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Tax planning diffusion, real effects, and sharing of benefits

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ABSTRACT

We investigate the diffusion of tax planning across firms, and the real effects and sharing of benefits from such diffusion. Using supply chain relationships among firms as a possible diffusion channel, we find that tax planning spreads from principal customers to their dependent suppliers. We find that tax planning diffusion has real effects on product markets and that both parties to the tax planning diffusion share in the benefits. As tax planning diffuses to suppliers, suppliers share the tax savings with their customers by reducing the mark-up on their products. Finally, we show that tax planning diffusion is more pronounced when the customer and the supplier share a common external auditor and when they are located in the same state, suggesting that these diffusion channels complement one another.

JEL Classification: H25, H26, L14.

Keywords: Tax planning, diffusion, real effects, product markets, supply chains.

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ABSTRACT

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1. Introduction

We examine the spread of tax planning across firms, a dynamic phenomenon that we refer to as tax planning diffusion. While researchers have made great strides in identifying characteristics of individual firms that are associated with firms' own tax planning (Shackelford and Shevlin 2001; Hanlon and Heitzman 2010; Wilde and Wilson 2018), surprisingly little research examines how tax planning diffuses across firms. Even less is known about the real effects of tax planning diffusion and whether and how firms share the benefits from such diffusion. Two pioneering studies, Brown (2011) and Brown and Drake (2014), find that tax-planning strategies diffuse among firms with board interlocks. More recently, Gallemore, Gipper, and Maydew (2019) and Lim, Shevlin, Wang, and Xu (2018) suggest that common banking relationships and auditor relationships, respectively, can facilitate the spread of tax planning. Cen, Maydew, Zhang, and Zuo (2017) find that greater tax planning among firms in customer-supplier relationships, but do not examine whether tax planning spreads through such relationships. Moreover, none of the prior studies examine whether there are real effects of tax planning diffusion, nor do they examine whether or how firms share the benefits of tax planning diffusion.

Rogers (2003, p. 11) defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system."[1] The supply-chain network can be considered as one such "social system" in the Rogers' (2003) innovation diffusion framework. In this framework, high frequency of interactions between customers and suppliers can cultivate an effective channel for the diffusion of valuable knowledge, particularly soft and tacit knowledge. Consistent with this observation, prior research suggests that

[1] In Rogers' (1962, 2003) framework, which has been cited over 100,000 times per Google Scholar, diffusion is a special type of communication, in that the messages are concerned with innovation. An innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers 2003, p. 11).

down-stream partners are an important information source for innovation. For example, Isaksson, Simeth, and Seifert (2016) find a positive effect of customer innovation on supplier innovation. Chu, Tian, and Wang (2019) document a positive effect of customer-supplier geographic proximity on supplier innovation and a stronger such effect when customers are more innovative themselves.

We posit that firms' tax planning strategies are similar to technological innovations and thus they can diffuse among trade partners. To maintain supply-chain stability, principal customers have incentives to help their dependent suppliers remain financially stable, including by sharing their tax planning expertise. Moreover, principal customers may directly benefit if suppliers share some of their additional tax savings with them. We consider whether tax planning diffusion has real effects on the product markets in which firms operate. Specifically, we test whether the benefits of tax planning diffusion are shared by suppliers in the form of a lower mark-up on their products.

Using both cash effective tax rate and GAAP effective tax rate measures of tax planning, we find evidence that tax planning diffuses from principal customers to their dependent suppliers. The results are robust to controlling for firm characteristics, relationship fixed effects, and year fixed effects. In addition, a simulation-based falsification test with pseudo supply-chain relationships rules out the possibility that the results are spurious. We next investigate whether tax planning diffusion has real effects on the product markets on which the supply-chain relationships are based. Our results show that when suppliers' effective tax rates decline because of tax-planning associated with their principal customer, they reduce the mark-up on their product prices, providing a direct benefit for principal customers to facilitate the diffusion of tax planning. Thus,

the evidence suggests that not only does tax planning diffusion have real effects on product markets, but that the tax benefits are shared across firms.

We then consider factors that could influence the extent to which tax planning diffuses. The first factor is the existence of a common auditor. In non-tax settings, prior research suggests that common auditors can serve as an information conduit between firms (e.g., Aobdia 2015; Cai, Kim, Park, and White 2016; Dhaliwal, Lamoreaux, Litov, and Neyland 2016). McGuire, Omer, and Wang (2012) show that auditors with industry expertise appear to help their clients achieve lower effective tax rates and Lim et al. (2018) provide evidence that auditors facilitate the spread of tax planning among firms in China. Brown and Drake (2014) find that the effect of board ties on tax knowledge diffusion is more pronounced when the interlocked firms engage the same local auditor, suggesting that common auditors amplify the direct link between firms. Consistent with an amplification effect, we find that customer tax planning has a stronger effect on supplier tax planning when the trade partners share common auditors. The results are robust in both cross-sectional tests and time-series tests involving auditor switches. The second factor we examine is geographic proximity of the firms. Prior literature suggests that geographic proximity facilitates the communication of soft information (e.g., Cannon and Homburg 2001; Costello 2013; Chu et al. 2019). We thus predict that the positive effect of customer tax planning on supplier tax planning is more pronounced when the trade partners are located closer to each other, i.e., in the same state. Again, both the cross-sectional results and the time-series results using headquarter relocation are consistent with the prediction.

In a final test, we conduct an event-study analysis using the establishment of new supply-chain relationships. We find that supplier firms' GAAP effective tax rates and cash effective tax rates decline significantly after the firms establish relationships with a principal customer with low

GAAP and cash effective tax rates, consistent with the diffusion of tax planning knowledge from principal customers to their suppliers.

Our study contributes to the literature on how tax-planning strategies spread across firms. Together with the findings of Brown (2011), Brown and Drake (2014), Gallemore et al. (2019) and Lim et al. (2018), our findings advance the understanding of how different parties that make up the firm's operating environment influence tax planning, answering calls for research by Wilde and Wilson (2018) and Dyreng and Maydew (2018). Importantly, by linking the effects of tax planning diffusion to product market prices, our study answers calls for more research on the real effects of tax planning (Hanlon and Heitzman 2010; Wilde and Wilson 2018).

Our study also contributes to the literature on the sharing of tax benefits. Shackelford and Shevlin (2001) and Scholes, Wolfson, Erickson, Hanlon, Maydew, and Shevlin (2015) suggest that effective tax planning requires the planner to consider the effects on all parties, which is sometimes referred to as the "all parties" concept. The idea is that tax planning generally involves (at least) two private parties and the government. If the private parties can work together to reduce their aggregate tax payments to the government, then even if the direct tax savings all go to one of the parties, both can benefit by adjusting some other aspect of their relationship. For example, prior research finds that when mergers and acquisitions are structured to provide tax benefits to the acquiring firm, the acquiring firm often shares some of its tax benefits with the selling firm in the form of a higher purchase price (e.g., Erickson 1998; Erickson and Wang 1999; Henning and Shaw 2000). Similarly, Matsunaga, Shevlin, and Shores (1992) build on the all parties concept when they examine compensation planning involving employee stock options. In our supply chain diffusion setting, we find tax planning spreads from principal customers to their dependent suppliers. While the dependent supplier benefits from the lower taxes, how does the principal

customer benefit? We find that suppliers share the tax benefits with their customers by reducing the mark-up on their product sales. In this way, the customers have an economic incentive to facilitate diffusion of tax planning to their suppliers.

In addition, our study contributes to the broader literature that examines how certain firm practices or strategies spread. A large body of prior research examines the diffusion of knowledge or practice via board ties (e.g., Bizjak et al. 2009; Stuart and Yim 2010; Brown 2011; Chiu et al. 2012; Cai et al. 2014). In the supply-chain relationship literature, several recent studies examine knowledge or innovation diffusion among the supply-chain partners (e.g., Isaksson et al. 2016; Chu et al. 2019). We extend this literature by examining tax knowledge diffusion along the supply chain. This vertical (customer-supplier) diffusion channel is distinct from the board interlock channel documented in Brown (2011) and Brown and Drake (2014) as these two relationships rarely overlap (Davis 1996).[2]

Following Cen et al. (2017), we examine firms in customer-supplier relationships. Cen et al. (2017) is limited, however, to simply documenting cross-sectional differences between firms in and out of such relationships. While Cen et al. (2017) conjecture that diffusion may be taking place in the sample, they do not test for diffusion. In contrast, we use relationship-level data (based on linked customer-supplier firm pairs) to understand the economic dynamics and channels of tax planning diffusion and how supply-chain relationships shape the tax-planning ecosystem. In addition, Cen et al. (2017) provide no empirical evidence on product market effects and whether supplier firms share tax benefits with their customers, whereas we do. Moreover, we examine the effects of common auditor and geographic distance on the spread of tax planning between customers and suppliers.

[2] Davis (1996) states that board interlocks among US firms mainly reflect the embeddedness in social structures (e.g., personal relationships), and they are seldom linked to vertical (customer-supplier) or banking relationships.

In the next section, we review related literature. Section 3 presents the data and variable measurement. Section 4 discusses the research design and main results. Section 5 presents some additional analyses. We conclude in Section 6.

2. Related Literature

Corporate tax planning represents activities or transactions that reduce a firm's taxes (Hanlon and Heitzman, 2010). As with investment activities, successful tax planning can enhance firm performance whereas unsuccessful tax planning can decrease firm value, and different types of tax-planning activities can have different levels of inherent risks. Tax planning strategies range from low risk activities such as municipal bond investments to highly risky or aggressive activities such as tax sheltering (Lisowsky, Robinson, and Schmidt 2013). Early research suggests that firms enjoy large returns to investments in tax planning (Mills, Erickson, and Maydew 1998). Despite the seeming benefits of tax planning, Dyreng, Hanlon, and Maydew (2008) find considerable cross-sectional variation in firms' tax planning activities. Motivated by this finding, a substantial body of research has investigated various firm or managerial characteristics that are potential determinants of such cross-sectional variation.[3]

In a recent study, Dyreng, Hanlon, Maydew, and Thornock (2017) investigate the systematic changes in corporate effective tax rates over the past 25 years. They find a significant downward trend in effective tax rates using a broad sample of publicly traded US corporations. Specifically, they show that the average cash effective tax rates of US firms have decreased by about 0.4 percentage points *per year* over the 25-year period from 1988 to 2012. The trend exists for both domestic and multinational firms and is largely unexplained by changing statutory tax

[3] See Shevlin (2016) and Wilde and Wilson (2018) for recent reviews of the tax planning literature.

rates, legislative or regulatory changes, changing firm characteristics, or the time-varying effects of firm characteristics on effective tax rates. These results suggest that there are wide gaps in our understanding of the spread of corporate tax planning.[4]

Motivated by this and other gaps in the tax planning literature, Wilde and Wilson (2018) call for more research on how tax planning is influenced by the firm's operating environment. Dyreng and Maydew (2018) make a similar call for more research on the workings of the ecosystem of tax planning. An important question in this line of inquiry is how do different firms, as members of a system, interact with each other in shaping the spread of tax planning across firms? Several recent studies provide us with some clues. Brown (2011) and Brown and Drake (2014) examine the spread of tax planning ideas through social networks. Specifically, Brown (2011) shows that network ties via board interlocks help to spread the adoption of the corporate-owned life insurance tax shelter. Brown and Drake (2014) find that firms with greater board ties to low-tax firms have lower cash effective tax rates, consistent with information sharing regarding tax strategies among these firms. Gallemore et al. (2019) investigate banks as tax planning intermediaries and find that tax planning can spread among firms with common banking relationships. Lim et al. (2018) examine whether sharing the same individual auditor influences the diffusion of tax planning. They find that firms with greater connection to low-tax firms through audit partners have lower effective tax rates. Kubick et al. (2015) show that firms mimic the tax outcomes of their product market leaders. Bird, Edwards, and Ruchti (2018) and Armstrong, Glaeser, and Kepler (2019) find evidence suggesting that a firm's tax reporting behavior impacts the tax reporting behavior of its peers. These findings imply that tax-planning ideas likely diffuse among corporations over time. Thus, it is useful to identify the potential channels through which

[4] Research on the sources of the decline over time is ongoing (e.g., Drake, Hamilton, and Lusch, 2019).

tax ideas spread. In addition, prior literature does not investigate the potential real effects of tax planning diffusion or whether firms share the benefits of tax planning diffusion. We fill this void using a supply chain setting.

Specifically, we focus on the relationships between customers and suppliers and examine the diffusion of tax planning strategies along the supply chain. Several recent studies examine how corporate strategies or tacit knowledge diffuse along the supply chain. Isaksson et al. (2016) analyze knowledge diffusion in the supply chain network for the high tech sectors. They find that customer innovation has a positive and significant effect on supplier innovation. Serpa and Krishnan (2018) argue that a firm can learn from and adopt the efficient practice of its trade partner and they show that customers' productivity has a positive and significant effect on supplier productivity. Chu et al. (2019) document a positive causal effect of customer-supplier geographic proximity on supplier innovation using exogenous variation in proximity caused by customer relocations. Our research extends this recent line of research by focusing on the diffusion of tax knowledge along the supply chain and the real effects of such diffusion in the product market.

3. Data and Variable Measurement

3.1. Sample and Data Sources

Following prior literature (e.g., Cen et al. 2017), we use the Compustat Segments Customer File to identify companies in supply-chain relationships between principal customers and dependent suppliers. Regulation S-K requires companies to disclose the existence, names, and sales to principal customers that represent more than 10% of total revenue.[5] Based on the company names disclosed, we manually match US-listed customers to their Compustat identifiers (i.e.,

[5] Statement of Financial Accounting Standards No. 14 (before 1997) and No. 131 (after 1997) also require firms to disclose the existence and the sales to principal customers.

GVKEY). Our sample consists of companies that report at least one principal corporate customer with a matched GVKEY. We restrict the sample to a 20-year period 1994–2013 over which companies' effective tax rates can be consistently measured.[6] In addition, we exclude relationship-year observations where either the customer or the supplier is from the financial services and utilities industries, or has negative pre-tax income or book value, non-positive sales, or total assets of less than $1 million. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. Our final sample consists of 11,051 relationship-years with non-missing variables.[7] Detailed sample selection filters are exhibited in Appendix I. As an example, we provide headquarter locations and auditor names of all publicly listed dependent suppliers for IBM in 2007 in Appendix II.

3.2. Key Tax Variables and Control Variables

To assess a company's overall level of tax planning, we use two effective tax rates: GAAP ETR (denoted by *GETR*) and cash ETR (denoted by *CETR*), where GAAP ETR is defined as total income tax expense divided by pre-tax book income less special items, and cash ETR is defined as cash taxes paid divided by pre-tax book income less special items. These two measures are complementary: GAAP ETR captures tax planning strategies that result in permanent tax savings, while cash ETR captures tax deferral strategies that are not reflected in GAAP ETR. Both measures

[6] Two relevant regulatory events occurred in 1993: issuance of SFAS No. 109 (Accounting for Income Taxes) and the increase of the US statutory corporate income tax rate from 34% to 35%.

[7] As noted in Cen et al. (2017), the customer-supplier data structure is akin to a separate "hub-and-spoke" network topology, where each principal customer firm represents a hub and its dependent suppliers represent spokes. There are generally minimal intertwinements between different networks (centered on each customer firm) because a dependent supplier usually has only one or two principal customers and it is rare for a given firm to be both a principal customer and a dependent supplier.

are winsorized at zero and one.[8]

Control variables are identified based on the existing literature (e.g., Chen et al. 2010; Dyreng et al. 2008; Rego 2003). Specifically, the following set of variables is included in our empirical model: return on assets (ROA), financial leverage, foreign assets, new investments, property, plant, and equipment, intangible assets, equity income in earnings, firm size, market-to-book ratio, abnormal accruals, and cash holdings.[9] The rationale is as follows: A firm's profitability (ROA) can influence its incentives and needs to avoid taxes. Financial leverage reflects the amount of interest tax shield, which affects a firm's marginal tax rate and its incentives for additional tax planning (Graham, 1996a, b, 2000). Multinational firms with more foreign assets have additional opportunities for tax planning (Rego 2003). New investments, property, plant, and equipment, intangible assets, and equity income in earnings contribute to a firm's book-tax differences (e.g., Chen et al. 2010). Firm size and book-to-market ratio are two fundamental characteristics that can affect a firm's tax planning. Abnormal accruals capture the potential effect of earnings management on book-tax differences (e.g., Frank, Lynch, and Rego 2009). Cash holdings affect a firm's incentives to avoid taxes: firms with more cash derive fewer benefits from cash tax savings, or tax aggressive firms may hold more cash in anticipation of potential disputes with the IRS (e.g., Hanlon, Maydew, and Saavedra, 2017).

3.3. Descriptive Statistics

Table 1 provides the summary statistics of dependent and independent variables in our

[8] Our *GETR* and *CETR* measures require positive pre-tax income. To test the robustness of our results for the sample that includes loss firms, we use a cash tax differential measure developed by Henry and Sansing (2018), which is estimated as the difference between cash taxes paid and the product of statutory tax rate and pre-tax income, scaled by lagged total assets. Our results continue to hold based on this measure.

[9] Detailed definitions of all the variables are provided in Appendix III. Our inferences are unchanged when we include net operating loss carryforwards and change in net operating loss carryforwards as additional controls.

analysis. The average GAAP ETR is 27.4% for supplier firms, and 30.4% for customer firms. The average cash ETR is lower than the average GAAP ETR for both supplier firms (22.8%) and customer firms (25.5%). Supplier firms have an average ROA of 12.1% and an average leverage ratio of 15.2%. The average amount of foreign assets, estimated following Oler, Shevlin, and Wilson (2007), is 0.250. The average amounts of new investments, property, plant and equipment, intangible assets, and equity income in earnings, as a percentage of lagged total assets, are 9.5%, 28.2%, 18.7%, and 0.1%, respectively. Average firm size, measured by the natural logarithm of market value of equity, is 6.132. The average market-to-book ratio is 2.810, and the average abnormal accruals are 0.059. Supplier firms have an average cash holdings of 20.8% (as a percentage of lagged total assets). All these statistics are consistent with those reported in Cen et al. (2017).

4. Research Design and Main Results

In this section, we empirically test for tax-planning diffusion along the supply chain. If tax planning diffuses from principal customers to their dependent suppliers, the effective tax rates of the customer-supplier pair should be positively correlated. In addition, we investigate the real effects of tax planning diffusion and whether suppliers share their tax savings with their customers, such that both parties benefit from the spread of tax planning across the supply chain.

4.1. Correlation between a Supplier's ETR and its Principal Customer's ETR

As a first step, we empirically test whether the effective tax rates of the customer-supplier pair are positively correlated.[10] The dataset is organized at the relationship-year level, and the

[10] We focus on the contemporaneous correlation in this analysis. Our inferences are unchanged when we look at the lead-lag relation between a supplier firm's effective tax rate at year *t* and its principal customer's effective tax rate at year *t*–1.

sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. The specification is as follows:

$$\begin{aligned} \textit{Supplier ETR} = {} & \alpha + \beta_1 \textit{Customer ETR} + \Gamma X \\ & + \textit{Year Fixed Effects} + \textit{Relationship Fixed Effects} + \varepsilon, \end{aligned} \quad (1)$$

where *Supplier ETR* is the GAAP ETR (*GETR*) or cash ETR (*CETR*) for the dependent supplier firm, and *Customer ETR* is the GAAP ETR (*GETR*) or cash ETR (*CETR*) for the corresponding principal customer firm. The vector *X* represents the set of control variables related to the supplier firm's characteristics. We identify control variables following prior literature (e.g., Chen et al. 2010; Dyreng et al. 2008; Rego 2003), including ROA, financial leverage, foreign assets, new investments, property, plant, and equipment, intangible assets, equity income in earnings, firm size, market-to-book ratio, abnormal accruals, and cash holdings. We control for relationship fixed effects and year fixed effects in all specifications. Standard errors are clustered at both the relationship and the year levels. We predict β_1 to be significantly positive.

Table 2 presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. Consistent with the diffusion story, we find a positive association between a supplier's ETR and its principal customer's ETR. In column (1) where the dependent variable is *Supplier GETR*, the coefficient on *Customer GETR* is 0.087 and statistically significant at the 1% level. In column (2) where the dependent variable is *Supplier CETR*, the coefficient on *Customer CETR* is 0.062 and statistically significant at the 1% level.

The coefficients on the control variables are generally consistent with prior research. ROA is positively related to GAAP ETRs but negatively related to cash ETRs. Firms with more foreign assets have lower GAAP ETRs and cash ETRs. Firms with more intangible assets and equity income in earnings generally have lower cash ETRs. Firm size is positively related to both ETRs

and market-to-book ratio is negatively related to both ETRs. The relation between abnormal accruals and GAAP ETRs is negative and significant. Finally, cash holdings are negatively related to cash ETRs.

To alleviate the concern that the positive association between a supplier's ETR and its principal customer's ETR documented in Table 2 is spurious, we perform a placebo analysis. Specifically, for each "true" supplier in the dataset, we find all pseudo supplier firms that belong to the same industry (i.e., based on SIC 2-digit industry) and same size quintile group.[11] In each simulation test, we randomly pick one pseudo supplier to replace the "true" supplier. The test specification is exactly the same as that described in Table 2. We repeat the simulation test for 1,000 times. In Table 3, we report the mean and standard deviation of key independent variables from 1,000 simulations, as well as the percentage of these coefficients that are larger than the corresponding coefficients in Table 2.

In column (1) where the dependent variable is the pseudo supplier's *GETR*, the average coefficient on *Customer GETR* is 0.001 and the standard deviation is 0.015. Only 2.30% of the coefficients on *Customer GETR* are statistically significant at the 5% level, and none of the coefficients are greater than the corresponding coefficient reported in Table 2. In column (2) where the dependent variable is the pseudo supplier's *CETR*, the average coefficient on *Customer CETR* is -0.004 and the standard deviation is 0.016. Only 1.40% of the coefficients on *Customer CETR* are statistically significant at the 5% level, and none of the coefficients are greater than the corresponding coefficient reported in Table 2.

Overall, the results in Table 2 and Table 3 suggest a significant, positive correlation between a supplier's ETR and its principal customer's ETR that is unlikely to be spurious.

[11] We conduct the placebo test based on pseudo supplier firms instead of pseudo customer firms because it is difficult, if not infeasible, to find firms comparable to the big customer firms such as Apple, IBM, Caterpillar and Microsoft.

4.2. Real Effects and Sharing of Tax Benefits

While supplier firms clearly have a strong economic incentive to learn tax-planning knowledge from more sophisticated and mature customer firms, it is less clear why customer firms facilitate such a learning process. More specifically, what are the benefits to customer firms as a consequence of tax-planning knowledge diffusion to their suppliers? In this section, we investigate whether suppliers share the tax savings with their customers in the form of lower product prices, such that both parties benefit from the spread of the tax planning. The all parties concept of tax planning posits that private parties can alter other payments with one another to share benefits from tax planning that would otherwise accrue to only one of the parties (Scholes et al. 2015). Moreover, if the tax planning diffusion leads to lower product market prices it represents a real effect.

The dependent variable in this test, the supplier's pre-tax gross profit margin, is defined as the difference between total sales and cost of goods sold, scaled by total sales. To obtain the two key independent variables, we first regress suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates and relationship fixed effects. This regression allows us to decompose suppliers' GAAP (cash) effective tax rates into two components: *Supplier GETR* (*CETR*) *Explained by Customer GETR* (*CETR*), which is the predicted value from this regression, and *Supplier GETR* (*CETR*) *Not Explained by Customer GETR* (*CETR*), which is the residual from this regression. Both components are standardized so that they have a mean of zero and standard deviation of one. By construction, it is clear that the first component, *Supplier GETR* (*CETR*) *Explained by Customer GETR* (*CETR*), captures the tax planning related to customer firms, and the second component, *Supplier GETR* (*CETR*) *Not Explained by Customer GETR* (*CETR*), reflects suppliers' tax planning unrelated to their principal customer. With gross profit margin as

the dependent variable, we include independent variables following Patatoukas (2011). Specifically, *Firm Size* is the natural logarithm of the market capitalization; *Firm Age* is the natural logarithm of one plus the firm age; *Sales Growth* is the annual sales growth rate; *Conglomerate* is an indicator variable that equals 1 if the firm has at least two business segments; and *Leverage* is measured as the ratio of long-term debt to total assets. All control variables are lagged by one year. Similar to the main test specification reported in Table 2, we include relationship fixed effects and year fixed effects in this regression. Standard errors are clustered at both the relationship and the year levels.

The results of this test are reported in Table 4. In columns (1) and (2), the coefficients of *Supplier GETR Explained by Customer GETR* and *Supplier CETR Explained by Customer CETR* are positive and statistically significant at the 5% and 1% levels, respectively. This result suggests that, when suppliers reduce their effective tax rates as an outcome of tax-planning knowledge diffusion along supply chains, their gross profit margin also goes down. This result is consistent with the notion that the customer firms understand that their suppliers benefit from the diffusion of tax-planning knowledge along the supply chain. Instead of blocking such a learning process, the customer firms may effectively bargain for a lower price with their suppliers by actively or passively facilitating the learning process. In equilibrium, both customers and suppliers benefit from the sharing of tax planning knowledge.

5. Additional Analyses

If principal customers facilitate the diffusion of tax planning to their dependent suppliers, the positive correlation of the effective tax rates of the customer-supplier pair should be stronger when the cost of tax planning diffusion is lower. We use two variables to capture the cost of tax

planning diffusion: whether the supplier firm and its principal customer rely on a common auditor, and whether they have their headquarters in the same state. In addition, to establish the direction and timing of diffusions, we use a difference-in-differences approach around the establishment of new customer-supplier relationships.

5.1. Common Auditors vs. Different Auditors

Prior research suggests that auditors can serve as an information conduit in both tax (Lim et al. 2018) and non-tax settings (Aobdia 2015; Cai et al. 2016; Dhaliwal et al. 2016). Thus, both supply chains and common auditors appear to be channels though which tax planning can spread across firms. We consider whether the channels appear to be complementary to one another. If common auditors also enhance the diffusion properties of supply chains, then we predict that the cost of knowledge diffusion will be lower for customer-supplier pairs with common auditors, and the positive correlation of effective tax rates will be stronger for those customer-supplier pairs. We perform both a cross-sectional test and a time-series test.

Table 5 reports the results for the cross-sectional test. This test compares two subsamples of relationship-pairs: (1) the "Same Auditor" group includes all relationships where customers and suppliers have the same auditor throughout the entire relationship duration; and (2) the "Different Auditor" group includes all relationships where customers and suppliers have different auditors throughout the entire relationship duration. In the first two columns where the dependent variable is *Supplier GETR*, the coefficient on *Customer GETR* is 0.243 (statistically significant at the 5% level) for customer-supplier pairs that share a common auditor, and 0.058 (statistically significant at the 5% level) for customer-supplier pairs that do not share a common auditor. The difference of the coefficients on *Customer GETR* is 0.185 and statistically significant at the 5% level. In the next two columns where the dependent variable is *Supplier CETR*, the coefficient on *Customer CETR*

is 0.186 (statistically significant at the 1% level) for customer-supplier pairs that share a common auditor, and 0.030 (not statistically significant) for customer-supplier pairs that do not share a common auditor. The difference of the coefficients on *Customer CETR* is 0.156 and statistically significant at the 1% level. Overall, the cross-sectional comparisons in Table 5 show that the positive correlation of effective tax rates is indeed stronger for those customer-supplier pairs with common auditors.

Next, we turn to a time-series test that focuses on customer-supplier pairs with changes of auditors. For this test, we add the variable *Same Auditor* and its interaction with *Customer ETR* to Equation (1). The specification is as follows:

$$\begin{aligned} \textit{Supplier ETR} = {} & \alpha + \beta_1 \textit{Customer ETR} + \beta_2(\textit{Customer ETR} \times \textit{Same Auditor}) \\ & + \beta_3 \textit{Same Auditor} + \Gamma X + \textit{Year Fixed Effects} \\ & + \textit{Relationship Fixed Effects} + \varepsilon, \end{aligned} \tag{2}$$

We predict β_2 to be significantly positive. Table 6 reports the results for the time-series test. The sample in columns (1) and (2) includes all relationship pairs that have changes of same auditor status within the relationship duration, i.e., in some years, customers and suppliers have the same auditor and in some other years, customers and suppliers have different auditors. In column (1) where the dependent variable is *Supplier GETR*, the coefficient on *Customer GETR* × *Same Auditor* is 0.217 and statistically significant at the 1% level. In column (2) where the dependent variable is *Supplier CETR*, the coefficient on *Customer CETR* × *Same Auditor* is 0.160 and statistically significant at the 5% level. The results in these two columns suggest that for a given customer-supplier pair, common auditors facilitate tax planning diffusion.

In columns (3) and (4), we only include relationships where the changes of same auditor status are driven by the changes of auditors from the customer side. A principal customer, such as Walmart, can have more than 50 dependent suppliers (whereas a dependent supplier usually has

only one or two principal customers). Thus, a principal customer's auditor change is more likely to be exogenous from a single dependent supplier's perspective. Compared with the results in the first two columns, the coefficients on *Customer GETR* × *Same Auditor* and *Customer CETR* × *Same Auditor* are slightly larger and remain statistically significant in columns (3) and (4). Overall, the time-series tests in Table 6 suggest that the positive correlation of effective tax rates is stronger when a given customer-supplier pair shares a common auditor.

5.2. Headquarters in the Same State vs. Headquarters in Different States

Prior literature argues that proximity to trade partners facilitates the communication of soft information (e.g., Cannon and Homburg 2001; Costello 2013; Chu et al. 2019). As with the common auditor test, we examine whether geographical proximity enhances the diffusion of tax planning along the supply chain. We predict the correlation of effective tax rates between customers and suppliers to be stronger when their headquarters are located in the same state. Similar to prior tests on common auditors, we perform both a cross-sectional test and a time-series test.

Table 7 reports the results for the cross-sectional test. This test compares two subsamples of relationship-pairs: (1) the "Same State" group includes all relationships where customers and suppliers have their headquarters located in the same state throughout the entire relationship duration; and (2) the "Different State" group includes all relationships where customers and suppliers have their headquarters located in different states throughout the entire relationship duration. In the first two columns where the dependent variable is *Supplier GETR*, the coefficient on *Customer GETR* is 0.196 (statistically significant at the 5% level) for customer-supplier pairs that share a common headquarter state, and 0.066 (statistically significant at the 1% level) for

customer-supplier pairs that do not share a common headquarter state. The difference of the coefficients on *Customer GETR* is 0.130 and statistically significant at the 5% level. In the next two columns where the dependent variable is *Supplier CETR*, the coefficient on *Customer CETR* is 0.147 (statistically significant at the 10% level) for customer-supplier pairs that share a common headquarter state, and 0.044 (statistically significant at the 5% level) for customer-supplier pairs that do not share a common headquarter state. The difference of the coefficients on *Customer CETR* is 0.103 and statistically significant at the 5% level. Overall, the cross-sectional comparisons in Table 7 show that the positive correlation of effective tax rates is indeed stronger for those customer-supplier pairs that share a common headquarter state.

Next, we turn to a time-series test that focuses on customer-supplier pairs with changes of headquarter states. For this test, we add the variable *Same State* and its interaction with *Customer ETR* to Equation (1). The specification is as follows:

$$\begin{aligned} \textit{Supplier ETR} = {} & \alpha + \beta_1 \textit{Customer ETR} + \beta_2(\textit{Customer ETR} \times \textit{Same State}) \\ & + \beta_3 \textit{Same State} + \Gamma X + \textit{Year Fixed Effects} \\ & + \textit{Relationship Fixed Effects} + \varepsilon, \end{aligned} \tag{3}$$

We predict β_2 to be significantly positive. Table 8 reports the results for the time-series test. The sample in columns (1) and (2) includes all relationship pairs that have changes of same state status within the relationship duration, i.e., in some years, customers and suppliers have their headquarters in the same state and in some other years, customers and suppliers have headquarters located in different states. In column (1) where the dependent variable is *Supplier GETR*, the coefficient on *Customer GETR* × *Same State* is 0.165 and statistically significant at the 1% level. In column (2) where the dependent variable is *Supplier CETR*, the coefficient on *Customer CETR* × *Same State* is 0.168 and statistically significant at the 5% level. The results in these two columns suggest that for a given customer-supplier pair, locating their headquarters in the same state

facilitates tax planning knowledge diffusion.

In columns (3) and (4), we only include relationships where the changes of same headquarter state status are driven by the relocation of headquarters from the customer side. Similar to its auditor change, a principal customer's headquarter relocation is more likely to be exogenous from a single dependent supplier's perspective. The coefficients on *Customer GETR* × *Same State* and *Customer CETR* × *Same State* remain positive and statistically significant in columns (3) and (4). Overall, the time-series tests in Table 8 suggest that the positive correlation of effective tax rates is stronger when a given customer-supplier pair shares a common headquarter state.

5.3. Relationship Establishment and Diffusion of Tax Planning Knowledge

To strengthen our inferences about tax-planning knowledge diffusion, we next use a difference-in-differences approach around the establishment of customer-supplier relationships.[12] Because principal customers are much larger (and presumably more financially sophisticated) than their dependent suppliers, we expect the tax planning knowledge to diffuse from the customer to its suppliers. Relationship establishment is based on when a firm reports a principal customer in year *t* for the first time, where the relationship will last for at least 5 years.[13]

Table 9 reports the impact of relationship establishment on the GAAP effective tax rate (*GETR*) and the cash effective tax rate (*CETR*) of suppliers. All tests are carried out in two sub-groups depending on whether the effective tax rates of the principal customers are higher or lower

[12] In spirit, one can do a similar test around relationship terminations. However, relationship terminations usually lead to a devastating effect on suppliers' operating performance (see Cen, Chen, Hou, and Richardson, 2018), which can make tax avoidance less relevant. In addition, Bauer, Henderson, and Lynch (2018) suggest that relationship terminations are likely affected by suppliers' internal control problems, which may confound the findings given that internal control quality affects tax avoidance (Gallemore and Labro 2015).

[13] One caveat is that it is not necessarily a new relationship, just one that crosses the threshold for disclosure.

than their industry median in year *t*–3. We expect that principal customers with effective tax rates lower than their industry median are more likely to have tax planning knowledge to share than are customers with effective tax rates greater than their industry median. In this test, we only consider a five-year period around the relationship establishment, i.e., from two years before relationship establishment (*t*–2) to two years after relationship establishment (*t*+2). *Year* (*t*–1) is an indicator variable that equals one for the observation of year *t*–1. *Year* (*t*), *Year* (*t*+1) and *Year* (*t*+2) are defined in a similar manner. The *Adj. GETR* (*CETR*) is the difference between *GETR* (*CETR*) and the average *GETR* (*CETR*) of benchmark firms that are neither principal customers nor dependent suppliers in the same year. We require that the incumbent supplier and the benchmark firms must belong to the same size and *GETR* (*CETR*) quintiles in the same industry. We include the same set of control variables as those reported in Table 2.

In column (1) of Table 9, we find that in a five-year period around the relationship establishment with principal customers whose GAAP ETRs are below industry median in year *t*–3, the GAAP ETRs of dependent suppliers decrease by 1.4, 2.1, and 3.7 percentage points in year *t*, year *t*+1, and year *t*+2, respectively. However, when principal customers' GAAP ETRs are above industry median in year *t*–3, as in column (2), the coefficients on the event year dummies are small and not statistically significant. We repeat the same analysis for cash ETRs in columns (3) and (4). In column (3), we find that in a five-year period around the relationship establishment with principal customers whose cash ETRs are below industry median in year *t*–3, the cash ETRs of dependent suppliers decrease by 2.0 and 2.1 percentage points in year *t*+1 and year *t*+2, respectively. In column (4), we do not find statistically significant results when principal customers' cash ETRs are above industry median in year *t*–3.

In columns (5) to (8) of Table 9, we use a difference-in-differences method to ensure that

the results are not driven by common industry trends or common factors that affect firms with similar size or similar tax rates before the relationship establishment. In column (5), we find that in a five-year period around the relationship establishment with principal customers whose GAAP ETRs are below industry median in year *t*–3, the adjusted GAAP ETRs of dependent suppliers decrease by 2.0 and 2.6 percentage points in year *t*+1 and year *t*+2, respectively. However, when principal customers' GAAP ETRs are above industry median in year *t*–3, as in column (6), the coefficients on the event year dummies are small and not statistically significant. We repeat the same analysis for adjusted cash ETRs in columns (7) and (8). In column (7), we find that in a five-year period around the relationship establishment with principal customers whose cash ETRs are below industry median in year *t*–3, the adjusted cash ETRs of dependent suppliers decrease by 2.3 and 3.8 percentage points in year *t*+1 and year *t*+2, respectively. In column (8), we do not find statistically significant results when principal customers' cash ETRs are above industry median in year *t*–3.

Overall, the results in Table 9 suggest that the reduction in a supplier' ETRs around the relationship establishment is conditional on whether the principal customer has a low tax rate. Suppliers establishing relationships with principal customers in the low tax group experience an effective tax rate reduction. Our difference-in-differences analysis confirms that our findings are not driven by industry trends or common characteristic-related factors associated with size or tax rates before the relationship establishment. In addition, the reduction of effective tax rates mainly happens in year *t*+1 and year *t*+2 instead of year *t*, suggesting that the diffusion of tax planning in the supply chain involves a gradual learning process. Taken together, the results suggest that tax planning knowledge diffuses from principal customers to dependent suppliers.

6. Conclusions

In this study, we investigate the diffusion of tax planning across firms, and the real effects and sharing of benefits from such diffusion. Using a large sample of supply-chain-relationship pairs, we find that principal customers' tax planning has a positive and significant impact on their suppliers' tax planning. This result suggests that suppliers, which are relatively small and less sophisticated compared with their principal customers, likely learn from the customers regarding the tax planning strategies they use. We also find evidence that suppliers share some of their tax savings with their customers in form of lower prices, such that both parties benefit from the diffusion of tax knowledge. By affecting product market pricing, diffusion of tax planning has real effects. We find tax planning diffusion via the supply chain is enhanced when customers and suppliers share the same external auditor and when they are located in the same state. This result extends prior research that indirect links (such as common auditors) and geographic proximity facilitate the diffusion of knowledge on their own. Our results show that specific channels (i.e., supply chains, common auditors) can interact with one another in a complementary way.

Our findings have policy implications. For example, when evaluating the overall impact of tax policies, our results suggest that governments should not only focus on certain targeted industries or firms, but also should consider the effects on other parties in the supply chain. Finally, we encourage more future research on the identification of the channels through which tax planning spreads.

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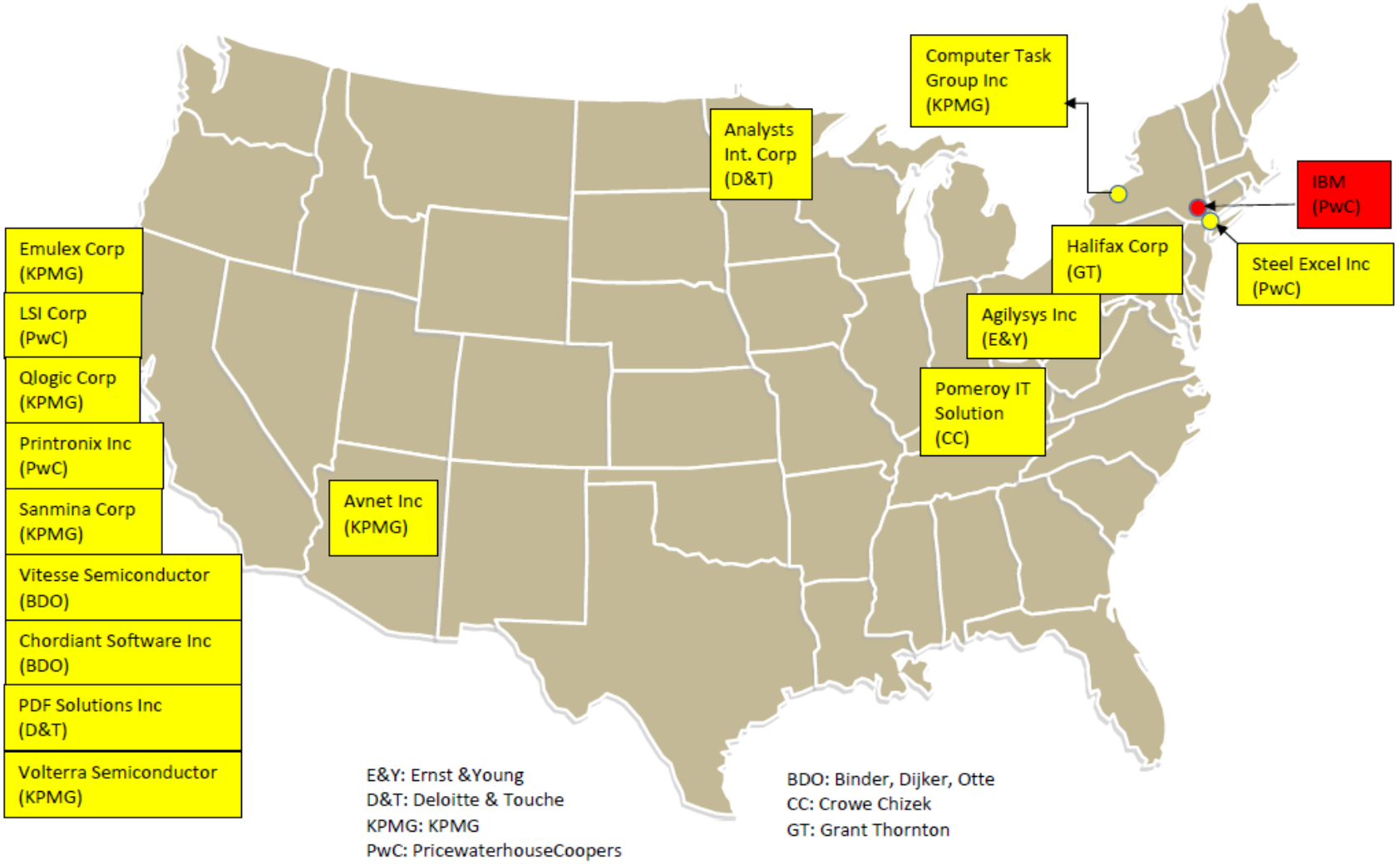
Appendix I: Detailed Sample Selection Filters

Customer-supplier relationship-years within 1994–2013 where both supplier and customer firms are public firms with GVKEYs	58628
- Relationship-years where sales to principal customers are missing in Compustat Customer Segment File	-12522
=	=46106
- Relationship-years where the entire duration is shorter than 5 years within the sample period	-30084
=	=16022
- Relationship-years where there is no sufficient information to compute independent variables defined in Appendix III	-1758
=	=14264
- Relationship-years where there is no sufficient information to compute either Supplier GETR or Customer GETR	-3213
=	=11051
- Relationship-years where there is no sufficient information to compute either Supplier CETR or Customer CETR	-1096
	=9955

APPENDIX II: Headquarter Locations and Auditor Names of Dependent Suppliers for IBM in 2007



This figure shows headquarter locations of all publicly listed dependent suppliers (in yellow) of IBM (in red) in 2007. For the customer firm and all supplier firms, we provide the names of their auditors in parentheses.

APPENDIX III: Variable Definitions

Dependent Variables	
Supplier GETR	A supplier firm's GAAP effective tax rate, TXT/(PI-SPI).
Supplier CETR	A supplier firm's cash effective tax rate: TXPD/(PI-SPI).
Supplier Gross Margin	A supplier firm's gross margin, calculated as the difference between total sales and cost of goods sold, scaled by total sales.
Key Customer-Supplier Relationship Variables	
Same Auditor	A dummy variable that equals one if customers and suppliers have the same auditor, and zero otherwise.
Same State	A dummy variable that equals one if customers and suppliers have their headquarters in the same state, and zero otherwise.
Control Variables	
Customer GETR	The principal customer's GAAP effective tax rate, TXT/(PI-SPI).
Customer CETR	The principal customer's cash effective tax rate: TXPD/(PI-SPI).
ROA	Return on assets, calculated as pre-tax income (*PI*) divided by lagged total assets (*AT*).
Leverage	Financial leverage at the end of the year, calculated as long-term debt (*DLTT*) scaled by total assets (*AT*).
Foreign Assets	Foreign assets, estimated following Oler, Shevlin, and Wilson (2007).
New Investments	New investment, calculated as Compustat (*XRD+CAPX+AQC-SPPE-DPC*), scaled by lagged total assets (*AT*).
Property, Plant, and Equipment	Net property, plant, and equipment at the end the year, calculated as Compustat *PPENT* scaled by lagged total assets (*AT*).
Intangible Assets	Intangible assets at the end of the year, calculated as Compustat *INTAN* scaled by lagged total assets (*AT*). If *INTAN* = 'C', then *INTAN* = *GDWL*.
Equity Income in Earnings	Equity income in earnings, calculated as Compustat *ESUB* scaled by lagged total assets (*AT*).
Firm Size	The natural logarithm of market value of equity at the end of the year, calculated as Compustat *PRCC_F* ×*CSHO*.
Market-to-Book	Market-to-book ratio at the end of the year, calculated as the market value of equity (Compustat *PRCC_F* ×*CSHO*) divided by the book value of equity (Compustat *CEQ*).
Abnormal Accruals	The absolute value of discretionary accruals, estimated from the performance-adjusted modified cross-sectional Jones model (Kothari, Leone, and Wasley, 2005).
Cash Holdings	Cash holdings at the end of the year, calculated as Compustat *CHE* scaled by lagged total assets (*AT*).
Firm Age	The natural logarithm of one plus firm age, i.e., the number of years since a firm appears in Compustat database.
Sales Growth	Annual percentage sales growth of the firm.
Conglomerate	An indicator variable that equals to one if the firm reports two or more business segments.

Table 1: Summary Statistics

This table provides summary statistics of dependent and independent variables in our analysis. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. Detailed definitions of all independent variables are provided in Appendix III.

Variables	Mean	Median	SD	Observations
Tax Rates				
Supplier GETR	0.274	0.309	0.168	11051
Supplier CETR	0.228	0.207	0.196	9955
Customer GETR	0.304	0.323	0.120	11051
Customer CETR	0.255	0.261	0.150	9955
Other Firm Characteristics of Suppliers				
ROA	0.121	0.095	0.097	11051
Leverage	0.152	0.116	0.158	11051
Foreign Assets	0.250	0.116	0.303	11051
New Investments	0.095	0.054	0.146	11051
Property, Plant, and Equipment	0.282	0.196	0.266	11051
Intangible Assets	0.187	0.104	0.222	11051
Equity Income in Earnings	0.001	0.000	0.004	11051
Firm Size	6.132	6.185	2.104	11051
Market-to-Book	2.810	2.055	2.649	11051
Abnormal Accruals	0.059	0.040	0.062	11051
Cash Holdings	0.208	0.124	0.240	11051

Table 2: Correlation between a Supplier's ETR and its Principal Customer's ETR

This table presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. Detailed definitions of all independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	(1)	(2)
	Supplier GETR	*Supplier CETR*
Customer GETR	0.087***	
	(3.76)	
Customer CETR		0.062***
		(3.31)
ROA	0.300***	-0.154***
	(7.70)	(-3.66)
Leverage	0.019	0.001
	(0.77)	(0.04)
Foreign Assets	-0.056***	-0.069**
	(-2.77)	(-2.57)
New Investments	-0.019	0.117***
	(-0.98)	(4.85)
Property, Plant, and Equipment	0.024	-0.012
	(1.11)	(-0.44)
Intangible Assets	-0.020	-0.095***
	(-1.12)	(-4.30)
Equity Income in Earnings	-0.983	-3.307***
	(-1.14)	(-3.92)
Firm Size	0.021***	0.049***
	(4.99)	(9.56)
Market-to-Book	-0.005***	-0.003*
	(-4.34)	(-1.79)
Abnormal Accruals	-0.081**	0.048
	(-1.99)	(0.98)
Cash Holdings	-0.027	-0.047**
	(-1.63)	(-2.39)
Year Fixed Effects	Yes	Yes
Relationship Fixed Effects	Yes	Yes
Observations	11,051	9,955
Adjusted *R*-squared	0.423	0.336

Table 3: Simulations with Pseudo Suppliers

This table presents the estimates of OLS regressions of pseudo suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. For each "true" supplier in the dataset, we find all pseudo supplier firms that belong to the same industry (i.e., based on SIC 2-digit industry) and same size quintile group. In each simulation test, we randomly pick one pseudo supplier to replace the "true" supplier. The test specification is exactly the same as that described in Table 2. We repeat the simulation test for 1,000 times. We report the mean and standard deviation of the coefficients on key independent variables from 1,000 simulations. We also report the percentage of these coefficients that are larger than the corresponding coefficients in Table 2.

Statistics for Coefficients of 1,000 Simulations	(1) Coef of *Customer GETR*	(2) Coef of *Customer CETR*
Mean	0.001	-0.004
Standard Deviation	0.015	0.016
% Positive Sig (5% level)	2.30%	1.40%
%>True Coefficient	0.00%	0.00%

Table 4: Sharing of Tax Benefits via Product Prices

This table presents the estimates of OLS regressions of suppliers' gross margin on the decomposed suppliers' GAAP (cash) effective tax rates explained and unexplained by their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. The dependent variable, the gross margin of supplier firms, is the difference between total sales and cost of goods sold, scaled by total sales. We first regress suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates with relationship fixed effects and decompose suppliers' GAAP (cash) effective tax rates into two parts. *Supplier GETR* (*CETR*) *Explained by Customer GETR* (*CETR*) is the predicted value and *Supplier GETR* (*CETR*) *Not Explained by Customer GETR* (*CETR*) is the residual from this regression. Detailed definitions of other independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	Supplier Gross Margin	
	(1)	(2)
Supplier GETR Explained by Customer GETR	0.004**	
	(2.23)	
Supplier GETR Not Explained by Customer GETR	-0.001	
	(-0.88)	
Supplier CETR Explained by Customer CETR		0.017***
		(9.49)
Supplier CETR Not Explained by Customer CETR		-0.001*
		(-1.68)
Firm Size	0.020***	0.017***
	(7.64)	(7.26)
Firm Age	-0.016**	-0.005
	(-2.32)	(-0.70)
Sales Growth	0.004	0.004
	(1.03)	(0.92)
Conglomerate	-0.004	-0.006
	(-1.11)	(-1.42)
Leverage	-0.001	-0.002
	(-0.09)	(-0.15)
Relationship Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	11,051	9,955
Adjusted *R*-squared	0.819	0.827

Table 5: Tax Planning Diffusion and Common Auditors vs. Different Auditors

This table presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. This test compares two subsamples of relationship-pairs: (1) the "Same Auditor" group includes all relationships where customers and suppliers have the same auditor throughout the entire relationship duration; and (2) the "Different Auditor" group includes all relationships where customers and suppliers have different auditors throughout the entire relationship duration. Detailed definitions of all independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	Supplier GETR		*Supplier CETR*	
	(1) Same Auditor	(2) Different Auditor	(3) Same Auditor	(4) Different Auditor
Customer GETR	0.243**	0.058**		
	(2.42)	(2.09)		
Customer CETR			0.186***	0.030
			(3.19)	(1.42)
ROA	0.376***	0.285***	-0.127	-0.167***
	(3.07)	(6.34)	(-1.08)	(-3.49)
Leverage	-0.010	0.026	0.123*	-0.039
	(-0.17)	(0.85)	(1.71)	(-0.92)
Foreign Assets	-0.068	-0.059**	-0.066	-0.066**
	(-1.16)	(-2.34)	(-1.38)	(-2.05)
New Investments	-0.012	-0.028	0.135**	0.111***
	(-0.15)	(-1.27)	(2.22)	(3.82)
Property, Plant, and Equipment	-0.005	0.029	-0.034	-0.001
	(-0.06)	(1.07)	(-0.47)	(-0.03)
Intangible Assets	0.010	-0.012	-0.177***	-0.071***
	(0.21)	(-0.58)	(-3.19)	(-2.70)
Equity Income in Earnings	-0.182	-1.231	-4.484*	-3.153***
	(-0.06)	(-1.20)	(-1.89)	(-2.94)
Firm Size	0.006	0.018***	0.060***	0.048***
	(0.52)	(3.74)	(3.77)	(8.29)
Market-to-Book	-0.002	-0.005***	0.001	-0.003
	(-0.71)	(-3.71)	(0.33)	(-1.54)
Abnormal Accruals	-0.043	-0.104**	0.361**	0.006
	(-0.32)	(-2.30)	(2.40)	(0.10)
Cash Holdings	0.046	-0.034*	-0.062	-0.056***
	(1.07)	(-1.82)	(-1.21)	(-2.76)
Difference	0.185**		0.156***	
(*p*-value)	(0.043)		(0.004)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Relationship Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,196	8,314	1,090	7,536
Adjusted *R*-squared	0.460	0.431	0.444	0.331

Table 6: Tax Planning Diffusion and Change of Same Auditor Status

This table presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. The sample in columns (1) and (2) includes all relationship pairs that have changes of same auditor status within the relationship duration, i.e., in some years, customers and suppliers have the same auditor and in some other years, customers and suppliers have different auditors. In columns (3) and (4), we only include relationships where the changes of same auditor status are driven by the changes of auditors from the customer side. Detailed definitions of all independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	All Changes		Changes Driven by Customers	
	(1)	(2)	(3)	(4)
	Supplier GETR	*Supplier CETR*	*Supplier GETR*	*Supplier CETR*
Customer GETR	0.029		0.016	
	(0.52)		(0.15)	
Customer GETR × Same Auditor	0.217***		0.253**	
	(2.97)		(2.20)	
Customer CETR		0.036		-0.049
		(0.48)		(-0.70)
Customer CETR × Same Auditor		0.160**		0.224***
		(2.19)		(2.93)
Same Auditor	-0.055**	-0.012	-0.065	-0.019
	(-2.04)	(-0.44)	(-1.43)	(-0.50)
ROA	0.312***	-0.136	0.364**	-0.239
	(3.26)	(-1.17)	(2.22)	(-1.31)
Leverage	-0.002	0.082	-0.048	0.142
	(-0.04)	(0.91)	(-0.50)	(0.77)
Foreign Assets	-0.026	-0.084	-0.062	-0.186**
	(-0.63)	(-1.27)	(-1.14)	(-2.11)
New Investments	0.021	0.113**	0.049	0.144
	(0.49)	(2.08)	(0.59)	(1.47)
Property, Plant, and Equipment	0.013	-0.018	-0.017	0.023
	(0.35)	(-0.43)	(-0.21)	(0.27)
Intangible Assets	-0.054	-0.130***	-0.100	-0.170
	(-1.08)	(-2.65)	(-1.06)	(-1.55)
Equity Income in Earnings	-0.258	-4.005***	1.085	-5.565***
	(-0.15)	(-2.67)	(0.43)	(-2.91)
Firm Size	0.034***	0.040***	0.036**	0.030
	(3.75)	(3.36)	(2.11)	(1.41)
Market-to-Book	-0.007**	-0.003	-0.008	-0.006
	(-2.08)	(-0.96)	(-1.59)	(-1.13)
Abnormal Accruals	0.012	0.110	-0.225	0.286
	(0.10)	(0.75)	(-1.12)	(0.83)
Cash Holdings	-0.035	-0.004	-0.020	0.077
	(-0.77)	(-0.07)	(-0.30)	(0.57)
Year Fixed Effects	Yes	Yes	Yes	Yes
Relationship Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,541	1,329	693	546
Adjusted *R*-squared	0.356	0.289	0.374	0.322

Table 7: Tax Planning Diffusion and Headquarters in the Same State vs. Headquarters in Different States

This table presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. This test compares two subsamples of relationship-pairs: (1) the "Same State" group includes all relationships where customers and suppliers have their headquarters located in the same state throughout the entire relationship duration; and (2) the "Different State" group includes all relationships where customers and suppliers have their headquarters located in different states throughout the entire relationship duration. Detailed definitions of all independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	Supplier GETR		*Supplier CETR*	
	(1) Same State	(2) Different State	(3) Same State	(4) Different State
Customer GETR	0.196**	0.066***		
	(2.38)	(2.72)		
Customer CETR			0.147*	0.044**
			(1.94)	(2.19)
ROA	0.339***	0.313***	-0.357***	-0.103**
	(3.23)	(7.35)	(-2.64)	(-2.37)
Leverage	-0.013	0.016	-0.135	0.014
	(-0.20)	(0.57)	(-1.32)	(0.39)
Foreign Assets	-0.042	-0.050**	-0.006	-0.063**
	(-0.79)	(-2.24)	(-0.08)	(-2.17)
New Investments	0.033	-0.031	0.128*	0.112***
	(0.72)	(-1.47)	(1.80)	(4.48)
Property, Plant, and Equipment	0.051	0.016	-0.048	-0.009
	(0.97)	(0.64)	(-0.83)	(-0.30)
Intangible Assets	-0.035	-0.022	0.009	-0.118***
	(-0.78)	(-1.08)	(0.14)	(-4.99)
Equity Income in Earnings	-1.868	-1.157	-1.588	-3.327***
	(-0.57)	(-1.24)	(-0.47)	(-4.00)
Firm Size	0.021	0.021***	0.054***	0.049***
	(1.62)	(4.60)	(3.21)	(9.10)
Market-to-Book	-0.007**	-0.005***	-0.000	-0.003*
	(-2.12)	(-3.80)	(-0.05)	(-1.74)
Abnormal Accruals	-0.120	-0.078*	-0.070	0.058
	(-1.06)	(-1.75)	(-0.41)	(1.13)
Cash Holdings	0.003	-0.034*	-0.045	-0.050**
	(0.08)	(-1.83)	(-1.12)	(-2.27)
Difference	0.130**		0.103**	
(*p*-value)	(0.018)		(0.027)	
Year Fixed Effects	Yes	Yes	Yes	Yes
Relationship Fixed Effects	Yes	Yes	Yes	Yes
Observations	1,099	9,633	1,041	8,617
Adjusted *R*-squared	0.450	0.421	0.342	0.339

Table 8: Tax Planning Diffusion and Change of Same Headquarter State Status

This table presents the estimates of OLS regressions of suppliers' GAAP (cash) effective tax rates on their customers' GAAP (cash) effective tax rates. The sample period is from 1994 to 2013. Since we examine correlations of effective tax rates between customers and suppliers, we require that a customer-supplier relationship must last for 5 years to be included in our sample. The sample in columns (1) and (2) includes all relationship pairs that have changes of same state status within the relationship duration, i.e., in some years, customers and suppliers have their headquarters in the same state and in some other years, customers and suppliers have headquarters located in different states. In columns (3) and (4), we only include relationships where the changes of same headquarter state status are driven by the relocation of headquarters from the customer side. Detailed definitions of all independent variables are provided in Appendix III. We control for relationship fixed effects and year fixed effects in all specifications. The *t*-statistics in parentheses are based on standard errors clustered at both the relationship and the year levels. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	All Changes		Changes Driven by Customers	
	(1)	(2)	(3)	(4)
	Supplier GETR	*Supplier CETR*	*Supplier GETR*	*Supplier CETR*
Customer GETR	-0.037	-0.090		
	(-1.29)	(-1.25)		
Customer GETR × Same State	0.165***	0.168**		
	(2.81)	(2.02)		
Customer CETR			-0.050	0.033
			(-0.74)	(0.18)
Customer CETR × Same State			0.164*	0.152**
			(1.77)	(2.27)
Same State	-0.097	-0.022	0.010	0.082
	(-1.58)	(-0.40)	(0.35)	(1.16)
ROA	-0.148	-0.777***	-0.233	-0.714**
	(-0.81)	(-3.20)	(-1.38)	(-2.45)
Leverage	0.088	0.057	0.287	-0.197
	(0.57)	(0.26)	(1.20)	(-0.87)
Foreign Assets	-0.163**	-0.211**	-0.164**	-0.226**
	(-2.30)	(-2.67)	(-2.28)	(-2.71)
New Investments	0.114	0.179	0.014	0.036
	(0.74)	(1.14)	(0.18)	(0.23)
Property, Plant, and Equipment	0.026	0.080	0.025	0.296
	(0.21)	(0.45)	(0.16)	(1.27)
Intangible Assets	-0.015	-0.016	-0.110	0.126
	(-0.15)	(-0.15)	(-0.83)	(1.18)
Equity Income in Earnings	0.950	-7.962	2.716	-8.876
	(0.42)	(-1.27)	(1.10)	(-1.29)
Firm Size	0.017	0.049***	0.024*	0.036
	(1.26)	(2.70)	(1.89)	(1.61)
Market-to-Book	-0.004	-0.010	-0.002	-0.011*
	(-1.06)	(-1.66)	(-0.82)	(-1.87)
Abnormal Accruals	0.148	0.311	0.214	0.364
	(0.60)	(0.83)	(0.84)	(0.94)
Cash Holdings	0.080	0.076	0.076	0.089
	(0.79)	(0.89)	(0.88)	(0.99)
Year Fixed Effects	Yes	Yes	Yes	Yes
Relationship Fixed Effects	Yes	Yes	Yes	Yes
Observations	319	297	219	200
Adjusted *R*-squared	0.356	0.285	0.509	0.303

Table 9: Relationship Establishment and Diffusion of Tax Planning

This table reports the impact of relationship establishment on the GAAP effective tax rate (*GETR*) and the cash effective tax rate (*CETR*) of suppliers. The sample period is from 1994 to 2013. Relationship establishment is based on when a firm reports a principal customer in year *t* for the first time where the relationship will last for at least 5 years. In this test, we only consider a five-year period around the relationship establishment, i.e., from two years before relationship establishment (*t*–2) to two years after relationship establishment (*t*+2). *Year* (*t*–1) is an indicator variable that equals to one for the year *t*–1 observation. *Year* (*t*), *Year* (*t*+1) and *Year* (*t*+2) are defined in a similar manner. The *Adj. GETR* (*CETR*) is the difference between *GETR* (*CETR*) and the average *GETR* (*CETR*) of benchmark firms that are neither principal customers nor dependent suppliers in the same year. We require that the incumbent supplier and the benchmark firms must belong to the same size and *GETR* (*CETR*) quintiles in the same industry. All tests are carried out in two sub-groups depending on whether the effective tax rates of customers are higher or lower than the industry median in year *t*–3. We include the same set of control variables as those reported in Table 2. Detailed definitions of all other variables for suppliers are defined in Appendix III. In all specifications, we control for relationship fixed effects and year fixed effects. The *t*-statistics in parentheses are based on standard errors clustered at the relationship level. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

	Supplier GETR		*Supplier CETR*		*Supplier Adj. GETR*		*Supplier Adj. CETR*	
	(1) *Customer GETR <Industry Med.*	(2) *Customer GETR >Industry Med.*	(3) *Customer CETR <Industry Med.*	(4) *Customer CETR >Industry Med.*	(5) *Customer GETR <Industry Med.*	(6) *Customer GETR >Industry Med.*	(7) *Customer CETR <Industry Med.*	(8) *Customer CETR >Industry Med.*
Year(*t*–1)	-0.002	0.001	-0.004	-0.005	0.005	-0.005	-0.005	0.004
	(-0.70)	(0.17)	(-0.67)	(-1.19)	(0.78)	(-0.43)	(-0.41)	(0.36)
Year(*t*)	-0.014***	-0.002	-0.007	-0.001	-0.013	0.009	-0.003	0.008
	(-2.93)	(-0.57)	(-0.98)	(-0.20)	(-1.53)	(0.66)	(-0.25)	(0.53)
Year(*t*+1)	-0.021***	0.000	-0.020**	-0.001	-0.020*	0.011	-0.023*	0.000
	(-5.07)	(0.12)	(-2.13)	(-0.29)	(-1.69)	(0.83)	(-1.77)	(0.00)
Year(*t*+2)	-0.037***	0.001	-0.021**	0.003	-0.026***	0.001	-0.038**	0.003
	(-7.64)	(0.21)	(-2.23)	(0.78)	(-2.96)	(0.05)	(-2.55)	(0.14)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Relationship Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5351	2415	3635	1659	5351	2415	3635	1659
Adjusted *R*-squared	0.639	0.625	0.414	0.547	0.530	0.377	0.333	0.298