the tax savings attributable to a transaction. This specification allows for more robust modeling of time- and firm-effects, and captures a wide range of firm changes (Wooldridge 2010; Roberts and Whited 2013). These controls are particularly important in our setting to remove trends in complexity or globalization over time (using year fixed-effects) or across firms (using firm fixed-effects). We primarily focus on Eq. (1) as it is more conservative; however, we also point out where it may not be capturing long-term SPE-related tax strategies that Eq. (2) reveals. In Section 4, we explain how we adapt these baseline models to address each of our research questions.

*TAA* is a vector of a firm's tax-advantaged attributes known to influence ETRs (McGuire et al. 2012; Donohoe 2015), which is intended to proxy for transactions that are difficult to measure with available data. To capture corporate borrowing, we include leverage (*LEV*), net debt issuances (*DISS*), and the current portion of long-term debt (*CLTD*). We include fixed assets (*PPE*) to reflect both depreciable assets and basis-shifting to tax preferred assets. Similarly, intangible assets (*INTANG*) and R&D expense (*RDE*) capture amortizable assets, as well as elements of U.S. domestic and foreign profit shifting. Net operating loss carryforwards (*NOL*) capture tax loss duplication, and mergers and acquisitions (*M&A*) reflect basis shifting to tax-preferred assets.

Foreign income (*FINC*) captures elements of foreign profit shifting. Finally, the number of tax haven subsidiaries (*HAVEN*; Dyreng and Lindsey 2009) controls for foreign tax deferrals and ensures our results are not simply driven by subsidiaries located in tax haven jurisdictions.

*CTRL* is a vector of control variables. Following Feng et al. (2009), we include total assets (*SIZE*), profitability (*ROA*), book-to-market (*BM*), cash holdings (*CASH*), interest coverage ratio (*INTCOV*), stock return volatility (*SVOL*), and internal funds (*IFUND*). We also control for discretionary accruals (*DACC*) to remove noise related to firms' disclosure and accounting quality (Dyreng et al. 2018), and include business segments (*BUSSEG*) to ensure our results are distinct from operational complexity. All variables are defined in the Appendix.

### **3.4 Sample selection**

We begin with Compustat observations for fiscal years 1997-2014 that are: (1) publicly traded; (2) domestically incorporated; and (3) have positive total assets. Fiscal year 1997 coincides with the effective date of the check-the-box regulations (Munden et al. 2002), which permit some entities to choose an organizational form for tax purposes, and is also the first year that registrants were required to electronically file annual reports with the SEC, a necessity for computing our SPE measures. From this initial sample, we remove observations with (1) negative three-year pre-tax income; (2) insufficient data to estimate ETRs; and (3) regulated and financial firms (NAICS codes 22 and 52). We require two future years of data to estimate the three-year forward-looking ETRs (i.e., ETRs for 2014 also require ETR-related data from 2015 and 2016). These screens result in a sample of 55,837 firm-year observations. Further data criteria for control variables yield 31,522 observations from 4,732 unique firms. Table 1 summarizes the sample selection process.<sup>13</sup>

<sup>13</sup> Financial reporting consolidation standards changed from a 50% ownership test pre-2003, to a majority of rewards, losses, or risks threshold from 2003 to 2009 (FIN 46), to a qualitative test of a sponsor's ability to direct the activities or absorb the losses of an entity after 2009 (SFAS 167). For tax reporting, entities can be consolidated if they are

## 4. Main results

### 4.1 Descriptive statistics and univariate tests

Panel A of Table 2 reports the temporal distribution of the number of SPEs and SPE users, which exhibit nearly monotonically-increasing growth over the sample period. From 1997 to 2014, the total number of SPEs used by sample firms increases from 874 to 23,896 (a growth rate of over 2,600%), while the number of unique firms using SPEs increases by over 400% (from 200 to 1,045). Only 10.5% of sample firms use SPEs in 1997, but 66.8% use SPEs by 2014. These statistics are consistent with regulators' growing concerns about SPE use (OECD 2015a, 2015b; United Nations 2015; European Parliament 2016; Tax Justice 2017) and further support the use of firm and year fixed-effects in our primary empirical model.

<INSERT TABLES 1-2 & FIGURE 1 ABOUT HERE>

Recent research finds that ETRs are decreasing over time (Dyrenge et al. 2017), consistent with the changing role of corporate tax planning (Donohoe et al. 2014). This finding inversely mirrors the growth in SPE use. Figure 1 plots average GAAP ETRs (*GETR*) and the total number of SPEs used by sample firms over time. The strong negative relation provides univariate evidence that corporate use of SPEs coincides with the decline in ETRs over the 18-year sample period.

Panel B of Table 2 reports industry distributions for the number of SPEs, SPE users, and non-users by two-digit NAICS code. Industries with a higher concentration of SPEs are those with more intangibles (arts and entertainment), legal risk (construction), or both (health care), whereas industries with fewer intangibles (agriculture and warehousing) have fewer SPEs.

Table 3 reports descriptive statistics for measures of tax avoidance (*ETR*), SPE use (*SPE*), tax-advantaged attributes (*TAA*), and controls (*CTRL*), along with *t*-statistics for mean tests of

owned 80% or more, unless "check-the-box" regulations apply. Our inferences hold across these regimes, suggesting that our results are not driven by the inclusion of SPEs with lower ETRs than those of the consolidated group.

differences between SPE users and non-users. Means and medians of *GETR* and *CETR* are between 24.3% and 30.4%, similar to prior studies. Relative to non-users, SPE users have significantly smaller mean *GETR* (27.3% vs. 29.4%) and *CETR* (24.9% vs. 27.3%), suggesting that SPE users avoid more taxes than non-users. About 47.1% of sample observations use SPEs (*SPEBIN*), with about 6 SPEs (*SPETOT*) per user (1.927 in log form).<sup>14</sup>

Statistics for other variables are similar to prior studies and suggest that SPE users and non-users differ across several features. For example, relative to non-users, SPE users are larger (*SIZE*), more levered (*LEV*), less profitable (*ROA*), and have less R&D (*RDE*). We include firm fixed-effects in Eq. (1) to model observable (and unobservable) differences. We model the endogenous choice to use or report SPEs in Online Appendix B.<sup>15</sup> Pearson correlations (untabulated) indicate that SPE use is negatively related to both ETRs ( $p < 0.01$ ), consistent with expectations. Also, business segments (*BUSSEG*) and tax haven subsidiaries (*HAVEN*) are positively correlated with *SPEBIN* ( $\rho = 0.132$  and  $0.293$ , respectively), suggesting that these are important controls.

<INSERT TABLES 3 & 4 ABOUT HERE>

#### **4.2 Baseline relation between SPEs and corporate tax avoidance**

We begin our multivariate analyses by providing the first large-sample empirical evidence on the overall relation between SPEs and corporate tax avoidance. Table 4 reports estimates of Eq. (1) and (2) for both measures of ETRs and SPEs. Results of estimating Eq. (1) in columns (1) through (4) using firm fixed-effects show that the within-firm *change* in both the number of SPEs (*SPETOT*) and use of SPEs (*SPEBIN*) are negatively and significantly associated with future GAAP (*GETR*) and cash (*CETR*) ETRs. Results of estimating Eq. (2) using industry fixed-effects

<sup>14</sup> These amounts differ from those that can be computed with information in Table 2 because we winsorize continuous variables in Table 3 at 1<sup>st</sup> and 99<sup>th</sup> percentiles.

<sup>15</sup> Please see “Online Appendix B: Other Tests,” as an addition to the online article.

in columns (5) through (8) show that the number and use of SPEs are also negatively and significantly associated with *GETR* and *CETR*. These consistent results suggest SPEs facilitate tax avoidance beyond common tax-advantaged attributes (vector *TAA*) and other controls (vector *CTRL*). In sum, consistent with anecdotes discussed earlier, SPEs are strongly associated with greater corporate tax avoidance.

While firm and year fixed-effects in Eq. (1) control for endogeneity linked to time-invariant and across-firm factors, respectively, the relation between SPEs and tax avoidance can be biased if other unobservable factors affect the decisions to (1) report and (2) use SPEs, and avoid taxes. We consider this endogeneity in Online Appendix B, and show that our results are not likely driven by the choices to disclose and/or use SPEs. Using cross-sectional tests, matching analyses, and endogenous switching models, we also find evidence suggesting that any endogeneity bias would likely understate the effect of SPEs on corporate tax avoidance (see Online Appendix B).

#### **4.3 Path analysis (RQ1 and RQ2)**

After establishing the negative association between ETRs and SPE use, we now turn to answering our research questions. We first use path analysis, which belongs to a class of structural equation models that provide explanations of correlation structures (Bhattacharya et al. 2012). This method decomposes the relation between the source (causal) variables, our *TAA* vector of tax-advantaged attributes, and the outcome variable, *ETR*, into direct and indirect paths. Recall that as separate entities, SPEs do not directly generate tax savings; rather, they facilitate tax savings by allowing sponsors to engage in a greater amount of tax-advantaged activities. Using path analysis to estimate our primary specification in Eq. (1), we evaluate the extent to which the tax-advantaged attributes measured by vector *TAA* are used in conjunction with SPEs to incrementally avoid more taxes (RQ1). We then use the results to estimate the total tax savings facilitated by SPEs (RQ2).

Bhattacharya et al. (2012) compare path analysis to traditional single-model regressions, noting two relevant issues for our study. First, like regression analysis, path analysis requires the researcher to postulate source, mediating, and outcome variables. This *ex ante* specification can be based on theory and/or knowledge-based reasoning about the links among the variables. Figure 2 diagrams the recursive path (links flow in only one direction) we consider among observable variables, which is guided by anecdotal evidence in Section 2.3 and Online Appendix A.

Second, whereas regression analysis evaluates overall effects, path analysis considers the existence and relative importance of alternative (indirect) paths of influence that jointly create the overall effects. For example, with *SPE* included in Eq. (1), the coefficients for the vector of tax-advantaged attributes (*TAA*) capture the direct effect of each measured attribute on ETRs (i.e., the solid arrows in Figure 2). This direct effect can be interpreted as the amount of each attribute that is unrelated to and unaffected by SPEs. When SPE is excluded from Eq. (1), the *TAA* coefficients capture the total effect of each measured attribute on ETRs, whether or not it is related to and affected by SPEs. The difference between the direct and total effects is the indirect effect (i.e., the dashed arrows in Figure 2), which reflects the portion of the variation in each *TAA* proxy that is related to SPE use or the incremental effect of each attribute used in conjunction with SPEs. These indirect effects are omitted in traditional single-model regression analysis.

#### 4.3.1 Amount of tax-advantaged attributes used in conjunction with SPEs (*RQ1*)

The output of path analysis includes path coefficients that link the postulated variables. In our setting, we are interested in three sets of path coefficients: (1) *Total*, which reflect the total (direct and indirect) effect of each tax-advantaged attribute measured by vector *TAA* on ETRs; (2) *Direct*, which reflect the effect of each attribute on ETRs outside (i.e., holding constant) SPEs; and (3) *Indirect*, which reflect the indirect (incremental) effect of each attribute on ETRs that is

facilitated by SPEs. To gauge the relative importance of the indirect effects and address RQ1, we also estimate the proportion of the total effect that is incrementally facilitated by SPEs, which we term *Indirect%* (i.e., the ratio of the indirect effect to total effect).

<INSERT FIGURE 2 & TABLE 5 ABOUT HERE>

We conduct our path analysis in three steps. First, we map each tax-advantaged attribute in Section 2 and Online Appendix A to at least one variable in vector *TAA* (see Figure 2). For example, *NOL* intends to reflect loss duplication by firms with NOLs, while *INTANG* and *FINC* intend to reflect tax avoidance via transfer pricing.<sup>16</sup> Second, we standardize variables to facilitate coefficient comparisons. Third, consistent with methodological best practices (Iacobucci 2009; LeBreton et al. 2009; Zhao et al. 2010), we estimate Eq. (1) as a full-information maximum likelihood structural equations model to obtain coefficients that explain the path in Figure 2.

Table 5 presents path coefficients. For brevity, we only report results for *SPETOT* (results for *SPEBIN* are similar). In the *Total* columns, we estimate Eq. (1) without *SPETOT* to examine the total (direct and indirect) effect of each non-SPE variable on *GETR* (Panel A) and *CETR* (Panel B). In the *Direct* columns, we estimate Eq. (1) with *SPETOT* such that the coefficients for the non-SPE variables capture only their direct effect on ETRs, controlling for the use of SPEs. Finally, the *Indirect* columns report the difference between *Total* and *Direct*, which reflects the incremental effect of each non-SPE attribute on ETRs incrementally facilitated by SPEs. In other words, the exclusion and then inclusion of *SPETOT* in Eq. (1) reflects how much of the non-SPE variables' effect on ETRs (as reflected in *Total*) is in conjunction with SPEs (as reflected in *Indirect*). A

<sup>16</sup> Foreign operations, tax havens, R&D activity, and intangible assets are related to income shifting activity (Collins and Shackelford 1998; Dischinger and Riedel 2011). To evaluate whether our results overlap with income shifting, we measure high income mobility using an indicator variable equal to one if a firm has (1) R&D expense, (2) a tax haven subsidiary, (3) above-median foreign operations, and (4) above-median intangible assets; zero otherwise. We find similar results in firms with high versus low income mobility, suggesting SPEs capture more than just income shifting.

negative (positive) indirect effect indicates that SPEs result in more (less) tax avoidance for a given attribute.<sup>17</sup> For instance, the negative indirect coefficients for *RDE* and *INTANG* suggest firms facilitate tax avoidance by using R&D and intangible assets, respectively, in conjunction with a SPE. To gauge the effect size, *Indirect%* reports the proportion of the total effect occurring in conjunction with SPEs ( $|Indirect/Total|$ ). This ratio is interpreted as follows: a one standard deviation increase in R&D (*RDE*) results in a 0.041 standard deviation decrease in *GETR*, where 0.003 of the decrease occurs from R&D used with SPEs and 0.038 occurs from R&D not in SPEs. That is, 7.3% ( $0.003/0.041$ ) of the total tax savings from R&D is incrementally facilitated by SPEs.

The results in Table 5 reveal that the tax savings from several tax-advantaged attributes in vector *TAA* are incrementally greater when used with SPEs. Specifically, 7.3% of total tax expense (*GETR*) and all cash tax savings (*CETR*) from R&D (*RDE*) is facilitated by SPEs. In addition, 3.7% of tax expense and 6.1% of the cash tax savings from depreciable assets (*PPE*), 10.1% and 37.5% of the savings from intangibles (*INTANG*), 4.7% and 3.9% of the savings from NOLs (*NOL*), and 4.3% and 2.3% of the savings from foreign operations (*FINC*) are facilitated by SPEs.

The results also indicate that 114.3% of tax expense (*GETR*) and 62.5% of cash tax savings from tax havens (*HAVEN*) are facilitated by SPEs. The amount of cash tax savings is large because tax havens are not associated with lower ETRs in our baseline tests (see Table 4), implying that tax havens primarily reduce ETRs when *combined* with SPEs. In other words, because only the indirect effect of *HAVEN* is significant for both *GETR* and *CETR*, most of the cash tax savings from tax havens likely occurs *in conjunction with* SPEs. This result is consistent with recent anecdotes of firms using SPEs to place specific assets (e.g., intangibles) in tax haven jurisdictions

<sup>17</sup> We compute standard errors for indirect effects using the Sobel Multivariate Delta Method (Sobel 1982), adjusted for firm-level clustering. In untabulated tests we re-estimate Eq. (1) using bootstrapped standard errors (Preacher and Hayes 2004; Zhao et al. 2010). Inferences remain the same, with improved statistical significance in many cases.

(Forbes and Sharma 2008; Duhigg and Kocieniewski 2012). Similarly, the insignificant total effect combined with the negative and significant indirect effect for *HAVEN* can occur when tax haven transactions not held in SPEs increase ETRs. This issue could arise when non-SPE tax haven subsidiaries incur penalties and interest charges from tax authorities (perhaps by attracting scrutiny), experience double taxation of transactions due to transfer pricing adjustments by tax authorities, or structure transactions in a tax inefficient manner.<sup>18</sup>

Finally, SPEs are associated with an increase in the use of cash holdings (*CASH*) and cash flows (*IFUND*) to obtain tax savings, and an increase in tax avoidance among larger firms (*SIZE*). SPEs are also associated with a reduction in the use of debt issuances (*DISS*) and mergers and acquisitions (*M&A*) to achieve tax savings. Overall, these findings are consistent with SPEs facilitating a greater amount of tax-advantaged activities in an economically meaningful way.<sup>19</sup>

#### 4.3.2 Total tax savings facilitated by SPEs (RQ2)

The path analysis results for RQ1 allow us to estimate the total tax savings facilitated by SPEs (RQ2). We use coefficient estimates in each column of Table 5 to compute average firm- and sample-level tax savings. We also compute maximum firm- and sample-level tax savings

<sup>18</sup> Dyreng and Lindsey (2009) find that haven subsidiaries are negatively associated with ETRs. As such, we examine whether the coefficient for *HAVEN* differs between SPE user and non-user firms (untabulated). We find no significant differences, or any evidence that tax haven subsidiaries have a significantly negative association with ETRs in any SPE-using or non-using subsample. We also partition our sample into firms with and without tax haven subsidiaries to examine whether our results change across these subsamples. We find that our firm fixed-effects results (Eq. 1) are stronger among firms that do not have tax haven subsidiaries when *GETR* is the dependent variable. We also find that our industry fixed-effects results (Eq. 2) are stronger among firms that do not have tax haven subsidiaries when examining *SPETOT*. Together, these results suggest that SPEs are not simply a proxy for tax haven use. Rather, SPEs have a unique effect on tax avoidance above and beyond tax haven use.

<sup>19</sup> While the sign and significance of indirect effects in Panels A and B are comparable, there are some differences in the magnitude of the indirect effect relative to the total effect. Larger effects in Panel B would be consistent with the *TAA* proxy representing transactions that result in significant temporary (i.e., reversing) tax savings, as these are captured by *CETR* but not by *GETR*, while larger effects in Panel A would be consistent with the *TAA* proxy capturing transactions that result in mostly permanent tax savings, as *GETR* captures these without dilution from temporary tax avoidance. Noise from tax accruals (e.g., valuation allowances and UTBs) in *GETR* could also drive differences in magnitudes between the two panels, although the effect of this noise on the relative magnitudes between the two panels is unclear. This same discussion applies in comparing tax savings magnitudes in Table 6.

using the untabulated lower (most negative) bound of the 95% coefficient confidence interval. To estimate the direct effects—the tax savings due to SPE-facilitated attributes *not* captured by *TAA*—we use the coefficient for *SPETOT* to compute the effect that moving from zero SPEs to the mean number of SPEs (5.87) has on *GETR* and *CETR* (i.e., the percentage point reduction in each ETR).<sup>20</sup> To estimate the indirect effects—the tax savings due to SPE-facilitated attributes captured by vector *TAA*—we sum coefficients for all *TAA* and *CTRL* variables in the *Indirect* column of Table 5, and compute the effect that moving from zero to the mean number of SPEs has on ETRs. Finally, to estimate the total effects, we sum the direct and indirect ETR effects. We then compute average firm-level (sample-level) tax savings as the product of the (a) absolute value of ETR effects and (b) average firm-level (sample-level) sum of pre-tax book income less special items for SPE users (\$677.5 million and \$10.069 trillion for firm-level and sample-level estimates, respectively). This approach is similar to Donohoe (2015).

<INSERT TABLE 6 ABOUT HERE>

Panel A of Table 6 reports estimates of the tax savings due to SPE-facilitated attributes (1) not captured by vector *TAA* (direct effects); (2) captured by vector *TAA* (indirect effects); and (3) combined (total effects). For the direct effects, moving from no SPEs to the mean number of SPEs is related to GAAP (*GETR*) and cash (*CETR*) ETRs that are 2.4 and 1.7 percentage points lower

<sup>20</sup> Because variables are standardized, we multiply ETR coefficients by the standard deviation of *GETR* and *CETR* (0.185 and 0.203, respectively), divide by the standard deviation of *SPETOT* (1.217), and then multiply by the mean of *SPETOT* for SPE users (1.927). We use the direct effect because the coefficient on *SPETOT* captures some tax-advantaged activities that are not captured in *TAA*, either because there is no reasonable proxy for these transactions or the *TAA* proxy we use is measured with noise. For example, with *SPE* in Eq. (1), the coefficients for the vector of tax-advantaged activity variables (*TAA*) capture the direct effect of each measured transaction on ETRs absent the use of SPEs (i.e., the solid arrow in Figure 2). Thus, if the *TAA* variables perfectly measured every tax-advantaged activity facilitated by SPEs, the coefficient for *SPE* will equal zero because (1) the direct effects of each transaction are captured by the *TAA* variable coefficients, and (2) regression analysis ignores indirect effects (i.e., the dashed arrows in Figure 2). However, because it is inherently difficult to measure the array of activities facilitated by SPEs, the coefficient for *SPE* captures the direct and indirect effects of unmeasured activities (i.e., those not captured by *TAA* due to measurement error or omission) that are used in association with SPEs. Path analysis identifies and measures the relative importance of such indirect effects, ultimately allowing us to infer the incremental effect of SPEs on the level of tax-advantaged transactions captured by *TAA* as well as those not captured by *TAA*.

than non-users, respectively. For the indirect effects, moving from no SPEs to the mean number of SPEs results in a 2.3 and 1.6 percentage point reduction in GAAP and cash ETRs, respectively. Thus, in total, SPE users have GAAP and cash ETRs that are 4.7 and 3.3 percentage points lower than non-users, respectively. As a percentage of mean ETRs for non-users (see Table 3), SPE users have GAAP and cash ETRs that are 16.0% and 12.1% lower than non-users, respectively. At the firm-level, these total effects equate to average GAAP and cash tax savings of \$31.56 million and \$22.21 million per year, respectively. At the sample-level, the cash tax savings are over \$330 billion, or 5.95% of total U.S. federal corporate tax collections during 1997-2016. However, these amounts could be as large as \$544 billion.

To place the estimates in perspective, Panel B of Table 6 compares the total SPE-facilitated tax savings to that from other types of tax planning. Both the aggregate and annual cash tax savings facilitated by SPEs are much larger than the savings from “round-tripping” (Hanlon et al. 2015), tax shelters (Wilson 2009), derivatives (Donohoe 2015), subsidiaries in tax havens, and deferral of U.S. taxes by placing non-U.S. income in tax havens (Dyreng and Lindsey 2009). Such comparisons provide evidence to regulators and investors on the large tax effects of SPEs.

#### **4.4 Interaction analysis (RQ3)**

Interaction (or moderation) analysis (Kline 2011) considers whether the relation between two variables depends on (is moderated by) a third variable. We use interactions between *SPETOT* and our *TAA* proxies to estimate how much SPEs enhance the tax efficiency, or relative tax savings, of tax-advantaged attributes (RQ3). That is, we evaluate if SPEs affect how efficient such attributes are at generating tax avoidance, *holding constant* the amount of the underlying attribute.

Interaction and path analysis, while seemingly similar, offer unique insights that are important in understanding how SPEs facilitate tax avoidance. While path analysis measures

indirect effects, and can thus measure how SPEs affect the amount of tax avoidance related to tax-advantaged attributes, interaction analysis cannot measure indirect effects. Instead, interaction analysis examines how the association between two variables (e.g., tax avoidance and tax-advantaged attributes) changes when a third variable (e.g., SPEs) is introduced. Thus, interaction analysis can measure if SPEs affect *how efficient* tax-advantaged attributes are at generating tax avoidance. Path analysis alone cannot generate these inferences.<sup>21</sup> In short, interaction analysis offers insight into the non-tax benefits/costs of facilitating SPE activities (Scholes et al. 2014).

We implement our analysis by estimating Eq. (1) with interaction terms between *SPETOT* and each covariate, where all variables are demeaned and standardized. Table 7 presents the results for *GETR* and *CETR* in Panels A and B, respectively, where column (1) reports the main effect of each covariate, column (2) reports the interaction between *SPETOT* and the relevant covariate, and column (3) reports estimates of the extent to which SPEs enhance the tax efficiency savings of tax-advantaged transactions captured by each *TAA* proxy.

The results are interpreted as follows. First, the main effect for *SPETOT* (column (1)) reflects the effect of SPEs on ETRs at the mean level of both SPEs and all covariates. For example, in Panel A, a one standard deviation increase in *SPETOT* (1.217, or 2.4 SPEs unlogged; Table 3) results in a 0.054 standard deviation decrease in *GETR* (measured at the mean of SPEs and other variables). Likewise, a one standard deviation increase in *LEV* (0.182; Table 3) is associated with a 0.060 standard deviation decrease in *GETR*. Second, the interaction effect (column (2)) captures the effect of SPEs on *GETR* changes as each covariate changes. For instance, for a one standard

<sup>21</sup> In general, interaction analysis and path analysis can produce similar results if, all else equal, firms conduct activities in conjunction with SPEs when SPEs make them more tax-advantaged. This outcome would suggest that tax savings are a primary goal for engaging in an activity in conjunction with a SPE. Results will differ, however, when SPEs contain tax-advantaged activities, but ultimately make the related tax avoidance less efficient (i.e., the non-tax benefits of SPEs exceed any loss in tax savings; see example 2 in Online Appendix A). Similarly, results will differ if the firm does not use SPEs for tax-advantaged activities, even if SPEs would make tax avoidance more efficient (i.e., the non-tax costs of SPEs exceed any gain in tax savings).

deviation increase in *SPETOT*, the effect of a one standard deviation increase in *LEV* is associated with a further 0.013 standard deviation reduction in *GETR* (totaling  $0.073=0.060+0.013$ ) at the mean of *LEV* and other covariates (except *SPETOT*, which increased by one standard deviation).<sup>22</sup>

Third, the percentage change (column (3)) measures the relative increase in tax savings from SPEs. For example, at the mean of *SPETOT*, a one standard deviation increase in *RDE* results in a 0.056 standard deviation decrease in *GETR* (column (1)). If *SPETOT* increases by one standard deviation, the effect of a one standard deviation increase in *RDE* is a 0.105 ( $0.056+0.049$ ) standard deviation decrease in *GETR*. The incremental reduction in *GETR* (0.049) due to the increase in *SPETOT* reflects an 87.5% increase in tax savings relative to no change in *SPETOT* ( $0.049/0.056$ ).

<INSERT TABLE 7 ABOUT HERE>

The path analysis (Table 5) indicates that SPEs are less likely to hold debt-related tax avoidance attributes (*DISS*). Consistent with this finding, the *positive* interaction coefficients (column (2)) for *DISS* and *CLTD* in Panel A of Table 7 indicate that debt used with SPEs is 43.8% to 170.0% *less* efficient at generating tax savings than debt elsewhere in the organizational structure.<sup>23</sup> There are several reasons why debt might be less efficient at generating tax savings when used with SPEs. For instance, because our sample period is largely post-Enron (2001), firms may be less likely to hold debt in SPEs unless the debt is relatively low risk (and thus low rate) to avoid appearing to engage in risky SPE-related financing (JCT 2003). SPE use may also produce more favorable financing terms (Shevlin 1987; Beatty et al. 1995; Mills and Newberry 2005) and

<sup>22</sup> In this example, the 0.013 additional reduction in *GETR* is not statistically significant.

<sup>23</sup> In untabulated analyses, we do not find any significant difference in these debt results between firms with high and low financial constraints, where financial constraints are measured using a median split on the Altman Z-score (Altman and Hotchkiss 2006) and/or the Whited and Wu (2006) Index. Additionally, because our results may be affected by including three debt-related variables in the same model (i.e., *LEV*, *DISS*, and *CLTD*), in untabulated analyses we remove the other two variables and rerun our analyses for each variable. All results are similar to those tabulated, and we also find a positive interaction coefficient if we replace these three variables with a variable composed of the principal component of these three debt variables.

thus generate less interest expense deductions per dollar of debt. Finally, because we find that SPEs facilitate tax savings from numerous non-debt attributes in Table 5, it may also be that firms have less need for a debt-tax shield when SPEs facilitate alternative tax shields, such as NOLs and intangible assets. Similar to debt, the positive interactions for *NOL* and *FINC* reveal 70.0% and 47.5% more total tax savings, respectively, when transactions related to NOLs and foreign operations are not used with SPEs. Conversely, intangibles (*RDE* and *INTANG*) are associated with 61.5% to 87.5% greater efficiency (i.e., greater total tax savings) when used with SPEs; for example, to shift profits or duplicate tax credits, losses, and/or deductions relating to R&D expense and intangibles. Because *HAVEN* is included in Eq. (1), such profit shifting would likely occur between U.S. states or the U.S. and non-tax havens.

However, we do not find these results for *CETR* in Panel B of Table 7. One explanation is that, while *GETR* and *CETR* both capture permanent book-tax differences, *GETR* also captures the effects of tax accruals and *CETR* also captures the effects of temporary book-tax differences. Consequently, finding results with *GETR* but not *CETR* may indicate that SPEs influence the efficiency of the noted tax-advantaged attributes to create favorable tax accruals. However, insofar as tax accruals are captured by control variables, failing to find results with *CETR* may also indicate that SPEs do not influence the efficiency of tax-advantaged attributes to create temporary book-tax differences. To examine this issue, we replace total tax expense in the numerator of *GETR* with deferred tax expense. We find results that are qualitatively similar to those in Panel B for *CETR* (untabulated), suggesting that SPEs may not influence the efficiency of the tax-advantaged attributes to create temporary book-tax differences.<sup>24</sup> Finally, the negative interaction coefficient for *M&A* in Panel B suggests SPEs increase the efficiency of cash tax savings from mergers/

<sup>24</sup> Another explanation for not finding similar results in Panel B is that *CETR* may be a noisier measure of tax avoidance (Dyreg et al. 2017). For example, *CETR* has a larger standard deviation (0.203) than *GETR* (0.185) in Table 3.

acquisitions by 48.1%, even though the overall magnitude of such savings is not large (Table 5).

Overall, while the path analysis (Table 5) indicates that an economically large portion of the tax savings from depreciable assets, foreign operations, NOL carryforwards, and tax havens occur in conjunction with SPEs, the interaction analysis (Table 7) reveals that SPEs do *not* also enhance the tax efficiency of these attributes. That is, SPEs facilitate tax avoidance by enabling sponsors to conduct a greater amount of these tax-advantaged attributes rather than by enhancing the efficiency of their relative tax savings. For R&D and intangibles, however, SPEs both enable a greater amount of these attributes *and* enhance the total tax efficiency of these attributes.

We highlight that our tests focus on the *tax* costs and benefits of SPE use. If non-tax benefits (e.g., lower financing costs, limited liability) exceed the potential tax savings, then holding depreciable assets, foreign operations, NOL carryforwards, and tax haven subsidiaries within SPEs could still be optimal for a sponsor (Scholes et al. 2014). This reasoning likely explains why sponsors still use SPEs to conduct a greater amount of these activities. For R&D and intangibles, however, the increase in amount and efficiency of tax savings is a valuable motive for using SPEs. Together, these results suggest that much of the tax savings associated with SPEs are in accordance with policy goals, such as investment in tangible assets and R&D.

## 5. Conclusion

Prior research examines the link between firm attributes and tax avoidance (Hanlon and Heitzman 2010). However, few studies consider organizational *structures* that facilitate such attributes, while those that do primarily focus on incentives and general determinants rather than tax outcomes (Shevlin 1987; Beatty et al. 1995; Feng et al. 2009). Accordingly, we study whether SPEs, increasingly complex and common organizational structures, facilitate tax savings by allowing firms to conduct a greater *amount* of tax-advantaged activities and/or enhance their tax

*efficiency* (i.e., increase tax savings holding the amount of activities constant).

First, we find consistent evidence that SPEs facilitate tax avoidance. Second, using path analysis, we show that SPEs facilitate a greater *amount* of tax-advantaged attributes. Specifically, SPEs facilitate greater cash tax savings from depreciable assets (6.1%), NOL carryforwards (3.9%), foreign operations (2.3%), intangible assets and R&D (37.5 to 100%), and tax havens (62.5%). Next, we estimate that SPEs facilitate total incremental cash tax savings of about \$330 billion for our sample of SPE users, or almost 6% of U.S. federal corporate tax collections during the sample period. Finally, interaction analyses reveal that SPEs enhance the tax efficiency (i.e., relative tax savings) of R&D and intangibles.

Although we provide large-sample evidence of the importance of SPEs in corporate tax avoidance, our inferences may change given the Tax Cuts and Jobs Act (TCJA). Effective for tax years 2018 and later, the TCJA significantly changed many features of the U.S. corporate tax system. For example, the TCJA moved the U.S. more towards a territorial tax system (Donohoe et al. 2019), which prior research finds is associated with greater income shifting (Markle 2016). Therefore, it is possible that the TCJA could either increase SPE-related tax avoidance as income shifting opportunities increase, or decrease SPE-related tax avoidance because the more territorial tax system may substitute for the usefulness of SPEs. Separately, the reduction in the top U.S. corporate rate from 35% to 21% may reduce, yet not eliminate the incentives for tax avoidance. Regardless, our study provides important economic insight into the complex organizational structures that facilitate corporate tax avoidance, and we offer an empirical roadmap for using path analysis to study these effects.

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## Appendix Variable definitions

### Measures of SPE use (*SPE*)

- SPE**TOT* Total number of SPEs, defined as the natural log of one plus the total number of subsidiaries in Exhibit 21 of Form 10-K meeting relevant criteria (see Section 3).
- SPE**BIN* Indicator variable equal to 1 if the firm-year has at least one SPE subsidiary in Exhibit 21 of Form 10-K; 0 otherwise.

### Measures of tax avoidance (*ETR*)

- GETR* GAAP effective tax rate (3-year), defined as the three-year sum ( $t$  to  $t+2$ ) of total tax expense (txt) divided by the three-year sum ( $t$  to  $t+2$ ) of pre-tax book income (pi) less special items (spi). Observations with negative denominators are dropped. ETRs are reset to 1 (0) if greater (less) than 1 (0).
- CETR* Cash effective tax rate (3-year), defined as the three-year sum ( $t$  to  $t+2$ ) of cash taxes paid (txpd) divided by the three-year sum ( $t$  to  $t+2$ ) of pre-tax book income (pi) less special items (spi). Observations with negative denominators are dropped. ETRs are reset to 1 (0) if greater (less) than 1 (0).

### Tax-advantaged attributes (*TAA*)

- LEV* Leverage, defined as long-term debt (dltt) divided by total assets (at).
- DISS* Debt issuance, defined as net debt issuance/reduction (dltis–dltr) divided by total assets (at).
- CLTD* Debt renegotiation costs, defined as the current portion of long-term debt (dlc) divided by total assets (at).
- RDE* Research and development expense, defined as research and development expense (xrd) divided by lagged total assets (at). Missing values are set equal to 0.
- PPE* Capital intensity, defined as gross property, plant, and equipment (ppeg) divided by total assets (at).
- INTANG* Intangible assets, defined as intangibles (intan) divided by total assets (at).
- NOL* Net operating loss, defined as tax-loss carryforwards (tlcf) divided by lagged total assets (at). Missing observations are set equal to 0.
- M&A* Indicator variable equal to 1 if cash flow from mergers and acquisitions (aqc) does not equal 0; 0 otherwise.
- FINC* Foreign income, defined as pre-tax foreign income (pifo) divided by lagged total assets (at). Missing observations are set equal to 0.
- HAVEN* Indicator variable equal to 1 for firm-years with at least one subsidiary listed in Exhibit 21 of Form 10-K that is located in a tax haven country; 0 otherwise. See Dyreng and Lindsey (2009).

**Control variables (CTRL)**

<i>SIZE</i>	Firm size, defined as the natural log of total assets (at).
<i>ROA</i>	Return on assets, defined as income before extraordinary items (ib) divided by average total assets (at).
<i>BM</i>	Book-to-market ratio, defined as book equity (seq) divided by market value of equity (prcc_f×csho).
<i>CASH</i>	Cash holdings, defined as cash and cash equivalents (che) divided by total assets (at).
<i>INTCOV</i>	Interest coverage ratio (inverse), defined as interest expense (xint) divided by operating income after depreciation expense (ebit).
<i>SVOL</i>	Stock return volatility, defined as the decile of the standard deviation (sdevv) of daily stock returns in each year. Stock return data obtained from CRSP.
<i>IFUND</i>	Internal fund supply, defined as the sum of cash flows from operations (oancf) and investing (invcf) divided by average total assets (at).
<i>DACC</i>	Discretionary accruals, defined as the residuals from the performance-matched cross-sectional modified Jones model. See Dechow et al. (1995) and Kothari et al. (2005).
<i>BUSSEG</i>	Business segments, defined as the natural log of one plus the number of business segments. Segment data obtained from Compustat Business Segments.

**Other variables**

<i>DOM</i>	Indicator variable equal to 1 for firm-years with no foreign income (pifo); 0 otherwise.
<i>FED</i>	U.S. federal effective tax rate (three-year), defined as the three-year sum ( $t$ to $t+2$ ) of federal tax expense (txfed) divided by the three-year sum ( $t$ to $t+2$ ) of pre-tax income (pi) less special items (spi).
<i>FRN</i>	Foreign effective tax rate (three-year), defined as the three-year sum ( $t$ to $t+2$ ) of foreign tax expense (txfo) divided by the three-year sum ( $t$ to $t+2$ ) of pre-tax income (pi) less special items (spi).
<i>STA</i>	State effective tax rate (three-year), defined as the three-year sum ( $t$ to $t+2$ ) of state tax expense (txs) divided by the three-year sum ( $t$ to $t+2$ ) of pre-tax income (pi) less special items (spi).
<i>%EX21</i>	Exhibit 21 industry ratio, defined as the percentage of all firms in a firm's two-digit NAICS industry and year that report a subsidiary on an exhibit 21.
<i>%SPE</i>	SPE industry ratio, defined as the percentage of SPE users in a firm's two-digit NAICS industry and year.

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**Note:** Compustat mnemonics in parentheses.

TABLE 1  
Sample selection

	Observations	
	<u>Firm-Years</u>	<u>Firms</u>
Compustat observations with positive assets (1997-2014)	176,086	22,403
Less: Observations with negative three-year pre-tax income	(55,695)	(1,921)
Less: Observations with missing data to compute ETRs	(50,837)	(10,225)
Less: Financial and regulated firms	<u>(13,717)</u>	<u>(2,156)</u>
Subtotal	55,837	8,101
Less: Observations with missing data to compute control variables	<u>(24,315)</u>	<u>(3,369)</u>
Primary Sample	31,522	4,732

TABLE 2  
SPE distributions

**Panel A:** Temporal distribution

Year	(1) Total SPEs	(2) SPE Users	(3) SPEs Per User [(1)/(2)]	(4) Non- Users	(5) Total Obs. [(2)+(4)]	(6) SPE Use [(2)/(5)]
1997	874	200	4.37	1,706	1,906	10.5%
1998	1,182	245	4.82	1,605	1,850	13.2%
1999	1,994	302	6.60	1,437	1,739	17.4%
2000	4,258	593	7.18	1,099	1,692	35.0%
2001	6,497	696	9.33	1,054	1,750	39.8%
2002	8,964	835	10.74	1,093	1,928	43.3%
2003	11,388	905	12.58	1,042	1,947	46.5%
2004	12,297	935	13.15	962	1,897	49.3%
2005	13,169	956	13.78	866	1,822	52.5%
2006	13,528	946	14.30	786	1,732	54.6%
2007	15,118	976	15.49	734	1,710	57.1%
2008	15,976	983	16.25	735	1,718	57.2%
2009	16,368	1,000	16.37	669	1,669	59.9%
2010	17,867	1,044	17.11	616	1,660	62.9%
2011	21,128	1,070	19.75	625	1,695	63.1%
2012	22,679	1,104	20.54	561	1,665	66.3%
2013	21,218	1,026	20.68	552	1,578	65.0%
2014	23,896	1,045	22.87	519	1,564	66.8%
Total	228,401	14,861	15.37	16,661	31,522	47.1%

**Panel B:** Industry distribution

NAICS Industry	(1)		(2)		(3)		(4)	
	Total SPEs		SPE Users		Non-Users		Total [(2+3)]	
	Obs.	%	Obs.	%	Obs.	%	Obs.	SPE Use
71: Arts & Entertainment	3,347	1.5	150	1.0	80	0.5	230	65.2%
62: Health Care	41,994	18.4	500	3.4	298	1.8	798	62.7%
23: Construction	8,945	3.9	303	2.0	205	1.2	508	59.6%
56: Administrative & Support Services	9,481	4.2	523	3.5	358	2.1	881	59.4%
81: Other Services	1,500	0.7	106	0.7	73	0.4	179	59.2%
72: Accommodation & Food Services	8,093	3.5	436	2.9	372	2.2	808	54.0%
44: Consumer Retail	14,814	6.5	605	4.1	596	3.6	1,201	50.4%
54: Professional Services	6,885	3.0	767	5.2	765	4.6	1,532	50.1%
21: Mining, Oil, & Gas Extraction	10,662	4.7	878	5.9	881	5.3	1,759	49.9%
51: Information	26,776	11.7	1,389	9.3	1,440	8.6	2,829	49.1%
32: Wood & Petroleum Products Manufacturing	17,885	7.8	2,013	13.5	2,101	12.6	4,114	48.9%
31: Food & Apparel Manufacturing	11,476	5.0	975	6.6	1,049	6.3	2,024	48.2%
53: Real Estate	8,221	3.6	396	2.7	431	2.6	827	47.9%
42: Wholesale Trade	6,987	3.1	744	5.0	858	5.1	1,602	46.4%
45: Miscellaneous Retail	1,631	0.7	302	2.0	370	2.2	672	44.9%
48: Transportation	15,634	6.8	506	3.4	621	3.7	1,127	44.9%
61: Education	1,031	0.5	81	0.5	100	0.6	181	44.8%
33: Other Manufacturing	32,104	14.1	4,060	27.3	5,816	34.9	9,876	41.1%
99: Other	708	0.3	57	0.4	94	0.6	151	37.7%
49: Couriers & Warehousing	42	0.0	33	0.2	64	0.4	97	34.0%
11: Agriculture, Forestry, & Fishing	185	0.1	37	0.2	89	0.5	126	29.4%
<b>Total</b>	<b>228,401</b>	<b>100.0</b>	<b>14,861</b>	<b>100.0</b>	<b>16,661</b>	<b>100.0</b>	<b>31,522</b>	<b>47.1%</b>

**Note:** This table reports the temporal (Panel A) and industry (Panel B) distributions of the total number of SPEs, SPE users, SPE non-users, and rate of SPE use. NAICS industries in Panel B are sorted by the rate of SPE use (column (4)), which is calculated as the number of SPE users from column (2) divided by the sum of SPE users and SPE non-users from columns (2) and (3).

TABLE 3  
Descriptive statistics

	(1)			(2)		(3)		
	Full Sample			SPE Users		Non-Users		
	Mean	Median	Std. Dev.	Mean	Median	Mean	Median	<i>t</i> -stat [(2)-(3)]
<i>GETR</i>	0.284	0.304	0.185	0.273	0.292	0.294	0.316	<b>-9.96</b>
<i>CETR</i>	0.261	0.243	0.203	0.249	0.236	0.273	0.251	<b>-10.35</b>
<i>SPETOT</i>	0.909	0.000	1.217	1.927	1.792	0.000	0.000	NA
<i>SPEBIN</i>	0.471	0.000	0.499	1.000	1.000	0.000	0.000	NA
<i>LEV</i>	0.201	0.173	0.182	0.236	0.214	0.170	0.132	<b>32.73</b>
<i>DISS</i>	0.016	0.000	0.096	0.019	0.000	0.013	0.000	<b>5.63</b>
<i>CLTD</i>	0.038	0.013	0.065	0.032	0.010	0.044	0.015	<b>-15.61</b>
<i>RDE</i>	0.025	0.000	0.049	0.019	0.000	0.030	0.000	<b>-18.88</b>
<i>PPE</i>	0.536	0.453	0.375	0.522	0.442	0.548	0.463	<b>-6.07</b>
<i>INTANG</i>	0.180	0.115	0.190	0.230	0.184	0.136	0.066	<b>45.42</b>
<i>NOL</i>	0.086	0.000	0.276	0.084	0.001	0.087	0.000	-0.88
<i>M&amp;A</i>	0.477	0.000	0.499	0.569	1.000	0.394	0.000	<b>31.46</b>
<i>FINC</i>	0.018	0.000	0.037	0.022	0.002	0.013	0.000	<b>21.61</b>
<i>HAVEN</i>	0.304	0.000	0.460	0.447	0.000	0.177	0.000	<b>54.32</b>
<i>SIZE</i>	6.646	6.619	1.965	7.371	7.313	5.999	5.833	<b>66.00</b>
<i>ROA</i>	0.059	0.055	0.076	0.056	0.053	0.061	0.056	<b>-6.79</b>
<i>BM</i>	0.602	0.475	0.531	0.546	0.444	0.653	0.506	<b>-17.96</b>
<i>CASH</i>	0.126	0.072	0.142	0.109	0.066	0.140	0.079	<b>-19.18</b>
<i>INTCOV</i>	0.209	0.122	0.432	0.228	0.139	0.191	0.105	<b>7.55</b>
<i>SVOL</i>	5.173	5.000	2.553	4.778	5.000	5.526	6.000	<b>-26.27</b>
<i>IFUND</i>	0.012	0.029	0.136	0.017	0.034	0.009	0.024	<b>5.34</b>
<i>DACC</i>	-0.045	-0.008	1.397	-0.064	-0.008	-0.027	-0.007	<b>-2.36</b>
<i>BUSSEG</i>	2.574	2.236	0.943	2.706	2.646	2.456	2.000	<b>23.69</b>
Obs.		31,522		14,861		16,661		

**Note:** This table reports descriptive statistics for the full sample, SPE users, and non-users. Bold *t*-statistics for tests of mean differences between SPE users and non-users denote significance of  $p < 0.10$  or better. Continuous variables are winsorized at 1<sup>st</sup> and 99<sup>th</sup> percentiles. Variables are defined in the Appendix.

TABLE 4  
Relation between SPEs and corporate tax avoidance

	(1) <i>GETR</i>	(2) <i>GETR</i>	(3) <i>CETR</i>	(4) <i>CETR</i>	(5) <i>GETR</i>	(6) <i>GETR</i>	(7) <i>CETR</i>	(8) <i>CETR</i>
<b>Measures of SPE use (<i>SPE</i>)</b>								
<i>SPETOT</i>	-0.009*** (-4.03)		-0.005** (-2.05)		-0.008*** (-5.00)		-0.009*** (-4.82)	
<i>SPEBIN</i>		-0.015*** (-3.51)		-0.008** (-1.94)		-0.009*** (-2.57)		-0.016*** (-3.78)
<b>Tax-advantaged attributes (<i>TAA</i>)</b>								
<i>LEV</i>	-0.061*** (-3.74)	-0.062*** (-3.82)	-0.066*** (-3.96)	-0.067*** (-4.00)	-0.068*** (-5.50)	-0.070*** (-5.70)	-0.123*** (-9.23)	-0.125*** (-9.32)
<i>DISS</i>	0.062*** (4.08)	0.063*** (4.16)	0.026* (1.67)	0.026* (1.71)	0.076*** (4.81)	0.077*** (4.88)	0.086*** (5.33)	0.088*** (5.42)
<i>CLTD</i>	-0.036 (-1.14)	-0.037 (-1.15)	0.000 (0.02)	0.000 (0.01)	-0.036 (-1.47)	-0.036 (-1.49)	0.009 (0.31)	0.007 (0.23)
<i>RDE</i>	-0.140* (-1.88)	-0.143* (-1.91)	-0.000 (-0.01)	-0.002 (-0.02)	-0.299*** (-7.64)	-0.292*** (-7.44)	-0.310*** (-6.68)	-0.304*** (-6.56)
<i>PPE</i>	-0.023 (-1.35)	-0.022 (-1.30)	0.038** (2.37)	0.039** (2.40)	-0.010 (-1.45)	-0.009 (-1.28)	-0.029*** (-3.81)	-0.028*** (-3.66)
<i>INTANG</i>	-0.065*** (-2.72)	-0.067*** (-2.80)	0.038 (1.57)	0.037 (1.53)	-0.015 (-1.13)	-0.016 (-1.20)	-0.010 (-0.69)	-0.010 (-0.69)
<i>NOL</i>	-0.049*** (-4.50)	-0.050*** (-4.56)	-0.029*** (-2.80)	-0.029*** (-2.84)	-0.057*** (-7.89)	-0.057*** (-7.94)	-0.065*** (-7.83)	-0.065*** (-7.86)
<i>M&amp;A</i>	0.001 (0.30)	0.001 (0.38)	0.011*** (3.60)	0.011*** (3.64)	0.000 (0.01)	-0.001 (-0.17)	0.007** (2.11)	0.007** (2.01)
<i>FINC</i>	-0.194*** (-3.31)	-0.195*** (-3.32)	-0.212*** (-3.53)	-0.213*** (-3.53)	-0.163*** (-3.55)	-0.154*** (-3.34)	0.006 (0.12)	0.017 (0.34)
<i>HAVEN</i>	-0.000 (-0.06)	-0.001 (-0.12)	0.005 (1.09)	0.005 (1.06)	0.007* (1.87)	0.005 (1.32)	0.015*** (3.55)	0.014*** (3.33)
<b>Control variables (<i>CTRL</i>)</b>								
<i>SIZE</i>	0.010** (2.20)	0.010** (2.03)	0.043*** (8.79)	0.042*** (8.70)	-0.000 (-0.21)	-0.001 (-0.91)	-0.002 (-1.04)	-0.002 (-1.58)
<i>ROA</i>	-0.040 (-1.44)	-0.040 (-1.42)	-0.118*** (-4.94)	-0.117*** (-4.93)	-0.036 (-1.37)	-0.035 (-1.35)	-0.184*** (-7.09)	-0.185*** (-7.08)
<i>BM</i>	-0.008 (-1.64)	-0.008* (-1.65)	0.005 (1.31)	0.005 (1.30)	-0.002 (-0.64)	-0.002 (-0.62)	0.010** (2.36)	0.010** (2.32)
<i>CASH</i>	-0.030 (-1.38)	-0.029 (-1.35)	0.068*** (2.99)	0.068*** (3.00)	-0.045*** (-3.01)	-0.041*** (-2.76)	-0.019 (-1.14)	-0.017 (-0.99)
<i>INTCOV</i>	0.005 (1.09)	0.005 (1.09)	0.002 (0.36)	0.002 (0.36)	-0.004 (-0.94)	-0.004 (-0.99)	0.001 (0.29)	0.001 (0.25)
<i>SVOL</i>	-0.002** (-2.11)	-0.002** (-2.13)	-0.002** (-2.17)	-0.002** (-2.18)	-0.001 (-0.83)	-0.001 (-0.80)	-0.001 (-0.64)	-0.001 (-0.63)
<i>IFUND</i>	0.022* (1.80)	0.022* (1.80)	-0.002 (-0.15)	-0.002 (-0.15)	0.051*** (4.04)	0.051*** (4.03)	0.060*** (4.54)	0.060*** (4.57)
<i>DACC</i>	-0.000 (-0.17)	-0.000 (-0.15)	0.002** (2.36)	0.002** (2.36)	0.000 (0.39)	0.000 (0.42)	0.002** (2.13)	0.002** (2.14)
<i>BUSSEG</i>	0.005* (1.66)	0.005 (1.61)	-0.005 (-1.48)	-0.005 (-1.51)	-0.001 (-0.39)	-0.001 (-0.53)	0.002 (0.86)	0.002 (0.78)
Intercept	0.259*** (6.29)	0.263*** (6.37)	-0.037 (-0.92)	-0.035 (-0.87)	0.260*** (4.79)	0.264*** (4.86)	0.257*** (5.57)	0.261*** (5.66)

Firm FE	Included	Included	Included	Included	-	-	-	-
Industry FE	-	-	-	-	Included	Included	Included	Included
Year FE	Included	Included	Included	Included	Included	Included	Included	Included
Adj. $R^2$	0.347	0.347	0.425	0.425	0.048	0.047	0.071	0.070
Within Adj. $R^2$	0.020	0.019	0.040	0.040	-	-	-	-
Obs.	31,522	31,522	31,522	31,522	31,522	31,522	31,522	31,522

**Note:** This table reports the results of estimating Eq. (1) (columns (1) through (4)) and Eq. (2) (columns (5) through (8)), where the dependent variable is either *GETR* (columns (1), (2), (5), and (6)) or *CETR* (columns (3), (4), (7), and (8)). \*, \*\*, and \*\*\* denote statistical significance levels of  $p < 0.10$ , 0.05, and 0.01, respectively (one-tailed for *SPE*; two-tailed otherwise). Reported  $t$ -statistics (in parentheses below the coefficients) are based on robust standard errors clustered by firm. Variables are defined in the Appendix.

TABLE 5  
Amount of tax-advantaged attributes used in conjunction with SPEs (RQ1)

	Panel A: <i>GETR</i>							Panel B: <i>CETR</i>						
	<i>Total</i>		<i>Direct</i>		<i>Indirect (within)</i>			<i>Total</i>		<i>Direct</i>		<i>Indirect (within)</i>		
	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat	%	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat	Coeff.	<i>t</i> -stat	%
<i>SPETOT</i>			-0.081	<b>-5.56</b>						-0.052	<b>-3.89</b>			
<b>Tax-advantaged attributes (<i>TAA</i>)</b>														
<i>LEV</i>	-0.052	<b>-3.27</b>	-0.051	<b>-3.23</b>	-0.000	-0.52	0.0	-0.051	<b>-3.45</b>	-0.051	<b>-3.43</b>	-0.000	-0.52	0.0
<i>DISS</i>	0.034	<b>4.33</b>	0.033	<b>4.20</b>	0.001	<b>2.68</b>	2.9	0.015	<b>2.07</b>	0.014	<b>1.97</b>	0.001	<b>2.46</b>	6.7
<i>CLTD</i>	-0.008	-0.67	-0.008	-0.74	0.001	1.37	12.5	0.005	0.52	0.005	0.47	0.000	1.31	0.0
<i>RDE</i>	-0.041	<b>-2.03</b>	-0.038	<b>-1.88</b>	-0.003	<b>-2.97</b>	7.3	-0.002	-0.08	0.000	0.02	-0.002	<b>-2.59</b>	100.0
<i>PPE</i>	-0.082	<b>-2.53</b>	-0.079	<b>-2.42</b>	-0.003	<b>-1.79</b>	3.7	0.033	1.14	0.035	1.22	-0.002	<b>-1.73</b>	6.1
<i>INTANG</i>	-0.089	<b>-3.69</b>	-0.080	<b>-3.30</b>	-0.009	<b>-4.07</b>	10.1	0.016	0.72	0.022	0.97	-0.006	<b>-3.10</b>	37.5
<i>NOL</i>	-0.086	<b>-5.24</b>	-0.083	<b>-5.01</b>	-0.004	<b>-4.04</b>	4.7	-0.051	<b>-3.64</b>	-0.048	<b>-3.46</b>	-0.002	<b>-3.28</b>	3.9
<i>M&amp;A</i>	0.006	0.77	0.005	0.64	0.001	<b>2.17</b>	16.7	0.031	<b>4.07</b>	0.030	<b>3.99</b>	0.001	<b>1.99</b>	3.2
<i>FINC</i>	-0.046	<b>-3.87</b>	-0.044	<b>-3.70</b>	-0.002	<b>-2.71</b>	4.3	-0.044	<b>-4.05</b>	-0.043	<b>-3.92</b>	-0.001	<b>-2.44</b>	2.3
<i>HAVEN</i>	-0.007	-0.63	0.001	0.06	-0.008	<b>-4.76</b>	114.3	0.008	0.77	0.013	1.24	-0.005	<b>-3.61</b>	62.5
<b>Control variables (<i>CTRL</i>)</b>														
<i>SIZE</i>	-0.041	-1.06	0.008	0.20	-0.049	<b>-5.37</b>	119.5	0.284	<b>7.66</b>	0.316	<b>8.19</b>	-0.032	<b>-3.84</b>	11.3
<i>ROA</i>	-0.011	-0.97	-0.013	-1.12	0.002	<b>3.54</b>	18.2	-0.038	<b>-4.34</b>	-0.039	<b>-4.45</b>	0.001	<b>3.01</b>	2.6
<i>BM</i>	-0.020	-1.50	-0.020	-1.54	0.001	1.08	5.0	0.015	1.43	0.015	1.40	0.000	1.05	0.0
<i>CASH</i>	-0.041	<b>-2.49</b>	-0.039	<b>-2.37</b>	-0.002	<b>-2.25</b>	4.9	0.028	<b>1.82</b>	0.029	<b>1.90</b>	-0.001	<b>-2.09</b>	3.6
<i>INTCOV</i>	0.013	1.24	0.013	1.22	0.000	1.04	0.0	0.004	0.46	0.004	0.44	0.000	1.02	0.0
<i>SVOL</i>	-0.017	-1.61	-0.018	<b>-1.70</b>	0.001	1.59	5.9	-0.018	<b>-1.76</b>	-0.019	<b>-1.83</b>	0.001	1.52	5.6
<i>IFUND</i>	0.013	1.43	0.014	1.51	-0.001	<b>-1.76</b>	7.7	-0.005	-0.56	-0.004	-0.50	-0.000	<b>-1.68</b>	9.6
<i>DACC</i>	-0.001	-0.17	-0.001	-0.18	0.000	0.33	0.0	0.013	<b>2.33</b>	0.013	<b>2.32</b>	0.000	0.33	0.0
<i>BUSSEG</i>	0.012	0.86	0.016	1.15	-0.004	<b>-3.17</b>	33.3	-0.037	<b>-2.77</b>	-0.035	<b>-2.57</b>	-0.003	<b>-2.75</b>	8.1
Firm FE			Included							Included				
Year FE			Included							Included				
Obs.			31,522							31,522				
$\chi^2$ Test			<b>4,418.27</b>							<b>4,615.41</b>				
Root mean squared error			<b>&lt;0.001</b>							<b>&lt;0.001</b>				
Comparative fit index			<b>1.0</b>							<b>1.0</b>				
Coefficient of determination			0.128							0.136				

**Note:** This table presents the path analysis decomposing the relation between the source (causal) variable, *SPE*, and outcome variable, *ETR*, shown in Table 4 into direct and indirect paths (Figure 2). In *Total* columns, we estimate Eq. (1) using fixed-effects regressions (both firm and year) after excluding *SPETOT* to examine the total (direct

and indirect) effect of each variable on *GETR* and *CETR*. In *Direct* columns, we estimate Eq. (1) including *SPETOT* such that the coefficients for other variables capture the direct effect of each variable on ETRs controlling for SPE use. The *Indirect* columns report the difference between *Total* and *Direct*, reflecting the incremental effect of each variable on ETRs occurring in conjunction with SPEs. A negative (positive) indirect effect indicates that SPEs result in more (less) tax avoidance for a given variable. The *Indirect%* is the absolute value of the indirect effect divided by the total effect, capturing the proportion of the total effect occurring *in conjunction with* SPEs. Each variable is standardized (subtract the mean and divide by standard deviation) to simplify coefficient comparisons. Bold *t*-statistics denote statistical significance of  $p < 0.10$  or better (one-tailed for *SPETOT*; two-tailed otherwise). Reported *t*-statistics are based on robust standard errors clustered by firm. Robust standard errors for *Indirect* are computed using the Sobel Multivariate Delta Method (Sobel 1982) and are adjusted for clustering at the firm-level. Variables are defined in the Appendix.

TABLE 6  
Total incremental tax savings facilitated by SPEs (RQ2)

**Panel A:** Tax savings estimates

	<i>GETR</i>		<i>CETR</i>	
	Average	Maximum	Average	Maximum
<b>Direct effect</b>				
Coefficient	-0.081	-0.109	-0.052	-0.079
ETR effect	-0.024	-0.032	-0.017	-0.025
Firm-level savings (millions)	\$16.08	\$21.63	\$11.32	\$17.20
Sample-level savings (millions)	\$238,907	\$321,493	\$168,295	\$255,680
<b>Indirect effect</b>				
Coefficient	-0.078	-0.126	-0.050	-0.089
ETR effect	-0.023	-0.037	-0.016	-0.029
Firm-level savings (millions)	\$15.48	\$25.01	\$10.89	\$19.38
Sample-level savings (millions)	\$230,059	\$371,634	\$161,822	\$288,044
<b>Total effect</b>				
ETR effect	-0.047	-0.069	-0.033	-0.054
Firm-level savings (millions)	\$31.56	\$46.64	\$22.21	\$36.59
Sample-level savings (millions)	\$468,966	\$693,126	\$330,118	\$543,724

**Panel B:** Tax savings comparison

Tax planning strategy	Estimated sample-level cash tax savings		Period	Reference
	Total (\$ billions)	Annual (\$ billions)		
SPEs	\$330.1 to \$543.7	\$16.5 to \$27.2	1997-2016	Panel A (above)
Tax havens	\$1.3 (active); \$92.9 (deferral)	\$0.1 (active); \$7.1 (deferral)	1995-2007	Dyreng and Lindsey (2009)
Round-tripping	\$33.0 to \$77.0	\$1.3 to \$3.1	1984-2008	Hanlon et al. (2015)
Tax shelters	\$12.4	\$0.5	1975-2001	Wilson (2009)
Financial derivatives	\$3.8	\$0.4	2000-2008	Donohoe (2015)

**Note:** This table estimates (Panel A) and compares (Panel B) the tax savings associated with the extent of SPE use (*SPETOT*), defined as the effect of moving from zero SPEs to the mean number of SPEs held by SPE users in our sample (5.87). Average (maximum) estimates are based on coefficients reported in Table 5 (unreported lower bound of the untabulated 95% confidence interval). The direct effects are based on coefficients for *SPETOT* in the *Direct* columns of Table 5, while the indirect effects are based on the sum of the indirect effects of all variables in the *Indirect* columns of Table 5. ETR effects are measured as the percentage point reduction in each ETR (*GETR* and *CETR*) for the mean SPE user. Specifically, we multiply ETR coefficients by the standard deviation of *GETR* and *CETR* (0.185 and 0.203, respectively), divide by the standard deviation of *SPETOT* (1.217), and then multiply by the mean of *SPETOT* (1.927). Average firm-level tax savings (in millions) are calculated by multiplying the ETR effect by -1 and the average three-year sum of pre-tax income less special items for SPE users (\$677.5 million) divided by three (to obtain an annual measure). Sample-level tax savings (in millions) are calculated by multiplying the

ETR effect by  $-1$  and the aggregate three-year sum of pre-tax income less special items for the sample of SPE users (\$10.069 trillion) divided by three. Panel B compares the estimated aggregate cash tax savings of SPEs to other tax planning strategies examined in prior research. Each estimate is reported as it is in the referenced study. The comparison is not intended to be a comprehensive summary of all tax avoidance strategies, but to provide context for our results.

TABLE 7  
Tax-advantaged attributes enhanced by SPEs (RQ3)

	Panel A: <i>GETR</i>			Panel B: <i>CETR</i>		
	(1)	(2)	(2)/(1)	(1)	(2)	(2)/(1)
	Main Effect ( <i>t</i> -stat)	Interaction ( <i>t</i> -stat)	Change  (%)	Main Effect ( <i>t</i> -stat)	Interaction ( <i>t</i> -stat)	Change  (%)
<i>SPETOT</i>	-0.054*** (-3.28)			-0.026** (-1.69)		
<b>Tax-advantaged attributes (<i>TAA</i>)</b>						
<i>LEV</i>	-0.060*** (-3.72)	-0.013 (-1.13)	0.0%	-0.060*** (-4.04)	0.008 (0.77)	0.0%
<i>DISS</i>	0.032*** (4.10)	0.014** (2.12)	43.8% ↓	0.012* (1.73)	-0.001 (-0.19)	0.0%
<i>CLTD</i>	-0.010 (-0.89)	0.017* (1.70)	170.0%	0.002 (0.19)	0.013 (1.37)	0.0%
<i>RDE</i>	-0.056*** (-2.63)	-0.049*** (-2.73)	87.5% ↑	-0.009 (-0.45)	-0.019 (-1.13)	0.0%
<i>PPE</i>	-0.040 (-1.16)	0.013 (0.84)	0.0%	0.077** (2.56)	0.018 (1.17)	0.0%
<i>INTANG</i>	-0.052** (-2.05)	-0.032** (-2.43)	61.5% ↑	0.045** (1.99)	-0.015 (-1.18)	0.0%
<i>NOL</i>	-0.070*** (-4.36)	0.049*** (3.00)	70.0% ↓	-0.037*** (-2.66)	0.006 (0.46)	0.0%
<i>M&amp;A</i>	0.001 (0.16)	-0.008 (-1.09)	0.0%	0.027*** (3.52)	-0.013* (-1.93)	48.1% ↑
<i>FINC</i>	-0.040*** (-3.36)	0.019* (1.88)	47.5% ↓	-0.039*** (-3.51)	0.014 (1.34)	0.0%
<i>HAVEN</i>	-0.001 (-0.07)	0.006 (0.72)	0.0%	0.012 (1.07)	0.004 (0.49)	0.0%
Intercept	-0.097*** (-2.80)			-0.096*** (-2.97)		
<i>CTRL</i>		Included			Included	
Firm FE		Included			Included	
Year FE		Included			Included	
Within Adj. R <sup>2</sup>		0.023			0.041	
Obs.		31,522			31,522	

**Note:** This table presents the moderation analysis, which examines whether the relationship between two variables depends on a third variable. We implement moderation analysis by estimating Eq. (1) with an interaction term between *SPETOT* and each covariate, where all variables are demeaned and standardized. In each panel, column (1) reports the main effect of each covariate, column (2) reports the interaction between *SPETOT* and the relevant covariate, and column (3) reports an estimate of the extent to which SPEs enhance the relative tax savings of tax-advantaged attributes captured by each covariate. The results are interpreted as follows. First, the main effect for *SPETOT* (column (1)) reflects the effect of SPEs on ETRs at the mean level of both SPEs and all covariates. For example, in Panel A, a one standard deviation increase in *SPETOT* results in a 0.054 standard deviation decrease in *GETR* (measured at the mean of SPEs and other variables). Second, the interaction effect (column (2)) captures the effect of SPEs on *GETR* changes as each covariate changes. For instance, for a one standard deviation increase in *LEV*, the effect of a one standard

deviation increase in *SPETOT* is associated with a further 0.013 standard deviation reduction in *GETR* (for a total of  $0.067=0.054+0.013$ ) about the mean of SPEs and other covariates except *LEV*, which increased by one standard deviation. Third, the percentage change (column (3)) measures the relative increase in tax savings from SPEs. For example, at the mean of *SPETOT*, a one standard deviation increase in *RDE* results in a 0.056 standard deviation decrease in *GETR* (column (1)). If *SPETOT* increases by one standard deviation, the effect of a one standard deviation increase in *RDE* is a 0.105 ( $0.056+0.049$ ) standard deviation decrease in *GETR*. The incremental reduction (0.049) in *GETR* due to the increase in *SPETOT* reflects an 87.5% increase in tax savings relative to no change in *SPETOT* ( $0.049/0.056$ ). The arrows denote whether attributes captured by the covariate are more ( $\uparrow$ ) or less ( $\downarrow$ ) efficient at generating tax savings when conducted in conjunction with SPEs. \*, \*\*, and \*\*\* denote statistical significance levels of  $p<0.10$ , 0.05, and 0.01, respectively. Reported *t*-statistics are based on robust standard errors clustered by firm. Variables are defined in the Appendix.

FIGURE 1  
Time trends in SPEs and one-year *GETR*

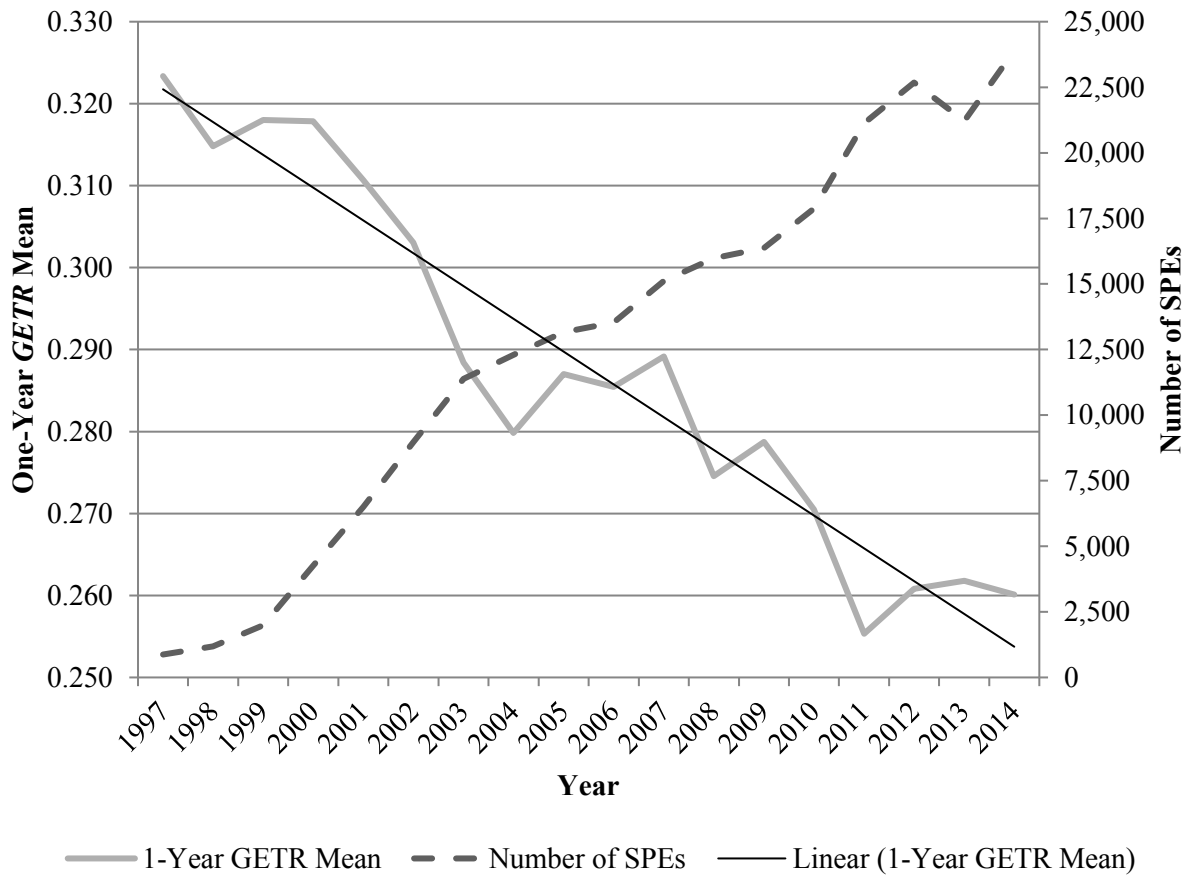
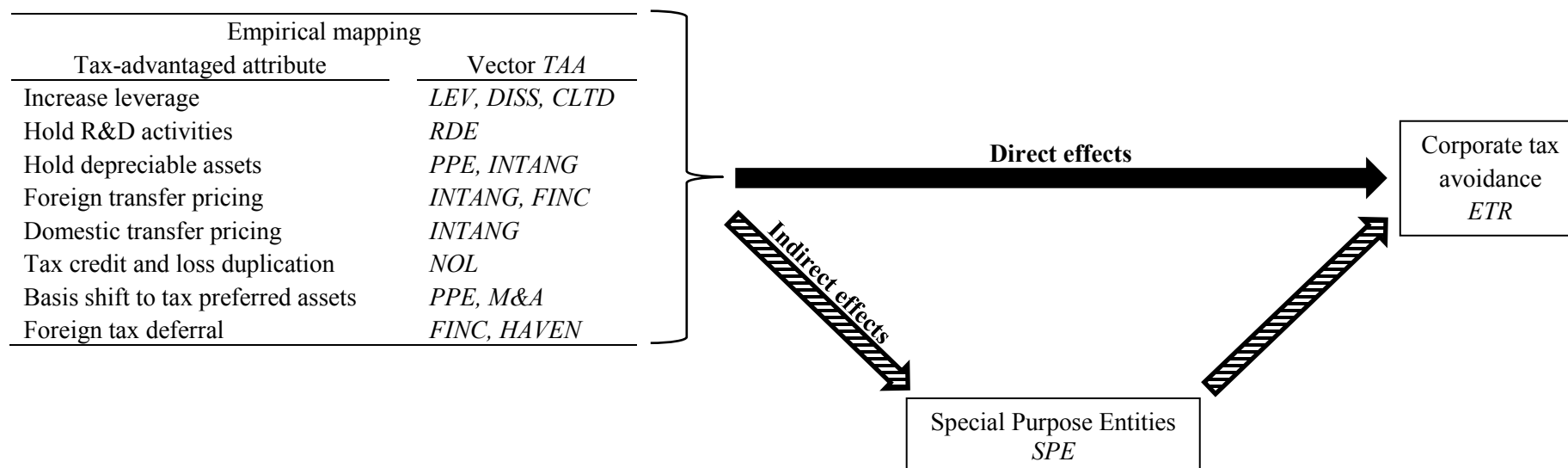


FIGURE 2  
Path analysis diagram



**Note:** This figure diagrams the recursive path (links flow in only one direction) that we consider among manifest (observable) variables, which is guided by the anecdotal evidence discussed in Section 2.3. While regression analysis evaluates overall effects, path analysis considers the existence and relative importance of alternative (indirect) paths of influence that jointly create the overall effects. For example, with *SPE* included in Eq. (1), the coefficients for the vector of tax-advantaged attribute variables (*TAA*) capture the direct effect of each measured attribute on ETRs (solid arrows). This direct effect can be thought of as the amount of each attribute that is unrelated to and unaffected by SPEs. When *SPE* is excluded from Eq. (1), the *TAA* coefficients capture the total effect of each measured attribute on ETRs, whether or not it is related to and affected by SPEs. The difference between the direct and total effects is then the indirect effect (dashed arrows), and can be thought of as the portion of each *TAA* proxy's variation that is related to SPE use or the incremental effect of each attribute that comes from being used in conjunction with SPEs. These indirect effects are missed when relying solely on traditional regression analysis.