Planning through competitive threats: Incumbent firm tax responses to sharing economy disruption[*]

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Abstract: Using the setting of the sharing economy (SE), I study whether incumbent firms increase tax planning to generate cash needed to respond to disruptive competitive threats. Due to their innovative business models, SE firms such as Airbnb and Uber pose substantial competitive threats to affected incumbent firms. Tax planning represents a competitive response available to incumbent firms to generate cash needed to combat these threats without derailing investment in current operations. I find that following key public events that reflect the emergence of SE competitive threats, incumbent firms significantly increase their cash tax planning, and that this tax planning is motivated by cash needs and tax planning opportunities. Further tests suggest that the tax planning can be used over time to sustain benefits and that incumbents view the SE entrants as long-term competitive threats, and tax plan accordingly. Overall, my study provides evidence of meaningful tax consequences that can arise from disruptions in firms' competitive environments, which affect both firms' competitive postures and government revenues.

I. INTRODUCTION

While competition among firms can ebb and flow, there are times when competition shifts dramatically so as to have disruptive effects on industries. Such disruptions affect firm operating and investing decisions, including marketing, product development, innovation, and employment (e.g., Xu 2012; Kim et al. 2021; Glaeser et al. 2023). Regardless of the specific actions incumbent firms take, *cash* is a ubiquitous and important element in firms' responses to competitive threats (Frésard 2010). One ready way in which firms can generate cash is through tax planning (Law and Mills 2015; Edwards et al. 2016; Campbell et al. 2021). I test whether incumbent firms increase tax planning in response to disruptive competitive threats from new entrant firms, where cash needs and tax planning opportunities are primary mechanisms.[1,2]

I examine this question within the context of the sharing economy (SE), also known as the gig, peer-to-peer (PTP), or collaborative economy.[3] The SE presents a particularly strong setting in which to examine incumbent firm responses to new competitive threats—specifically, threats from firms with innovative business models. The competitive effects from these incoming firms have been so strong that the SE has been described as fundamentally disruptive across a broad spectrum of entire industries (e.g., Guttentag 2015; Cramer and Krueger 2016; Leaphart 2016). Since the early 2000s, the SE has emerged as an innovative business model with profound implications for the competitive landscape in which incumbent firms operate. The SE involves a structure in which intermediary digital platforms facilitate transactions between peers (e.g.,

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[1] I use the term "incumbent" firms to refer to non-SE firms that are already in the market *and* that are within industries affected by incoming SE firms. Because I study spillover effects of SE threats, I use "treated" firm and "incumbent" firm interchangeably.

[2] I define tax planning as any means by which firms decrease their income tax burdens. Tax planning occurs on a continuum, from legal strategies that are in full compliance with tax laws to aggressive strategies that result from aggressive interpretations of tax law ambiguities (Edwards et al. 2016). I view the terms "tax planning" and "tax avoidance" as interchangeable, and use "tax planning" throughout the paper.

[3] See Table A1 of Appendix A for examples of SE firms.

Valant 2016; OECD 2017; Berger et al. 2020). This business model offers SE firms many competitive advantages that allow them to operate under lower costs and often offer lower prices while flexibly changing to cater to customer expectations (e.g., Cramer and Krueger 2016; Raafat and Weller 2019). While the specifics of the advantages vary across types of SE firms, ultimately they threaten the cash flows of incumbent firms, including by putting pressure on incumbents to take real actions (such as lowering prices, innovating, or advertising) to respond competitively.[4]

As an example, one of the most well-known SE firms is Uber, which provides a mobile application as a platform to connect potential passengers to drivers. The SE model has allowed Uber to offer convenient and affordable rides through efficient driver-to-passenger matching while maintaining low costs (Cramer and Krueger 2016). These advantages attract large amounts of investor cash funding for Uber and threaten taxi and rental car companies as customers shift from traditional means of transportation to ridesharing services (Richter 2017). The effects on taxi and rental car companies have been both significant and long lasting, including strains on liquidity (Rosenthal 2019) and fundamental shifts in the industry as the traditional companies evolve to compete—for example, by developing and providing services through their own mobile apps (Pyzyk 2019).

One challenge is determining how to source cash to fund competitive responses without derailing planned investments or ongoing operations. Cash is crucial in competitive settings, as it can finance competitive strategies, shield firms from market shocks, and otherwise provide firms operational flexibility (Frésard 2010). While firms can use many strategies to increase cash (e.g.,

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[4] I expand on specific advantages and threats of different types of SE firms in Appendix A. SE firms enter many types of markets, often with more than one SE firm competing within that market (e.g., Uber and Lyft in ridesharing and Airbnb and Vrbo in homesharing). I group these markets based on SE types into what I call "cohorts."

decreasing capital expenditures, reducing employment, or raising additional debt), such actions can require costly changes or adversely affect firms' operations (Frésard and Valta 2015; Edwards et al. 2016; Glaeser et al. 2023). On the other hand, tax planning is an attractive option to firms because it directly increases firms' cash holdings, and empirical evidence suggests it is largely available to profitable firms and often can be implemented quickly (Cook et al. 2008; Leone 2008; Scheffel Boyle 2019). While not costless, tax planning is unlikely to fundamentally change the operations of a firm. Extant literature also provides support for tax planning as a source of internal funds (e.g., Law and Mills 2015; Edwards et al. 2016; Campbell et al. 2021). Therefore, I predict that incumbent firms respond to new competitive threats from the SE by generating cash through increases in tax planning.

I examine the tax planning responses of incumbent firms to competitive threats from eight types of SE firms, as listed in Appendix A. Because I argue that tax planning is used as a cash-generating mechanism, I focus on a cash-based measure of tax planning, rather than measures based on tax expense. Treated firms are those within NAICS industries that are affected by competitive threats from the SE. Control firms are in similar, but unaffected, industries. For example, taxi and rental car companies are threatened by ridesharing emergence and so would be considered treated, whereas consumer goods rentals are included as control firms. To identify when SE competitive threats become salient, I use the years of key public events within each SE category that call attention to the rising prominence of the SE (see Table A1). These event dates reflect the emergence of salient, SE-induced competitive threats.

Using a stacked difference-in-differences (DiD) model to account for staggered treatment dates related to SE emergence, I find that incumbent firm cash tax planning significantly increases in response to competitive threats from the SE. This result suggests that when faced

with competitive threats from disruptive, innovative firms, incumbent firms decrease their cash taxes paid, thus generating much-needed cash in response to the competitive threat. I also find that the increase in tax planning is sustained for at least three years, beginning with the year in which SE-induced competitive threats become salient. The persistence of the tax planning is consistent with the fundamentally disruptive nature of the SE.

In cross-sectional tests, I provide evidence that the tax planning is cash motivated by demonstrating that firms that lack alternative sources of cash—specifically, firms with weak cash flows from operations or lower ability to raise additional debt—exhibit incrementally greater increases in tax planning. I also find a greater tax planning effect among firms that likely have greater room to take on new tax strategies. Across these cross-sectional tests, my main result of an increase in tax planning holds, which corroborates tax planning as an appealing means of generating cash in response to competition due to its broad availability and flexibility.

In additional tests, I study other related tax and nontax outcomes. While my main tests focus on cash tax planning, I examine but do not find evidence of significant changes in financial reporting-affected tax planning, providing further support that the tax planning is primarily cash motivated. Further, I do not find a significant change in tax aggressiveness following SE emergence. I do find evidence suggesting a greater focus on more sustainable cash tax reductions, measured through the volatility of tax planning. These results are consistent with findings in the literature that demonstrate that incremental tax planning is not necessarily more uncertain, that low tax rates tend to be more persistent than high tax rates, and that firms value tax rate persistence (Dyreng et al. 2008; Guenther et al. 2017; Guenther et al. 2019; Neuman 2023). These results also suggest that tax planning can be used over time to sustain benefits, further supporting the idea that incumbent firms perceive the SE entrants as long-term

competitive threats and tax plan accordingly. Finally, I examine key non-tax outcomes in the form of investments; I find a significant increase in research and development (R&D) and capital expenditures for treated firms following SE emergence, motivating a need for cash financing and validating the expectation of disruptive competitive threats from the SE.

Overall, I provide evidence of cash tax planning responses to competitive threats. A related study is Cai and Liu (2009), who associate Chinese firms' tax planning with proxies for competition. My study differs in two key ways: improved identification and the existence of an actual, as opposed to a perceived, competitive threat. In primary tests, Cai and Liu (2009) associate market share with tax planning. In further tests, their study equates competition with industry-level barriers to entry, using deregulation as a proxy. Barriers to entry are a necessary but not a sufficient condition for competition. In contrast, I use events that more directly identify increases in competitive threats—that is, from SE firms that fundamentally threaten incumbent firms. Thus, I capture a disruptive change in the competitive threat faced by incumbent firms, which both necessitates and creates opportunities for increased tax planning (Omer et al. 2012; Higgins et al. 2015). Further, Cai and Liu (2009) use one deregulation event that affects two industries, whereas I use staggered events across many industries. In summary, my study uses the SE setting to examine the effect of competitive threats on tax planning more directly.

I contribute to the competition literature by demonstrating cash tax responses to competitive threats from disruptive firms. Historically, the competition literature has focused almost exclusively on non-tax effects (e.g., Aghion et al. 2005; Frésard 2010; Hoberg et al. 2014). Instead, I provide evidence that firms use taxes to generate cash in response to fundamentally disruptive competitive threats, even across many industries. This finding is significant because cash is an essential element in firms' competitive postures, and tax planning

can generate cash without adversely affecting firms' current operations or investments. By supplying evidence of an increase in cash tax planning in response to the SE, my study provides insight into how firms might respond using tax strategies in other settings in which disruptive competitive threats from innovative business models emerge.

My study also contributes to an emerging literature on the SE (e.g., Barrios et al. 2022; Ellis et al. 2022). As the SE was named as one of the "10 ideas that will change the world," its effects are important to understand in their own right (Walsh 2011). Whereas the nascent SE literature tends to focus on individual SE firms themselves or the effects of specific types of SE firms, I contribute by providing broad evidence of tax-related effects on incumbent firms across many types of SE categories. Because the SE affects a wide variety of industries, changes in incumbent firm tax payments should be of interest to regulators and tax authorities in responding to new business models, especially given increased interest in the U.S. tax gap and emphasis on tax enforcement (KPMG 2019).

II. RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1. Competition Literature

My study is related to a stream of literature that examines how firms respond to competition. Much of this literature examines effects of competition in the context of barriers to entry through tariffs or regulations; these studies demonstrate that increases in competition due to reductions in such barriers contribute to higher debt costs and reductions in investment, and that firms with larger cash holdings are more successful at expanding their market shares (Frésard 2010; Valta 2012; Xu 2012; Frésard and Valta 2015). Other studies provide evidence that competition is positively associated with cash held, innovation, advertising, and new product introductions (Thomas 1999; Aghion et al. 2005; Hoberg et al. 2014). These findings

demonstrate that competition can induce affected firms to take real actions to respond competitively, including through means that affect firms' cash holdings.

I build upon this literature by examining a different but vital outcome: whether firms change their *tax* strategies in response to increases in competitive threats. By studying tax effects of competition, my study is closely related to literature that investigates changes in competition arising from income tax differences across competitors (e.g., Kim et al. 2021; Donohoe et al. 2022; Glaeser et al. 2023). For example, Kim et al. (2021) and Glaeser et al. (2023) examine competition from differences in statutory tax rates across countries and provide evidence of non-tax effects on employment, investment, and market power. These studies highlight the importance of tax considerations in competitive strategies. In contrast to these studies, I examine whether *non*-tax competitive threats produce *tax* responses, specifically when the competition comes from innovative, disruptive firms.

2.2. SE Firms as a Competitive Threat

SE firms are particularly challenging competitors because their innovative business models provide them with key competitive advantages that have precipitated the SE's rise as a "disruptive economic force" that threatens the cash flow of incumbent firms (Leaphart 2016, p. 191). While these competitive advantages differ in their details, as a whole SE firms are able to operate more efficiently and under lower costs while flexibly catering to customer expectations (e.g., Guttentag 2015; Cramer and Krueger 2016; Raafat and Weller 2019). One advantage of SE firms is their ability to operate largely as online, technological platforms, which allows them to maintain low costs through lean asset ownership and by often circumventing traditional regulations (e.g., Bershidsky 2019; Brown et al. 2021). These low costs, combined with strong cash funding from investors, enable SE firms to pose significant competitive threats. Further, SE

firms have greater agility and ability to accommodate fluxes in demand, decreasing the pricing power of incumbents. Finally, the innovative nature of SE firms appeals to customers by offering greater convenience and accessibility (e.g., through mobile apps and on-demand delivery), putting pressure on incumbents to invest and innovate to respond to such customer expectations.

These advantages present significant competitive threats to incumbent firms, including to their cash flows. I expand on specific threats within each SE category in Appendix A. For example, because PTP lending firms operate almost exclusively online, they face lower costs and regulatory burdens, allowing them to offer loans more quickly, efficiently, and at times, with lower interest rates. These competitive advantages threaten the liquidity of incumbent firms through the loss of lending volume and interest revenue from borrowers who turn from traditional financing to PTP lending. Despite differences in specifics, each type of SE firm ultimately presents a threat to incumbent firms' cash flows, by threatening the incumbent firms' demand, reducing their pricing power, increasing their costs, and/or putting pressure on incumbents to make costly changes to accommodate shifting customer expectations.

In addition to these specific threats on incumbent firm cash flows, Frésard (2010) argues that cash is crucial in competitive settings more generally. Cash provides firms operational flexibility and can finance competitive strategies. I offer a unique and important perspective on the importance of cash through the SE setting, wherein I use one business model (i.e., that of the SE) that has various competitive effects across many industries, but that all tie to cash needs. This setting allows me to speak to the importance of cash in these diverse competitive settings.

2.3. Tax Planning as a Source of Internal Funds

A substantial issue for incumbent firms is identifying ways to generate such cash. Firms have several options available to generate cash flows, such as reducing advertising, R&D, capital

expenditures, or staffing; however, these actions are costly and can adversely affect the firm's operations and long-term competitive position (Edwards et al. 2016; Kim et al. 2021). Additional ways of increasing cash include raising additional debt or reducing dividends. However, empirical evidence suggests that debt becomes more expensive in competitive environments (Valta 2012). Further, while decreasing dividends can be a competitive response (Hoberg and Prabhala 2008; Zhou et al. 2013), the pecking order theory predicts that firms use internal funds before increasing debt, and that dividends are sticky (Myers 1984).[5] In that light, the findings in the literature that some firms do increase debt or decrease dividends highlights the importance of cash in competitive environments.

Tax planning can also be a valuable source of cash. Extant research demonstrates that firms can generate internal funds through tax planning, especially in response to financial constraints (Law and Mills 2015; Edwards et al. 2016; Campbell et al. 2021). While financial constraints are likely related to competitive shocks, I argue that competitive shocks are more all-encompassing in that they radically disrupt industries. For example, incumbent firms often are forced to significantly alter their investments and strategies to remain competitive in the new environment following SE emergence (e.g., Cramer and Krueger 2016). Thus, even firms that would not traditionally be considered financially constrained experience a shock to their equilibrium state that could lead them to adjust their tax planning strategies to respond to the new environment and generate internal cash funding.[6] Therefore, my study speaks to the effects of a broader disruption in a competitive market.

Tax planning is a favorable way to finance competitive responses due to its profitability

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[5] Additionally, not all firms pay dividends; in my sample, 76 percent of firms pay dividends (Table 2, Panel A).
[6] Consistent with this argument, I do not find that my empirical results are concentrated in firms with high financial constraints (untabulated).

and discretionary nature (Mills 1998). Compared to other cost-cutting techniques, such as reducing investments, tax planning is less likely to adversely affect the operations of a firm (Edwards et al. 2016). Tax strategies are also generally available to profitable firms and can often be implemented quickly (Cook et al. 2008; Scheffel Boyle 2019). Even so, tax planning involves some costs, such as the direct costs of implementing tax strategies, any interest or penalties paid in the future, and public scrutiny (Gallemore et al. 2014; Balakrishnan et al. 2019; Chen, Schuchard, and Stomberg 2019; Campbell et al. 2021). Perhaps in part due to these costs, empirical and anecdotal evidence suggests that many firms do not utilize all tax planning opportunities (Weisbach 2002), until a shock increases firms' need or opportunity for additional planning (e.g., Cheng et al. 2012; Khan et al. 2017; Ayers et al. 2018; Armstrong et al. 2019; Ege et al. 2021). For example, in the wake of the economic recession of 2008, a Grant Thornton national tax office managing principal said, "a lot of companies are receptive to focusing on opportunities in the tax area that they may not have been eager to focus on in the past" (Leone 2008; Edwards et al. 2016). Thus, while firms do not always maximize their tax-planning opportunities due to costliness or knowledge gaps (Campbell et al. 2021), a shock that heightens the need for additional cash can precipitate increases in tax planning.

Tax planning is also associated with investments that are especially beneficial in a competitive setting, including capital expenditures, acquisitions, and R&D (Brown et al. 2009; Mayberry 2012). Further, Hanlon et al. (2023) find that profitable firms use tax savings generated from tax law changes to make investments that allow them to gain market share from their loss-making competitors that do not immediately benefit from the tax cuts. Applied to my setting, profitable firms can use tax planning to ward off market predation by SE firms, which generally enter the market in loss positions.

A related but theoretically separate study by Armstrong et al. (2019) demonstrates evidence that firms respond to changes in their industry-competitors' tax planning by changing their own tax planning in the same direction. These reactions stem primarily from concerns about appearing more tax aggressive than industry competitors. I do not expect that the same type of mimicking behavior dominates in my setting. First, the incumbent firms in my setting are not likely concerned about how their tax planning compares to that of the SE firms, which are generally in loss positions and thus not paying federal income taxes. Even if the SE firms were profitable and paying income taxes, it is not clear whether traditional incumbent firms would mimic the SE firms' income tax behavior, which, while disruptive, are not generally considered product market leaders (Kubick et al. 2015). Therefore, I argue that the tax planning changes in my setting arise primarily from cash flow needs and tax planning opportunities.

In summary, the SE presents competitive threats to incumbent firms, including to their cash flows, which are crucial to remain competitive. Tax planning is an important and effective means by which firms can respond to such competitive threats to generate cash. Accordingly, my hypothesis is as follows:

Hypothesis: Following sharing economy emergence, incumbent firms threatened by the sharing economy increase their cash tax planning, relative to unaffected firms.

Despite the cash-generating benefits, taxes are not likely first-order concerns for incumbent firms—for example, firms might prioritize responses such as new product development or R&D (Thomas 1999; Kim et al. 2021). However, cash tax planning provides a more immediate competitive benefit, and can help to fund more long-term competitive responses. Importantly, I do not claim that firms *only* use tax planning to generate cash flows in response to the new competitive environment. Rather, the tax effect itself is an important dial that firms turn to generate internal funds. Further, a benefit to examining tax planning is that

while other competitive responses can vary widely, tax planning is likely a beneficial response across firms affected by a variety of different SE-induced competitive shocks. Finally, an additional reason why incumbent firms might not adopt additional tax planning strategies is an anticipation of a broad increase in tax enforcement scrutiny due to greater attention to tax compliance issues brought on by SE emergence (Atwood et al. 2012; Hoopes et al. 2012; Kubick et al. 2016). However, tax enforcement agencies have limited resources, which might lead them to divert attention away from incumbent firms to the newer SE firms (Nessa et al. 2020).[7]

III. SAMPLE AND RESEARCH DESIGN

3.1. Cohort Selection

I consider the effects of SE firms across eight categories, or "cohorts": PTP lending, ride/car sharing, homesharing, caretaking, gig (miscellaneous) services, food delivery, bike/scooter sharing, and grocery delivery.[8] Each of these SE categories involves transactions between peers conducted through a digital platform intermediary, and are arguably disruptive to traditional, incumbent industries. I describe these cohorts in detail in Appendix A.

My treatment group consists of incumbent firms that are most affected by the introduction of SE firms into the market. I identify treated firms based on four-digit NAICS industry groupings.[9, 10] I list the treated NAICS codes for each SE cohort in detail along with a narrative description in Appendix A (see Table A2). Examples of firms within each of these

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[7] In untabulated empirical tests, I do not find evidence of a significant change in IRS attention as a proxy for enforcement scrutiny for treated firms following SE emergence (Bozanic et al. 2017).

[8] Hereafter, for simplicity I refer to ride/car sharing as simply ridesharing, and bike/scooter sharing as bike sharing.

[9] The NAICS classification is based on "similarity in the process used to produce goods or services" (OMB 1998, p.11), which is appropriate for the SE setting, which involves goods- and service-based competition. The NAICS classification is also more recently updated relative to SIC codes (Bhojraj et al. 2003). In robustness tests (Section 5.3.4), I alternatively identify treated firms based on 10-K product descriptions (Hoberg and Phillips 2010, 2016).

[10] In cases where the four-digit level would include a large portion of firms that clearly do not fit within the treatment group, I use more granular NAICS codes; these exceptions are marked with asterisks in Table A2. My hypothesis test result continues to hold if I do not make these exceptions.

samples are included in Table A3.[11]

An ideal control group consists of firms that are similar to those competing with the SE, but that are not themselves affected by the SE (Armstrong et al. 2019). I use as control firms those that are in the same three-digit NAICS category but *not* in the same four-digit NAICS category. In my extensive searches through NAICS classifications, firms included in the control group through this classification do not appear to be those that would be closely impacted by the SE, but are still related enough to the treatment firms to provide a viable counterfactual. For example, while firms in the automotive rental industry (four-digit NAICS = 5321) are likely affected by the growth of ridesharing and so are in the treatment group, other firms within the three-digit NAICS group of 532 (rental and leasing services) include those in the consumer goods rental industry (5322), which are related to but not likely directly affected by the growth of ridesharing, and so are included in the control group.[12]

3.2. Market Emergence Dates

I measure increases in competition from the SE using the dates at which SE firms become salient competitive threats to incumbent firms. I identify these dates using the years of key public events surrounding each SE cohort ("public event year"), as described in columns (3) and (4) of Table A1. These are key events that call attention to the SE firms and their rising prominence, often involving responses from local governments or other stakeholders. For example, the homesharing sector first gained legal legitimacy in 2014, when San Francisco passed the "Airbnb Law" amidst an increase in regulatory debates surrounding homesharing (CBS 2014; MacMillan

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[11] While it could be assumed that restaurants would be *aided* by food delivery SE firms, anecdotal and empirical evidence suggests a detrimental effect on restaurant margins, sometimes with long-lasting effects. See Appendix A.
[12] In some cohorts, my basic procedure for identifying control firms results in control groups that are too small; in these cases, I include control firms from an additional three-digit NAICS category. Specifically, I add 622 (hospitals) to the caretaking cohort, and 713 (amusement, gambling, and recreational industries) to the homeshare and food delivery cohorts.

2014). For each cohort, I identify the year of the earliest significant, relevant public event to reflect the emerging threat of the SE.

My measure of SE market entrance does not perfectly capture SE emergence, as the non-physical nature of the SE makes identification of market emergence challenging (e.g., Arcidiacono et al. 2020). Other SE studies generally examine individual SE firms or categories and are often limited to specific jurisdictions, allowing more detailed analysis of entrance (e.g., Zervas et al. 2017; Barrios et al. 2022; Ellis et al. 2022). Because I consider many different types of SE firms across the U.S., identification of dates such as launch dates by jurisdiction is untenable. Despite these limitations, the public event year identification has a number of benefits. First, the public event tends to affect all SE firms within the cohort. Second, the public event generally occurs several years following each SE firm's founding, which allows time for firms to become viable competitors.[13] This approach is conservative, in that choosing a later event date likely biases against finding support for my hypothesis. Finally, for cohorts with firms that lobby, the public event years are all within two years of the earliest date at which an SE firm within the cohort begins lobbying the federal government, which provides some validation that my event years reflect a point in time when the specific SE firms have emerged as competitive threats. In a robustness test, I use a different set of dates based on cash funding in order to address some of the limitations of my main approach to identifying market entrance (Section 5.3.3). I continue to find an increase in tax planning following SE competitive emergence.

3.3. Income Tax Planning: Sample and Empirical Design

3.3.1. Sample Selection

I limit my sample to the years 2001 through 2019; beginning in 2001 allows for several

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[13] For example, while Grubhub began as a website of menus in 2004, it only began acting as a food delivery business in 2014.

years of data before the rise of most SE firms, and ending in 2019 avoids complexities that were

introduced in 2020 due to the COVID-19 pandemic, which greatly impacted many SE firms

(e.g., Abril 2020; Morshed et al. 2021). Detailed sample selection steps are listed in Table 1. My

sample is composed of non-SE U.S. firms from the Compustat database; I split this sample into

individual cohorts based on NAICS classification. Within each cohort, I retain three years before

the year of market entrance and three years including and following entrance. Limiting each

cohort to a constant window is akin to an event study design (Wing 2021). I choose a three-year

window to balance having enough years to capture an effect while also preserving as much of the

post-event period within the sample as possible.[14] I drop firms that switch between treatment and

control groups within the sample window, which occurs if a firm experiences a change in NAICS

classification across these groups. To ensure "clean" control groups, I also exclude control firms

that are treated within a different cohort (Barrios 2021; Baker et al. 2022).[15] I further restrict my

sample to profitable firms with all variables needed for the test of my hypothesis. Focusing on

only profitable firms both allows for straightforward interpretation of my tax planning measures

and ensures my sample is limited to a subset of firms that can potentially compete by generating

cash through tax planning (Hanlon et al. 2023). Finally, I ensure that all firms have at least one

observation in both the pre- and post-event periods.

3.3.2. Empirical Design

To test my hypothesis, I primarily rely on the following stacked DiD model, with

standard errors clustered by firm (Wing 2021):

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[14] The bike share and grocery delivery cohorts have truncated post periods; results are robust to their exclusion.
[15] A firm falls into both a control group and a treated group when, within a three-digit NAICS group, there are four-digit NAICS codes that are treated in different cohorts. Such overlaps occur between the homeshare and gig cohorts and between the ridesharing and bike share cohorts. The presence of repeated control firms across cohorts is common in stacked DiD studies (Wing 2021).

$$TaxPlan\_Cash_{i,t} = \alpha + \beta_1 Treat_i * Post_t + \gamma Controls_{i,t} + \textit{Firm-Cohort Fixed Effects}_i + \textit{Year-Cohort}$$

$$\textit{Fixed Effects}_t + \varepsilon_{i,t}, \tag{1}$$

where *TaxPlan_Cash* is an adjusted effective tax rate (ETR) measure from Atwood et al. (2012),

calculated as the difference between expected taxes (pre-tax income times statutory income tax

rate, τ) and cash taxes paid, as a percentage of pre-tax income (De Simone et al. 2023).[16, 17] This

variable captures cash tax planning by measuring the current tax burden relative to the expected

amount based on the statutory tax rate, and is preferable to a conventional ETR measure in my

setting because it accommodates the change in U.S. tax rates beginning in 2018 following the

Tax Cuts and Jobs Act (TCJA).[18] *TaxPlan_Cash* increases with tax planning; thus, if incumbent

firms respond to SE entrance by increasing tax planning, β_1 will be positive.

The incumbent-firm effect of SE market entrance is captured by the interaction between

Treat and *Post*, which constitutes my DiD variable. *Treat* is equal to 1 for any treated firm, as

defined in Section 3.1. That is, treated firms are non-SE firms in industries that likely experience

competitive effects due to SE emergence. *Post* is equal to 1 starting with the event year identified

in Table A1 within each SE cohort. Because SE firms enter the market in different years, *Post* is

staggered across time for the different cohorts. While staggered treatment effects can aid in

empirical identification, recent studies demonstrate significant weaknesses of traditional DiD

regressions with two-way fixed effects (e.g., Barrios 2021; Sun and Abraham 2021; Baker et al.

2022). Such regressions often suffer from "bad comparisons," especially when treatment effects

are staggered (as in my setting) and the treatment effect is heterogeneous. Baker et al. (2022)

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[16] I limit *TaxPlan_Cash* to firms with positive pre-tax income. I examine firms with negative pre-tax income in Section 5.3.2.
[17] An equivalent way to calculate *TaxPlan_Cash* is [(*pi* x τ)/*pi*] - cash ETR, where cash ETR = *txpd*/*pi*. I winsorize the cash ETR portion to (0, 1). I winsorize all other continuous variables at the 1st and 99th percentiles.
[18] In untabulated tests, I find that my results are consistent when using traditional ETR measures and limiting my sample to the years prior to 2018.

state that dynamic treatment effects are the most reasonable default assumption in many economic settings, and I expect this assumption to hold in my setting. Thus, my study is vulnerable to bias under a traditional two-way fixed effect DiD.

Because of these issues, I use a stacked DiD design, which uses event-specific datasets of treated and "clean" control firms for each cohort (Cengiz et al. 2019; Wing 2021; Baker et al. 2022). I create variables to identify each cohort, then stack the cohorts to form my full, stacked database. Cohort-firm and cohort-year fixed effects subsume the individual effects of *Treat* and *Post*, respectively. Thus, the DiD design allows me to compare changes in tax planning for treatment firms to changes for control firms, controlling for overall trends over time. Importantly, the stacked DiD design is theoretically the same as a traditional generalized DiD design, with the key difference that by creating cohort-specific groupings, I ensure that the treated firms within a cohort are compared to control firms within that same cohort, and no control firms are ever treated within my sample period. The stacked DiD design also has the benefit of allowing for heterogeneity in the treatment effect across cohorts.

In addition to fixed effects, I include controls common to the tax planning literature. These include firm size (*Size*), profitability (*ROA*), leverage (*Leverage*), R&D expense (*R&D*), intangibles (*Intangibles*), property, plant, and equipment (*PPE*), capital expenditures (*Capex*), special items (*Special*), advertising expense (*Advert*), market-to-book (*MTB*), net operating loss (*NOL*), change in *NOL* (*ΔNOL*), and multinational status (*MNC*) (e.g., Gupta and Newberry 1997; Rego 2003; Chen et al. 2010; McGuire et al. 2012). Variables are defined in Appendix B.

IV. RESULTS

4.1. Descriptive Statistics

I present descriptive statistics in Panel A of Table 2. 19.8 percent of my sample is treated

(*Treat*). *TaxPlan_Cash* is positive, indicating firms in my sample, on average, pay lower taxes than the statutory rate would imply (De Simone et al. 2023). Sample firms are large, with over $1.25 billion of assets on average. All have positive income and report an average return on assets (*ROA*) of 5.2 percent. Other tax planning variables are in line with those in prior literature (e.g., Dyreng et al. 2010; Kubick et al. 2016).

Panel B presents descriptive statistics by *Treat* for my hypothesis test. I do not find that the treated firms are significantly different in size than the control group; however, I do find that the treated firms are significantly different along many of the tax planning controls, such as ROA, leverage, R&D, intangibles, and PPE. While these samples are different on many dimensions, the key assumption for a DiD model is that the average change in outcome variables, but for the treatment, is the same across treatment and control groups. I address this assumption through "parallel trends" analysis, and in robustness tests entropy balance across groups to mitigate potential concerns about covariate imbalances (Section 5.3.1).

4.2. Test of Hypothesis: Income Tax Planning of Incumbent Firms

Table 3 presents results of estimating equation (1) in a stacked DiD to examine the tax planning of incumbent firms in response to SE emergence. I find that incumbent peer firms increase their cash tax planning following a major public event that increases the salience of the SE, relative to firms in industries not likely affected by the SE. The coefficient on *Treat x Post* is significantly positive ($\beta_1 = 0.081$, $t = 4.608$), consistent with my hypothesis that incumbent firms increase their tax planning to generate cash in response to SE-induced competitive threats. Further, the increase in cash tax planning is economically meaningful, and equates to an estimated $5.29 million in cash tax savings relative to control firms.[19] These results bolster the

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[19] A coefficient of 0.081 suggests that treated firms' tax planning increases 8.1 basis points following SE emergence, relative to the change for control firms. While this is large, the standard deviation of *TaxPlan_Cash* is also large at

argument that incumbent firms perceive SE emergence as a true competitive threat.[20]

An increase in tax planning could imply that in equilibrium (i.e., before the competitive shock), firms were not taking advantage of all tax-planning opportunities. This inference is not new; in fact, a long stream of literature has attempted to explain the "undersheltering puzzle" (Weisbach 2002; Hanlon and Heitzman 2010; Campbell et al. 2021). Related studies suggest many possible reasons for undersheltering, including management practices, preferences, and incentives; investment opportunity sets; and capital market pressures (e.g., Mills 1998; Desai and Dharmapala 2006; Atwood et al. 2012; McGuire et al. 2014). Overall, ample evidence suggests that outside events can induce firms to increase tax planning (e.g., Cheng et al. 2012; Khan et al. 2017; Ayers et al. 2018; Armstrong et al. 2019; Chen, Huang, Li, and Shevlin 2019; Gallemore et al. 2019; Ege et al. 2021).

4.3. Parallel Trends and Timing

Next, I jointly examine both the validity of the parallel trends assumption of DiD regressions and the timing of the tax planning increase. The parallel trends assumption is that without a treatment, the change in the dependent variable would have been the same for both the treatment and control groups (Roberts and Whited 2013). To test this assumption, I replace *Post* in equation (1) with event-year indicators, omitting year $t-1$ to avoid perfect multicollinearity. Table 4 and Figure 1 present the results of this test. *Treat x Year* begins to be significantly positive in the public event year (t), which is consistent with the parallel trends assumption holding in my analysis of tax planning.

0.214, suggesting a shift in tax planning of just over one-third of a standard deviation. I calculate the cash savings by multiplying the coefficient of 0.081 by the mean pre-tax income in the sample of $65.33 million. Edwards et al. (2016) find that cash savings from increases in tax planning due to financial constraints range from $3.82 to $5.15 million; thus, my estimate of $5.29 million is similar. The somewhat larger magnitude could be reflective of the highly disruptive nature of SE emergence and the anticipation of long-run competitive threats.

[20] Because financial firms are regulated and have different incentives than do nonfinancial firms, as a robustness test I exclude the PTP lending cohort. I continue to find evidence of an increase in cash tax planning (untabulated).

This analysis also sheds light on the timing of the tax planning increase, both leading up to and following the event year. First, the significant change in the event year suggests that tax planning can be implemented quickly and thus is a timely competitive response (Cook et al. 2008; Leone 2008; Scheffel Boyle 2019). Second, the years following the event provide insight into the length of the competitive response. While firms need cash to fund either short- or long-term effects, my expectations are in line with predominantly long-term effects. Incumbent firms have historically not been able to successfully beat out competition from the SE through pricing wars due to SE firms' operational efficiencies and typically strong cash funding from investors (e.g., Cramer and Krueger 2016; Richter 2017). Further, the SE is fundamentally disruptive to industries, changing norms and expectations, and with these, firm strategies (e.g., Guttentag 2015; Leaphart 2016). Recent examples of continuing competition include ongoing legal battles with ridesharing companies (Rana 2021), Hilton's advertising campaign against homesharing businesses (O'Neill 2022), changes in how caretaking firms interact with gig workers (Kaplan and Hoff 2021; Evans 2023), and continuing merger and acquisition activity involving PTP finance firms (Wang and Melican 2022; Morgenroth 2023). Even if some individual SE firms are unable to maintain a long-term competitive presence, fundamental changes persist. Consistent with expectations of long-term threats, I find that the increase in tax planning persists for at least three years including and following the shock. The multi-year effect further supports that SE firms are inherently disruptive to their respective markets and that incumbent firms, on average, view SE emergence as a long-term competitive threat.

4.4. Cross-Sectional Tests

4.4.1. Other Cash Sources

I expect that firms use tax planning as a competitive response primarily to generate cash,

which is crucial in a competitive setting. I provide support for this mechanism in cross-sectional tests that examine whether the tax planning response is associated with pre-period cash flows or opportunities to generate cash through decreasing dividends or increasing debt. Firms with low dividends or high debt prior to SE emergence likely have limited scope for further capital structure changes as a means of generating cash. Therefore, I predict a stronger tax planning response among firms that lack other cash sources through the form of operating cash flows or capital structure alterations, relative to firms with such cash sources.[21]

To test this prediction, I interact my DiD variable with an indicator for firms that lack other cash sources (*OtherCashSource*) in the form of having low operating cash flows (*LowCFO*), low dividends (*LowDiv*), or high debt (*HighDebt*) in the pre-period, based on tercile distributions. I present the results of this test in Table 5.[22] I find that firms with weaker pre-period operating cash flows and higher pre-period debt incrementally increase their tax planning following a competitive shock. Specifically, the coefficient on *Treat x Post x OtherCashSource* is positive and significant in columns (1) and (3). A stronger tax planning effect for firms with weaker pre-period operating cash flows suggests tax planning is motivated by cash needs, and a stronger effect for firms with high pre-period debt is consistent with lower capacity to generate cash by incurring new debt.[23] While I do not find that the tax planning response differs for firms with low dividends in column (2), the lack of significant change in tax planning due to dividend-decreasing opportunities is consistent with the documented reluctance to decrease dividend payouts (e.g., Myers 1984). Across each model, I continue to find a consistent main result. In

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[21] That is, my approach is to first show that SE emergence affects incumbent firm tax avoidance (Table 3), then provide evidence that other cash sources and cash tax planning opportunities (see Section 4.4.2) act as moderators (Table 5 and 6).
[22] I omit *Treat x OtherCashSource*, as this interaction is fully subsumed by the firm-cohort fixed effects.
[23] Consistent with this argument, I find an increase in leverage following SE-induced competitive threats for firms with low debt (untabulated).

summary, the results suggest firms respond to SE-induced competitive threats through increased tax planning, and do so to a greater degree when they lack other key cash sources.

4.4.2. Cash Tax Planning Opportunities

Next, I examine whether firms with available tax planning opportunities exhibit incrementally greater tax responses to competitive threats from SE emergence. Empirical evidence suggests tax planning opportunities influence the relation between tax planning and incentives to avoid taxes (Wu 2018). Therefore, both incentives and opportunities are important factors in tax planning strategies.

I identify firms with opportunities for tax planning as those that are in the lowest tercile of *TaxPlan_Cash* in the pre-event period (*TaxPlanOpp*). These firms presumably have greater room to increase their tax planning following the competitive shock, especially if changes to the competitive environment create or prompt firms to reevaluate tax planning opportunities. I test whether these firms incrementally increase their cash tax planning following SE emergence by interacting the indicator variable *TaxPlanOpp* with my DiD estimator.[24] In Table 6, I find that cash tax planning increases for treated firms following SE emergence (*Treat x Post*), consistent with my main results. Furthermore, the tax planning effect is incrementally greater for treated firms with low pre-period levels of tax planning (*Treat x Post x TaxPlanOpp*). Overall, these results are generally suggestive of the following interpretation: incumbent firm cash tax planning increases following SE-induced competitive threats, and this effect is incrementally greater when incumbent firms likely have tax planning opportunities.[25]

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[24] *Treat x TaxPlanOpp* is fully subsumed by the firm-cohort fixed effects, and so is omitted.
[25] These cross-sectional tests provide evidence of an *incremental* effect beyond treatment status. That is, I provide evidence of stronger results within the subsets of firms that I expect have greater incentives or opportunities to increase tax planning as a competitive response.

4.5. Income Tax Planning by Cohort

While the specifics of the competitive threats vary across cohorts (Appendix A), I predict that across all cohorts, firms increase tax planning to generate cash in response to the disruptive competitive threat. However, there is likely variation in the strength of effects due to details of the competitive threats in each cohort. I do not make ex-ante predictions about how the effects of the competitive threats on tax planning might differ across these cohorts due to the lack of extant literature about each specific type of competitive threat. On the contrary, I view as a contribution of my paper the expectation of an increase in cash tax planning across many industries even when the details of these competitive threats differ. To provide more insight into the cohort-specific effects, however, I re-examine my main tax planning test within the individual cohorts.

I present the results of equation (1) within each cohort in Table 7. As in the stacked DiD design, I examine the change in tax planning in affected incumbent firms compared to the change for firms that are in similar but unaffected industries. I find that within the PTP lending, ridesharing, caretaking, and food delivery cohorts, incumbent firms significantly increase their cash tax planning as a competitive response. While all DiD estimator coefficients are positive, I do not find significant results in the homeshare, gig, bike share, or grocery delivery cohorts.[26] While the lack of significance in the homeshare cohort is particularly surprising, I note that I do find a significant increase for this cohort within the cross sections of firms that lack other cash sources or have tax planning opportunities (untabulated).[27]

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[26] The lack of significance in the gig, bike share, and grocery delivery cohorts could reflect econometric limitations and/or institutional details. The bike share and grocery delivery cohorts each have truncated post periods, limiting my ability to find an effect. The lack of results is also consistent with weaker evidence of competitive effects, as well as the possibility that these SE firms contribute to an increase in the "size of the pie" of the respective market (Appendix A).

[27] Substantial anecdotal and empirical evidence demonstrates significant competitive effects from homesharing on the accommodations and hospitality industries, motivating my deeper analysis within this cohort (Zervas et al. 2017; Barrios et al. 2022; Ellis et al. 2022). Specifically, I find that within the homesharing cohort, treated firms experience a marginal increase in cash tax planning following SE emergence when they have low pre-period cash

V. ADDITIONAL TESTS

In additional analyses, I examine other tax and non-tax effects associated with SE-induced competition. First, I shed light on specific types of tax planning and changes in tax rate volatility; second, I investigate nontax, investment-related outcomes.

5.1. Characterizing the Tax Planning

5.1.1. Tax Planning Types: Aggressive or GAAP-affected

If firms take on additional tax planning, a natural question is whether these new strategies are more aggressive strategies that, prior to the competitive shock, were considered too costly (Slemrod and Yitzhaki 2000). Firms will adopt more aggressive tax strategies as they increase tax planning if firms use the "safest" tax planning strategies first, before moving to more aggressive strategies (Dyreng et al. 2019). As cash becomes more valuable in response to competitive threats from the SE, firms could be more likely to be willing to shoulder the burden of the higher costs of aggressive tax planning (e.g., Scholes et al. 2020). However, evidence also exists that firms do not take advantage of all available tax planning activities, even non-aggressive ones, and that one possible reason for forgoing tax strategies is because of the high costs of choosing the strategies (Weisbach 2002; Campbell et al. 2021). In this case, if a shock increases a firm's awareness of and willingness to pursue tax planning opportunities, then tax planning increases will not necessarily be more aggressive.

To test whether tax aggressiveness increases following SE competitive threats, I replace *TaxPlan_Cash* with two proxies for more aggressive tax planning: the presence of tax havens

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flows from operations or low pre-period tax planning. I also find a significant effect when I instead use the earlier date of 2010, the year in which Airbnb secured its Series A funding (Section 5.3.3). One possible explanation of these findings is that my identification of the relevant SE emergence year based on public event dates is too late for the homesharing cohort, such that only those firms that have not yet taken advantage of tax planning opportunities or that have outstanding cash flow needs respond with further tax planning. I do not tabulate cross-sectional tests across cohorts, however, because the small sample sizes of some of the cohorts limit interpretation.

(*TaxHaven*) and the likelihood of tax shelter usage (*ShelterScore*). *TaxHaven* is equal to one if a firm has material operations in a country considered to be a tax haven, as indicated in exhibit 21 of form 10-K, and zero otherwise (Dyreng and Lindsey 2009). *ShelterScore* reflects the probability of tax sheltering based on Lisowsky (2010). The results of this test are presented in Panel A of Table 8. While the DiD coefficient is positive, it is not significant at conventional levels.[28, 29] Therefore, my results do not indicate that following SE-related public events, incumbent peer firms utilize more aggressive tax planning strategies. These results are consistent with anecdotal and empirical evidence that firms often have non-aggressive forms of tax planning available to them (Leone 2008; Edwards et al. 2016). A shock, such as the emergence of the SE, can shift attention to such strategies.

To provide further evidence on the type of tax planning that firms use, I replace *TaxPlan_Cash* with *TaxPlan_GAAP*, which measures tax planning based on tax expense reported in the financial statements. As demonstrated in Panel B of Table 8, I do not find evidence of a significant change in firms' GAAP tax planning. The lack of results when using GAAP tax planning, combined with the significant increase in cash tax planning, further supports the argument that firms use tax planning to respond to competitive threats primarily as a means of generating cash. These findings also suggest that firms primarily use deferral-based tax planning strategies to respond to new competitive threats, consistent with the findings of

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[28] I also do not find an increase in shelter probability using the Wilson (2009) measure. The lack of significance on these variables might also be because the Lisowsky 2010 (Wilson 2009) variables are based on tax shelters prior to 2005 (2003), and the first SE emergence year in my sample is 2008.

[29] A lack of significant change could result if firms within my sample industries do not generally have tax haven or sheltering activities. I separately examine *TaxHaven* and *ShelterScore* across two-digit NAICS industries within my sample. Two industries do not exhibit haven activity: NAICS 44 (subset of grocery delivery cohort) and 81 (subset caretaking cohort). When I remove these industries, I still do not find a significant change in tax haven use for treated firms following SE emergence. I also reexamine the *ShelterScore* tests by removing industries with average shelter scores lower than the sample average. Again, I do not find significant evidence of a change.

Edwards et al. (2016).[30] In equilibrium (i.e., outside of a competitive shock), firms tend to

prioritize tax planning that provides financial benefits (Robinson et al. 2010; Armstrong et al.

2012); thus, the deferral-based tax strategies are more likely to be available as opportunities for

firms to *increase* cash tax savings in a timely manner when faced with a shock such as a new

competitive threat.[31] Overall, my results suggest that firms utilize non-aggressive tax planning

mechanisms that prioritize cash benefits.

5.1.2. Tax Persistence

I next examine the effects of SE-induced competitive threats and new tax planning on tax

persistence, measured using tax volatility. Tax volatility will increase if firms' additional tax

planning strategies are subject to greater scrutiny by tax authorities and thus reflect more

uncertainty (Phillips et al. 2003; Erickson et al. 2004; Neuman et al. 2020). This reasoning is in

line with Dyreng et al. (2019), who demonstrate that firms with the highest levels of tax planning

bear greater tax uncertainty. On the other hand, however, Guenther et al. (2019) demonstrate that

incremental tax planning is not necessarily associated with more uncertainty. The latter is likely

the case if firms increase their awareness of additional opportunities to tax plan or if additional

opportunities arise following a shock such as SE emergence (Omer et al. 2012; Higgins et al.

2015). Further, many firms prioritize tax sustainability or persistence through low tax volatility

as a key aspect of their overall tax strategy (Neuman 2023). If tax sustainability becomes more

important following SE competitive threats, perhaps to counteract overall uncertainty, then tax

volatility could instead decrease. To test incumbent firm tax volatility, I replace the dependent

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[30] In an untabulated test, I find evidence of an increase in deferred tax expense as a percentage of pretax income for firms that increase their tax planning following SE-related competitive threats.
[31] The use of deferral-based tax strategies might seem incongruent with tax planning as a persistent response to expectations of long-term competition. It is possible that firms use deferral-based strategies as an immediate response, and with time adjust their tax strategies to sustain the new, lower levels. The question of *how* firms sustain high levels of tax planning continues to be a subject of interest and debate in the literature (Mills 1998).

variable in equation (1) with *TaxPlanVol*, which is the three-year volatility of *TaxPlan_Cash*.[32,] [33] I include the same control variables from equation (1); based on the tax volatility literature, I also add controls for the volatility of performance (*Vol(ROA)*), of special items (*Vol(Special)*), and of cash flows (*Vol(CFO)*) to capture the volatility of the underlying economic environment; discretionary accruals (*Disc_Acc*) to control for the effects of potential accounting adjustments; and the excess tax benefit of stock options (*ETBSO*) and volatility of *ETBSO* (*Vol(ETBSO)*), which can affect rate volatility (Guenther et al. 2017).

I present my results for this test in Table 9. I find that SE emergence is associated with a decrease in tax volatility (column (1)). I then add an interaction with an indicator variable equal to one for firms that increase tax planning in response to SE emergence (*IncrTaxPlan*), and I find that the decrease in tax volatility is concentrated in these firms (column (2)). These results are consistent with findings in the literature that demonstrate the persistence of tax planning, even at high levels, and suggest that sustained levels of tax planning might become more important in the face of SE competitive threats (Dyreng et al. 2008; Guenther et al. 2017; Neuman 2023). These results further suggest that incumbent firms view the SE as a long-term threat that is fundamentally disruptive to the business environment.[34]

5.2. Investment Outcomes

Next, I explore key non-tax outcomes. This analysis serves two purposes: first, it

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[32] Results are consistent if I instead use a three-year cash ETR volatility, limited to pre-TCJA years (Guenther et al. 2017; Drake et al. 2019; Guenther et al. 2019).

[33] A limitation of *TaxPlanVol* is that by using a backward-looking volatility measure, pre-event features are included in post-event volatility. To alleviate concerns about potential bias and to aid interpretation, in an untabulated robustness test I create an alternative measure that separately reflects volatility in the pre-event period and in the post-event period, with no overlap. My results are consistent using this alternative measure.

[34] I also examine changes in firms' uncertain tax benefits (UTBs), which reflect management perceptions of uncertainty (measured as *txtubposinc*/*at*). I do not find significant evidence of a change in UTB additions following SE emergence, either on average or within firms that increase their cash tax planning in response to the SE (untabulated).

provides some validation of disruption by the SE, and second, it gives insight into how firms might use the cash they generate from tax planning.

Cash is beneficial in a competitive setting in many ways (Frésard 2010); while not all uses of cash can be readily measured empirically, I examine firm investments in R&D, acquisitions, capital expenditures, and the labor force, which can be significantly affected by both competition and cash holdings. I predict an increase in incumbent firm R&D. Although firms could decrease R&D to increase profits and save cash in the short run (Darrough and Rangan 2005), R&D is a key competitive response that can differentiate a firm's products in response to competition, which is likely to be especially important in the inherently innovative SE setting (Li 2011; Gu 2016; Kim et al. 2021). I do not make directional predictions for the other investment outcomes. Both acquisitions and capital expenditures have been shown to be associated with the internal cash flows generated by cash tax planning (Mayberry 2012; Frésard and Valta 2015; Edwards et al. 2016). However, while evidence exists of incumbent firms acquiring companies to preempt future competition (Cunningham et al. 2021), it is less clear whether incumbents acquire firms that *already* present a disruptive competitive threat that strains firms' cash flows. Similarly, evidence of competitive effects on capital expenditures is mixed (e.g., Frésard and Valta 2015). Finally, while competition can dampen employment (Guadalupe and Wulf 2010; Glaeser et al. 2023), an R&D response could counteract a dampening effect if an increased focus on R&D leads to greater employment.

I test my predictions within a stacked DiD with *R&D*, *Acquisitions*, *Capex*, and *Labor* as dependent variables. I control for variables that have been shown to influence investment and firm responses to competition, with slight differences based on the dependent variable (e.g.,

Giroud and Mueller 2010; Xu 2012; Edwards et al. 2016; Kim et al. 2021).[35] I present my results

in Table 10. I find the coefficient on *Treat x Post* is significantly positively associated with *R&D*

and *Capex* (columns (1) and (3), respectively), suggesting incumbent firms increase R&D and

capital expenditures on average following SE emergence.[36] This finding adds motivation for a

cash financing need, and provides greater validity to the expectation that incumbent firms view

the SE as long-term competitive threats. I do not find significant changes in acquisition

expenditures or in employee counts, perhaps reflecting conflicting competitive effects.[37]

5.3. Robustness Tests

5.3.1. Entropy Balancing

While the key assumption of DiD designs is that of parallel trends, I also address

concerns about differences between my treatment and control groups through an entropy

balancing approach. Using the sample and controls from my hypothesis test (equation (1)), I

entropy balance covariates on the first two moments and with a tolerance of less than 0.015

(Hainmueller 2012; Hainmueller and Xu 2013).[38] The result of my hypothesis test (Table 3)

continues to hold and is consistent whether I entropy balance on the pre-period only, post-period

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[35] Across all models, I control for sales growth (*SalesGrowth*), market capitalization (*MVal*), market-to-book (*MTB*), property, plant, and equipment (*PPE*), intangibles (*Intangibles*), market concentration (*HHI*), and volatility of industry sales (*Vol(Ind_Sales)*). I also control for capital intensity (*CapInt*) in all models except when the dependent variable is *Capex* (columns (1), (2), and (4) of Table 10). I include an indicator variable for firms that are missing R&D (*Missing_R&D*) when the dependent variable is *R&D* (column (1)). Finally, I add controls for cash flows from operations (*CFO*), returns (*Return*), and leverage (*Leverage*) when the dependent variable is *Acquisitions* or *Capex* (columns (2) and (3)). Variables are defined in Appendix B.

[36] While investments in R&D can mechanically increase *TaxPlan_Cash* due to the tax-preferred nature of R&D, this relation does not appear to drive my main cash tax planning results. In my hypothesis test (Table 3), R&D is not a significant determinant of cash tax planning; further, in an untabulated path analysis I do not find these to be significantly related.

[37] I also examine whether firms experience changes in revenue or ROA, modifying equation (1) to exclude ROA as a control. I do not find an on-average significant change in revenue or ROA for treated firms following SE emergence, suggesting my tax planning results are not driven by a denominator effect. Demonstrating a loss in revenue is not necessary for firms to turn to tax planning to increase cash, as firms that effectively use cash tax planning might be able to use the generated cash in a way that allows them to retain revenue.

[38] In my main tests, I balance each cohort before stacking. If I loosen this restriction by balancing the full dataset after stacking the cohorts, then I am able to entropy balance the covariates on the first three moments with a tolerance of less than 0.001. Either way, my results are consistent.

only, or across the entire sample (untabulated).

5.3.2. Loss Firms

Consistent with most extant research on tax planning, I focus my main analyses on profitable firms. As an additional test, I examine effects within a separate sample of 699 loss firm-years. Given loss firms generally do not pay federal income taxes and so cannot decrease tax payments to generate more cash, I do not expect loss firms to use tax planning as a competitive response. Consistent with this expectation, I do not find a significant effect on tax planning when estimating equation (1) within the loss firm sample (untabulated).

I also examine investment outcomes within loss firm-years. My sample size for the investments analysis decreases to 485 firm-years; because of this small size, I create a combined investment variable equal to the sum of R&D, acquisitions, and capital expenditures (Edwards et al. 2016). I find a significant decrease in combined investments for treated loss firms, relative to control firms, following SE-induced competitive threats (untabulated). I also find that the effect on investments is significantly more negative for loss treated firms than for profitable treated firms. These results are consistent with loss firms suffering more from the competitive effects of SE disruption because they are not able to use tax planning to generate cash and fund investments (Hanlon et al. 2023).

5.3.3. Alternative Event Dates and Placebo Test

To address some of the limitations of my current event dates, I test for an increase in cash tax planning using an alternative set of event dates: the dates of early cash infusions within each cohort. Because cash infusions are objectively positive events for the SE firms, this choice of event date mitigates concerns about results being affected by whether the public event dates helped or hindered the SE. Specifically, I use the dates of Series A funding for SE firms within

each cohort, using data from Crunchbase. At Series A funding, a firm typically is still in an early stage of its life cycle, but is advanced enough that the business is at least more than merely an idea, and thus more likely to be perceived as a significant competitive threat. I choose the funding dates of the earliest SE firm within each cohort that appears to be a functioning SE business by its Series A date, listed in column (5) of Table A1.[39] I continue to find that on average, tax planning increases for treated incumbent firms following these SE-induced competitive threats (untabulated). Within cohorts, I find that tax planning increases within PTP lending, ridesharing, homesharing, and grocery delivery, as well as for food delivery where there is room for increased tax planning. Therefore, my results are robust to a plausible alternative set of event dates; further, the lack of results in my main tests within the miscellaneous gig and bike share cohorts do not appear to be due to event dates possibly reflecting events that were detrimental to the SE firms themselves.

The use of cash funding dates is not itself a perfect identifier of when SE firms present salient competitive threats. Because cash funding happens in series rather than all at once, judgment is still required in identifying which round of funding to use. Cash funding also affects only one SE firm at a time, rather than the entire cohort of SE firms, again requiring judgment as well as possibly weakening the competitive effects. For this latter reason especially, I use public event dates for my main tests, as these reflect events that affect the SE cohorts as a whole, and I present the cash funding dates as an important robustness test.

I also use alternative event dates to conduct a placebo test, in which I ensure that my

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[39] These dates also require some researcher subjectivity. While Prosper Marketplace achieves its Series A funding in 2005, it is not yet open to the public in that year, while LendingClub receives its funding and is active in 2007. Further, Zipcar achieves its funding in 2002, but the ridesharing disruption begins in earnest when Turo, Uber, and Lyft all receive their major funding rounds in 2010-2011. Further, Vrbo is founded before Airbnb, but never receives traditional funding and is later acquired by Homeaway. Finally, while GrubHub receives Series A funding in 2007, it is not functioning as a food delivery company until 2014.

entire *POST* period finishes in the year before the earliest SE firm's founding date. Consistent with tax planning responding to SE-induced competitive threats, I do not find a significant change in cash tax planning using event dates before the SE firms were founded (untabulated).[40]

5.3.4. Treated Firms

In an alternative specification, I identify treated firms based on similarities in 10-K product descriptions to public SE firms, utilizing textual analysis data from Hoberg and Phillips (2010, 2016). I find that income tax results are generally consistent, though at times weaker, within this group. However, this classification tends to be noisier in my setting and results in smaller treated samples. In further robustness tests, I set *Treat* equal to one for any firm that is identified as a peer firm through product market descriptions *or* due to industry classification, which decreases the risk of misclassifying treated firms as control firms. These findings demonstrate results consistent with my main hypothesis test (untabulated).

VI. CONCLUSION

Due to the many operational advantages of the SE, its emergence presents a disruptive competitive threat to incumbent firms, including to their cash flows. I demonstrate that incumbent firms respond to the salient threat of the SE with an increase in tax planning, and that this effect persists for at least three years, consistent with the long-term competitive effects of the SE. I demonstrate stronger tax planning effects among firms with fewer outside cash-generating opportunities (i.e., firms with weaker pre-period operating cash flows or with less ability to incur additional debt) and for firms that likely have greater opportunities for additional tax planning

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[40] Earliest SE firm founding years: PTP Lending: 2005 (Prosper Marketplace). Ridesharing: 2009 (Uber; Zipcar was founded in 2000, but I use 2009 due to data limitations in early years). Homeshare: 2006 (Vrbo; founded in 1995, but I use the year it was acquired in 2006 due to data limitations in early years; Airbnb was founded in 2008). Caretaking: 2006 (Care.com). Gig (misc.): 2008 (Task Rabbit). Food delivery: 2013 (DoorDash; GrubHub was founded in 2004, but did not start deliveries until 2014). Bike share: 2011 (Spinlister). Grocery: 2012 (Instacart).

strategies. I also provide evidence of tax planning within specific cohorts. In additional tests, I do not find significant changes in tax aggressiveness measures or financial reporting-related tax planning; I do, however, find evidence of a decrease in tax volatility, consistent with an emphasis on sustained tax planning in response to fundamental threats from the SE. Finally, I provide evidence of an increase in certain non-tax investments following SE-induced competitive threats, validating the competitive threat and motivating the need for cash tax planning. Overall, my results suggest that following SE-induced competitive shocks, incumbent firms use cash tax strategies to generate cash as a competitive response.

I contribute to the literature by demonstrating a tax response to a non-tax form of competition; specifically, that firms use tax planning to generate cash in the face of competitive threats from new, disruptive firms. In doing so, my evidence provides insight into how firms might use tax strategies to respond to other sources of innovative business models, even across a variety of industries. Finally, my research on SE effects contributes to the nascent literature on SE emergence, which has become increasingly relevant in recent years (e.g., Barrios et al. 2022; Ellis et al. 2022). By demonstrating tax effects on incumbent firms affected by the SE, my results should be of interest to tax authorities and regulators in responding to new business models and closing the tax gap.

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Appendix A. Detailed SE Cohort and Sample Descriptions

In this Appendix, I give a narrative description of treated industries and of the specific competitive threats within each cohort, corresponding to Table A2. Further details are included in Tables A1 through A3.

PTP Lending
In PTP lending, individuals lend money to one another through an online intermediary. For borrowers, PTP lending can take the place of traditional sources of credit or cash, such as credit cards, retail credit, student loans, and payday loans. I include these traditional sources of financing as treated firms.

Competitive threats to incumbents: Treated firms face a threat to liquidity. PTP lending threatens a loss of lending volume and interest revenue from borrowers who turn to PTP platforms for easier borrower-to-lender matching and quicker loan approval (Schumpeter 2013; Wolfe and Yoo 2017). Further, incumbents risk losing potential depositors to PTP loans, which increases the cost of deposits (interest expense) for incumbents (Farag et al. 2019). While some PTP loans are new loans that expand borrowing availability, a substantial portion substitutes for commercial bank loan volumes (Schumpeter 2013; Wolfe and Yoo 2017).

Rideshare
Ride and carsharing technological platforms facilitate connecting individuals to drivers and car owners seeking to rent their driving services or cars, respectively. Industries affected by ridesharing are rental cars, taxis, and public transportation (Erhardt et al. 2019). Because many firms within these industries are private, I also include other industries that are likely affected by the emergence of ridesharing. These include automobile manufacturing and support activities for road transportation, which include services such as towing.[42]

Competitive threat to incumbents: Incumbent taxi and rental car companies face competitive threats to their market share and liquidity. The SE business model enables ridesharing companies to circumvent many traditional regulations, utilize efficient driver-passenger matching technology, and operate a large scale of drivers while flexibly scaling to changes in demand (Cramer and Krueger 2016). The dramatic increase in the supply of drivers by ridesharing, combined with extensive investor cash funding, pushes down per-ride prices and undercuts incumbents (Richter 2017). The increase in supply also contributed to the near collapse of the medallion system, greatly increasing the risk of default by taxi drivers (Katz 2018; Williams 2018; Rosenthal 2019). Similarly, rental car companies experience competitive threats to their demand through both lower rental volume and lower rental rates, which further threatens their ability to repay loans (Richter 2017; McGinnis 2018). Car manufacturers also experience threats to their demand, as volume of sales and per-car profitability decrease following the decline in car ownership due to car sharing (Cervero et al. 2007; Martin et al. 2010), and the decline in car purchases as rental car companies shrink their fleets (Richter 2017; McGinnis 2018).

Homeshare
Through online platforms, homesharing facilitates the matching of those looking for short-term accommodation with those renting out their privately-owned accommodation. I include traveler accommodation industries as treated firms, which include hotels and other accommodations that are likely negatively affected by the emergence of homesharing (e.g., Zervas et al. 2017). I also include travel arrangement and reservation services, which have also experienced some negative effects from homesharing platforms (Major 2021).[43]

Competitive threats to incumbents: Incumbent hotels and other short-term rentals face threats to their pricing power due to homesharing's responsiveness to market conditions and ability to expand supply as demand increases, limiting hotels' ability to raise prices (Guttentag 2015; Karmin 2015; Farronato and Fradkin 2018;

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[42] In robustness tests, I exclude support activities (NAICS 488), and tests of my hypothesis hold.
[43] In robustness tests, I exclude travel services (NAICS 5615), and overall inferences hold.

Zervas et al. 2017). Because the ability to raise prices around major local events traditionally has generated essential windfalls for hotels (Karmin 2015), limiting this ability threatens hotels' liquidity. Homesharing platforms also generally face lower costs than traditional hotels and so can often offer lower prices. While homesharing has continued to evolve to appeal to business travelers in addition to leisure travelers, even a decline in leisure travel alone can significantly threaten hotels' market share and pricing power (Guttentag 2015; Raafat and Weller 2019). Further, homesharing ushers in changing customer expectations for travel, and hotels have responded by incorporating new technologies and expanding services in order to retain customers, straining cash flows and providing further evidence of a competitive threat (Raafat and Weller 2019). From the perspective of incumbent travel agency firms, homesharing threatens their market share and customer base by providing free and easy access to the tourism sector via homesharing technological platforms and by expanding into travel advisory services (Guttentag 2015; Major 2021).

Caretaking
Caretaking marketplaces provide a platform for individuals to post and find childcare, senior care, and other similar services. I include as treated firms those related to nursing care, disability care, assisted living, and child day care services.

Competitive threats to incumbents: Traditional caretaking industries are threatened by caretaking platforms primarily through the potential loss of employees. For example, many employees of traditional daycares leave to work as private nannies, where they can get paid more and experience greater flexibility and safer working conditions (Kaplan and Hoff 2021; White 2022). Due to the business model of traditional childcare centers, which must abide by laws that include caretaker-to-child ratio mandates, labor costs can be as high as 80 percent of a childcare center's budget (Long 2021). Thus, raising wages or benefits to retain employees, in the best case, puts considerable strain on the centers, and in the worst case, can force centers to shut down classrooms or entire centers due to ratio constraints. The introduction of caretaking marketplaces threatens traditional centers by making it easier for employees to make the switch from traditional to private caretaking.

Similar threats exist in other caretaking settings, including senior care. Advantages of senior caretaking marketplaces include quicker matching, more transparent reviews of caregivers, and greater flexibility, thus threatening market share of traditional, incumbent caretaking agencies (de la Fuente 2015; O'Hear 2018). Such shifts toward the sharing economy and gig work are also occurring in the nursing industry (Evans 2023).

Gig (Miscellaneous) Services
Several gig marketplaces exist that allow individuals and companies to find others who are willing to work various "odd" jobs, including construction, pest control, housekeeping, landscaping, cleaning, repair and maintenance, etc. Based on the job listings in Handy, a well-known online marketplace for home services, I include treated firms within these industries.

Competitive threats to incumbents: Gig marketplaces threaten incumbent firm customer bases as customers—both companies and individuals—turn to online marketplaces for services for which they previously would have used contracting companies (Newton 2013). Online marketplaces are attractive because customers have more say over with whom they will work, how much they will pay, and when the project will be completed (Newton 2014). Thus, incumbent firms such as traditional cleaning companies experience threats to their customer base, threatening traditional firm cash flows. Currently, it is unclear the extent to which customers use the gig marketplace to replace services versus to hire services that they previously would not have hired out (e.g., to run errands they would have run themselves); the latter case would work against my hypothesis.

Food Delivery
In the food delivery SE, individuals deliver food to those who use an online platform to order food from various restaurants. I include restaurants and drinking places as treated firms.

Competitive threats to incumbents: SE delivery companies charge high commissions and fees, threatening the profit margins of incumbent restaurants (Tkacik 2020; Durbin 2021; Popper 2021). Restaurants have very little negotiating power, as the growing popularity of food delivery can make signing up on the delivery apps necessary for survival, while pushing their already-slim margins even lower (Tkacik 2020). One study suggests that there is an increasing level of cannibalization of brick-and-mortar restaurant sales by online food delivery, and that while restaurant revenues increase, profitability decreases—sometimes, even putting restaurants out of business altogether (Collison 2020). Notably, I expect that this pressure manifests through cash needs, as the ability to sustain ongoing operations in the face of competitive threats is likely the most pressing concern for restaurants in the face of the new competitive disruption.

Bike Share
In the bike sharing industry, a third-party platform provides bikes and/or scooters that individuals can access through a mobile app for short-term use. I include in the treated group motorcycle, bicycle, and parts manufacturing and sporting goods stores, which include bicycle shops, as well as transit and ground passenger transportation firms.

Competitive threats to incumbents: Incumbent firms in bike manufacturing and retail experience threats to their customer base as individuals turn to bike and scooter sharing instead of private bike ownership. Public transportation companies also experience similar threats, as bike and scooter sharing can reduce public transportation usage (Campbell and Brakewood 2017; Ziedan et al. 2021). However, mixed evidence exists in that bike and scooter sharing can also complement public transportation usage, which would work against my hypothesis (Nawaro 2021; Wang et al. 2022).

Grocery Delivery
Grocery delivery apps provide a platform by which individuals can order groceries from partnered grocery stores or earn commissions for deliveries. I include grocery stores, as well as general merchandise stores, which include stores such as Walmart, in the treatment group.

Competitive threats to incumbents: Incumbent firms (grocery stores) experience threats to their profit margins if grocery delivery apps, like restaurant delivery apps, charge high commission fees. By giving up some control over customer relationships, incumbent firms also risk losing profitability in other ways, such as through inventory issues (Williams 2021). However, mixed evidence exists as to the long-term effects of grocery delivery apps on grocery stores themselves, and because this SE sector is still relatively young, more evidence on the effects is needed (Acosta 2020).

Table A1. Description of Sharing Economy Cohorts

1	2	3	4	5
SE Category	**Examples of SE Firms**	**Year of First Key Public Event**	**Description of Public Event**	**Alt. Date: Cash Funding (Series A)**
PTP Lending	Prosper Marketplace, LendingClub, SoFi	2008	LendingClub registers its offerings with the SEC, followed by Prosper Marketplace in the following year, paving the way for legitimacy of PTP lending.	2007 (LendingClub)
Ride/car share	Zipcar, Turo, Uber, Lyft	2010	California becomes the first U.S. state to pass a bill allowing private car sharing. In this year, Uber also receives publicity for its launch in San Francisco.	2010 (Turo)
Homeshare	Vrbo, Airbnb	2014	San Francisco passes the "Airbnb Law" amidst an increase in regulatory debates surrounding homesharing, granting it regulatory legitimacy.	2010 (Airbnb)
Caretaking	Care.com	2014	Year of Care.com IPO.	2007 (Care.com)
Gig (misc.)	TaskRabbit, Handy	2014	Handy sued over labor violations, including misclassifying workers as independent contractors versus employees.	2010 (Handy)
Food delivery	DoorDash, Postmates, GrubHub, UberEats	2017	Lawsuit against DoorDash regarding employee vs. independent contractor specification. Similar lawsuit against GrubHub the following year.	2013 (Postmates)
Bike/scooter share	Spinlister, Lime, Bird	2018	San Francisco enacts a temporary ban on electric scooters following a rapid increase in controversies around their launches without permission of municipal authorities.	2017 (Lime/Bird)
Grocery delivery	Instacart	2019	Increase in media and customer attention on issues of employee pay.	2013 (Instacart)

This table describes each SE category that I include in my analyses; examples of SE firms within each category; the event year, which is the year of the first key public event related to the SE category; a description of the event; and the alternative event year based on Series A funding rounds (with the relevant SE firm in parentheses; see Section 5.3.3).

1	2	3
SE Category	**NAICS 3-digit Codes**	**Treated**
PTP Lending	522: Credit intermediation and related activities	**5222, 5223**: Nondepository credit intermediation; activities related to credit intermediation
Ride/car share	336: Transportation equipment manufacturing	**33611, 336211, 3363, 336991**: Automobile and light duty motor vehicle manufacturing*; motor vehicle body manufacturing*; motor vehicle parts manufacturing; motorcycle, bicycle, and parts manufacturing
	485: Transit and ground passenger transportation	**4851, 4852, 4853, 4859**: Urban transit systems; interurban and rural bus transportation; taxi and limousine service; other
	488: Support activities for transportation	**4884, 4889**: Support activities for road transportation; other
	532: Rental and leasing services	**5321**: Automotive equipment rental and leasing
Homeshare	561: Administrative and support services	**5615**: Travel arrangement and reservation services
	721: Accommodation	**7211, 7212, 7213**: Traveler accommodation; RV parks and recreational camps; rooming and boarding houses
Caretaking	623: Nursing and residential care facilities	**6231, 6232, 6233**: Nursing care facilities; residential intellectual and developmental disability, mental health, and substance abuse facilities; continuing care retirement communities and assisted living facilities for the elderly
	624: Social assistance	**6241, 6244**: Individual and family services; child day care services
	814: Private households	**8141**: Private households
Gig (misc.)	238: Specialty trade contractors	**2381, 2382, 2383, 2389**: Foundation, structure, and building exterior contractors; building equipment contractors; building finishing contractors; other
	561: Administrative and support services	**5617**: Services to buildings and dwellings (pest control, janitorial, landscaping, carpet and upholstery cleaning, and other services)
	811: Repair and maintenance	**8114**: Personal and household goods repair and maintenance
Food delivery	722: Food services and drinking places	**7221, 7222, 7223, 7224, 7225**: Full-service restaurants, limited-service eating places, special food services, drinking places
Bike/scooter share	336: Transportation equipment manufacturing	**336991**: Motorcycle, bicycle, and parts manufacturing*
	451: Sporting goods, hobby, musical instrument, and book stores	**45111**: Sporting goods stores*
	485: Transit and ground passenger transportation	**4851, 4852, 4853, 4859**: Automobile dealers; urban transit systems; interurban and rural bus transportation; taxi and limousine service; other
Grocery delivery	445: Food and beverage stores	**4451, 4452, 4453**: Grocery stores; specialty food stores; beer, wine, and liquor stores
	452: General merchandise stores	**4523, 4529**: General merchandise stores

This table describes the NAICS codes that make up the treated firms within my sample. Column (3) lists the specific NAICS codes that I consider to be treated, and column (2) lists the corresponding 3-digit NAICS groups.

*While I generally identify the treated firms as those within certain 4-digit NAICS groups, these industry groups are measured at a 5- or 6-digit NAICS level because other subcategories within the 4-digit NAICS clearly do not belong within the treatment sample.

Table A3. SE Cohort Examples

SE Category	Examples of Treated Firms	Examples of Control Firms	N(*Treat*) = 1	N(*Treat*) = 0
1	2	3	4	5
PTP Lending	World Acceptance Corporation (522291)	Bank of America Corporation (522110)	207	2,232
Rideshare	Hertz Global Holdings Inc (532111)	Rent-A-Center Inc. (532210)	177	351
Homeshare	Hilton Worldwide Holdings (721110)	Maximus Inc (561110)	81	279
Caretaking	Sonida Senior Living (623312)	Universal Health Services Inc. (622110)	21	53
Gig (Misc.)	Davey Tree Expert Company (561720)	ManpowerGroup (561320)	43	227
Food delivery	Chipotle Mexican Grill (722513)	SeaWorld Entertainment Inc. (713110)	224	63
Bike share	Big 5 Sporting Goods Corporation (451110)	Barnes & Noble Inc. (451211)	31	168
Grocery delivery	Kroger Company (445110)	Kohl's Corporation (452111)	52	12

This table provides examples of firms within each treatment and control group for each SE category. Columns (2) and (3) list examples of firms, with NAICS codes in parentheses. Columns (4) and (5) list the number of firm-years within the sample.

Appendix B. Variable Definitions

Variable	Description
Primary Treatment and Dependent Variables	
Treat	Indicator variable equal to one for firms identified as being incumbent peers to a sharing-economy (SE) firm, based on 4-digit NAICS codes; zero otherwise.
Post	Indicator variable equal to one for the year of or following the identified date of SE market entrance, zero otherwise.
TaxPlan_Cash	Pre-tax income (*pi*) multiplied by the statutory tax rate less current taxes paid (*txpd*), scaled by pre-tax income, following Atwood et al. (2012) and De Simone et al. (2023). This variable increases with tax avoidance.
Controls: Tax Planning	
Size	Natural logarithm of total assets (*at*).
ROA	Return on assets, calculated as *pi* divided by total assets.
Leverage	Current and long-term debt (*dlc* + *dltt*) scaled by total assets.
R&D	Research and development expense (*xrd*) scaled by total assets, where research and development expense is set to zero if missing.
Intangibles	Total intangible assets (*intan*) scaled by total assets, where intangibles are set to zero if missing.
PPE	Property, plant, and equipment (*ppent*) scaled by total assets.
Capex	Capital expenditures (*capx*) scaled by total assets.
Special	Special items (*spi*) scaled by total assets, where special items are set to zero if missing.
Advert	Advertising expense (*xad*) scaled by total assets, where advertising expense is set to zero if missing.
MTB	Market-to-book, calculated as the ratio of market value of equity (*prcc_f* x *csho*) to book value of equity (*ceq*).
NOL	One if the tax loss carryforward (*tlcf*) is greater than zero, zero otherwise.
ΔNOL	Change in tax loss carryforward scaled by total assets, from $t - 1$ to t.
MNC	One if foreign income (*pifo*) is not zero or missing, zero otherwise.
Additional Tests	
LowCFO	One if firm is in the bottom tercile of median pre-period cash flows from operations (*oancf*, scaled by assets), zero otherwise.
LowDiv	One if firm is in the bottom tercile of median pre-period total dividends (*dvc* + *dvp*, scaled by assets), zero otherwise.
HighDebt	One if firm is in the top tercile of median pre-period leverage, zero otherwise.
CFO_Pre	Pre-period median cash flows from operations at the firm level.
Div_Pre	Pre-period median total dividends at the firm level.
Debt_Pre	Pre-period median leverage at the firm level.
DivPayer	One if total dividends is greater than zero, zero otherwise.
TaxPlanOpp	One if firm is in the lowest tercile of average pre-period *TaxPlan_Cash*, zero otherwise.
TaxPlan_Pre	Firm-level average *TaxPlan_Cash* in the pre-event period.
TaxHaven	One if the firm has material operations in a country considered to be a tax haven, as disclosed in exhibit 21 of form 10-K, based on Dyreng and Lindsey (2009); zero otherwise.
ShelterScore	Probability of IRS reportable transaction-based sheltering, using Table 4, Combined Model (1) from Lisowsky (2010), as implemented by Chi et al. (2017).
TaxPlan_GAAP	Pre-tax income multiplied by the statutory tax rate less current tax expense, scaled by pre-tax income, following Atwood et al. (2012) and De Simone et al. (2023). Current tax expense is total income taxes (*txt*) less deferred tax expense (*txdi* if not missing, and *txdfed* + *txdfo* if *txdi* is missing). This variable increases with tax avoidance.
TaxPlanVol	Volatility of *TaxPlan_Cash* over years $t - 2$ to t.
IncrTaxPlan	One if firm increases tax planning in the *Post* period relative to the pre-event period, zero otherwise.
Vol(ROA)	Volatility of ROA over years $t - 2$ to t.
Vol(Special)	Volatility of special items over years $t - 2$ to t.
Vol(CFO)	Volatility of cash flows from operations (*oancf*, scaled by assets) over years $t - 2$ to t.
Disc_Acc	Performance-adjusted discretionary accruals, based on the Kothari et al. (2005) model.
ETBSO	Excess tax benefit of stock options (*txbcof* + *txbco*) scaled by total assets.
Vol(ETBSO)	Volatility of ETBSO over years $t - 2$ to t.

Acquisitions	Cash flows related to acquisitions (*aqc*), scaled by assets.
Labor	Number of employees (*emp*), scaled by assets.
SalesGrowth	Sales (*sale*) in year t minus sales in year t - 1, scaled by sales in year t - 1.
MVal	Market capitalization, calculated as the natural logarithm of common shares outstanding (*csho*) times closing price (*prcc_f*).
CapInt	Ratio of total invested capital (*icapt*) to the number of employees (*emp* * 1000).
HHI	Herfindahl-Hirschman Index, calculated at the three-digit NAICS level.
Vol(Ind_Sales)	Volatility of median sales over years t - 4 through t at the three-digit NAICS level.
CFO	Cash flows from operations, scaled by assets.
Return	Stock return over the year (*ret*, from CRSP).
Missing_R&D	One if research and development expense is missing, zero otherwise.

This appendix defines each variable in the analyses. Primary data sources are Compustat and CRSP; variable names noted in parentheses and italics refer to Compustat identifiers, unless otherwise noted. I obtain tax haven data from Scott Dyreng (Dyreng and Lindsey 2009; https://sites.google.com/site/scottdyreng/Home/data-and-code/EX21-Dataset).

Figure 1. Parallel Trends: Cash Tax Planning
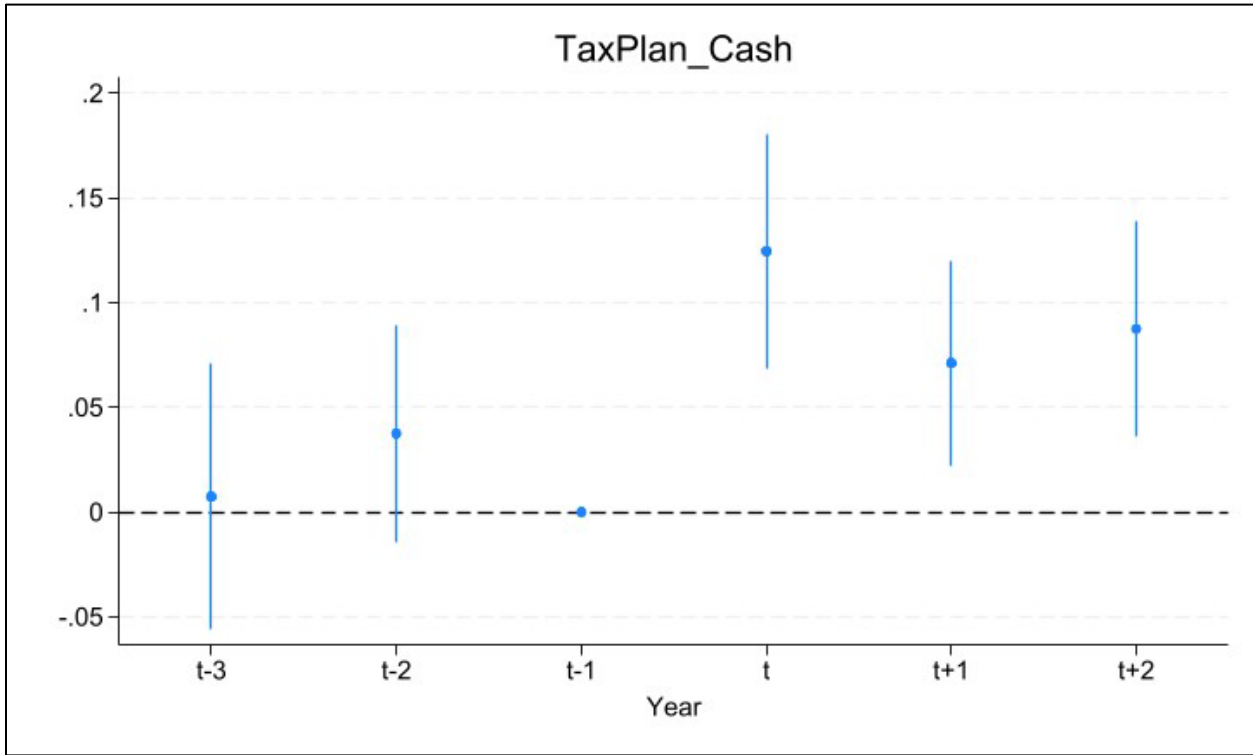
This figure corresponds to Table 4 and presents trends in estimating equation (1) in a stacked DiD, where *Post* is replaced with event-year indicators. Year $t – 1$ is omitted to avoid perfect multicollinearity. The dependent variable is *TaxPlan_Cash*. All variables are defined in Appendix B.

Table 1. Sample Selection

	PTP Lend	Rideshare	Home	Care	Gig	Food delivery	Bike share	Grocery delivery
Initial cohort sample*	14,568	3,237	3,154	678	2,273	2,112	2,643	748
Exclude firm-years that:								
Fall outside 3 years pre- and post-market entrance†	(9,963)	(2,256)	(2,339)	(484)	(1,690)	(1,564)	(2,087)	(644)
Are treated in a different cohort	-	-	(34)	-	(50)	-	(265)	-
Have zero assets or negative pre-tax income, or are missing tax avoidance variables	(1,412)	(390)	(352)	(97)	(220)	(216)	(71)	(28)
Do not have at least one observation in both pre and post periods	(754)	(63)	(69)	(23)	(43)	(45)	(21)	(12)
Cohort sample	**2,439**	**528**	**360**	**74**	**270**	**287**	**199**	**64**
Total stacked sample	**4,221**							

This table presents the sample selection for the descriptive statistics presented in Table 2. Where indicated, additional tests have data requirements that yield further sample attrition. All variables are defined in Appendix B.

*Initial samples are composed of non-SE U.S. firms from the Compustat database, excluding flow-through entities, ETFs, trusts, and utilities. Cohorts include treated and control firms, based on NAICS classification as indicated in Table A2 of Appendix A.

†I also ensure that no firms experience a change in NAICS code that would change their treated vs. control designation within the sample period.

Table 2. Descriptive Statistics

Panel A. Univariate Statistics

	N	Mean	S.D.	P25	Median	P75
Primary independent and dependent variables:						
Treat	4,221	0.198	0.399	0.000	0.000	0.000
Post	4,221	0.466	0.499	0.000	0.000	1.000
TaxPlan_Cash	4,221	0.031	0.214	-0.043	0.047	0.159
Tax planning controls:						
Size	4,221	7.136	1.706	6.120	6.945	8.079
ROA	4,221	0.052	0.068	0.010	0.018	0.075
Leverage	4,221	0.216	0.237	0.074	0.155	0.273
R&D	4,221	0.004	0.016	0.000	0.000	0.000
Intangibles	4,221	0.104	0.170	0.002	0.020	0.121
PPE	4,221	0.131	0.205	0.013	0.026	0.150
Capex	4,221	0.023	0.041	0.001	0.005	0.031
Special	4,221	-0.002	0.014	-0.001	0.000	0.000
Advert	4,221	0.005	0.016	0.000	0.001	0.001
MTB	4,221	2.165	7.991	1.024	1.517	2.354
NOL	4,221	0.282	0.450	0.000	0.000	1.000
ΔNOL	4,221	0.000	0.063	0.000	0.000	0.000
MNC	4,221	0.236	0.425	0.000	0.000	0.000
Variables for additional tests:						
CFO_Pre	4,221	0.059	0.076	0.011	0.018	0.099
Div_Pre	4,221	0.012	0.038	0.000	0.004	0.008
Debt_Pre	4,221	0.207	0.218	0.071	0.154	0.266
DivPayer	4,221	0.760	0.427	1.000	1.000	1.000
TaxPlan_Pre	4,221	0.050	0.147	-0.023	0.044	0.132
TaxHaven	4,221	0.176	0.381	0.000	0.000	0.000
ShelterScore	1,549	0.890	0.246	0.979	0.999	1.000
TaxPlan_GAAP	4,221	0.052	0.141	-0.015	0.034	0.107
TaxPlanVol	4,040	0.117	0.120	0.034	0.074	0.150
IncrTaxPlan	4,221	0.388	0.487	0.000	0.000	1.000
Vol(ROA)	4,040	0.018	0.042	0.002	0.006	0.021
Vol(Special)	4,040	0.007	0.022	0.000	0.001	0.005
Vol(CFO)	4,040	0.020	0.030	0.003	0.009	0.026
Disc_Acc	4,040	0.014	0.155	-0.010	0.003	0.018
ETBSO	4,040	0.000	0.001	0.000	0.000	0.000
Vol(ETBSO)	4,040	0.000	0.002	0.000	0.000	0.000
Acquisitions	4,067	0.011	0.038	0.000	0.000	0.001
Labor	4,067	0.008	0.025	0.000	0.000	0.005
SalesGrowth	4,067	0.103	0.171	0.001	0.078	0.171
MVal	4,067	6.045	1.998	4.430	5.844	7.429
CapInt	4,067	0.695	1.209	0.126	0.414	0.752
HHI	4,067	0.080	0.059	0.050	0.057	0.091
Vol(Ind_Sales)	4,067	0.040	0.055	0.005	0.008	0.068
CFO	4,067	0.059	0.071	0.011	0.020	0.101
Return	3,740	0.095	0.368	-0.099	0.078	0.270
Missing_R&D	4,067	0.749	0.434	0.000	1.000	1.000

This panel presents summary statistics: number of observations, means, standard deviations, medians, and 25th and 75th percentiles. This sample is primarily based on data from Compustat and is presented on a firm-year basis. All variables are defined in Appendix B.

Table 2 (Continued)

Panel B. Univariate Statistics by Treat

Variable	*Treat* = 1	*Treat* = 0	Difference	*t*-statistic
Observations	836	3,385		
TaxPlan_Cash	0.071	0.022	0.049	-5.935
Size	7.103	7.145	-0.042	0.634
ROA	0.099	0.040	0.059	-23.726
Leverage	0.348	0.183	0.165	-18.749
R&D	0.008	0.003	0.005	-7.616
Intangibles	0.170	0.090	0.080	-12.700
PPE	0.290	0.090	0.200	-27.500
Capex	0.053	0.016	0.037	-24.777
Special	0.000	0.000	0.000	1.190
Advert	0.015	0.003	0.012	-21.351
MTB	2.880	1.990	0.890	-2.900
NOL	0.510	0.226	0.284	-16.851
ΔNOL	0.000	0.000	0.000	1.390
MNC	0.450	0.180	0.270	-16.890

This panel presents descriptive statistics for the variables in my hypothesis test, comparing treated firm-years to non-treated (control) firm-years. All variables are defined in Appendix B.

Table 3. Test of Hypothesis: Cash Tax Planning Effect

	(1) TaxPlan_Cash
Treat x Post	**0.081***
	(4.608)
Size	-0.038*
	(-1.684)
ROA	1.074***
	(7.107)
Leverage	0.061
	(1.164)
R&D	1.174
	(1.197)
Intangibles	0.120
	(1.048)
PPE	0.034
	(0.249)
Capex	-0.135
	(-0.775)
Special	1.101***
	(3.025)
Advert	-0.363
	(-0.550)
MTB	0.000**
	(2.520)
NOL	0.012
	(0.555)
ΔNOL	0.017
	(0.331)
MNC	-0.009
	(-0.360)
Year-Cohort FEs	Yes
Firm-Cohort FEs	Yes
Observations	4,221
Adjusted R-squared	0.328

This table presents results of estimating equation (1) in a stacked DiD. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 4. Event-Year Analysis

	(1) TaxPlan_Cash
Treat x Year(t-3)	0.007
	(0.229)
Treat x Year(t-2)	0.038
	(1.423)
Treat x Year (t)	**0.124*****
	(4.385)
Treat x Year (t+1)	**0.071*****
	(2.853)
Treat x Year (t+2)	**0.087*****
	(3.325)
Controls	Yes
Year-Cohort FEs	Yes
Firm-Cohort FEs	Yes
Observations	4,221
Adjusted R-squared	0.328

This table presents results of estimating equation (1) in a stacked DiD, where *Post* is replaced with event-year indicators. Year $t-1$ is omitted to avoid perfect multicollinearity. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 5. Cross-Sectional Tests: Other Cash Sources

	(1) *TaxPlan_Cash*	(2) *TaxPlan_Cash*	(3) *TaxPlan_Cash*
OtherCashSource =	*LowCFO*	*LowDiv*	*HighDebt*
Treat x Post	**0.065***	**0.084***	**0.039***
	(3.752)	**(4.226)**	**(1.799)**
Post x OtherCashSource	-0.017	0.004	-0.014
	(-0.941)	(0.191)	(-0.802)
Treat x Post x OtherCashSource	**0.108***	**-0.009**	**0.080***
	(1.896)	**(-0.272)**	**(2.573)**
Control Variables	Yes	Yes	Yes
Year-Cohort FEs	Yes	Yes	Yes
Firm-Cohort FEs	Yes	Yes	Yes
Observations	4,221	4,221	4,221
Adjusted R-squared	0.329	0.328	0.329

This table presents cross-sectional tests in a stacked DiD, in which *Treat x Post* from equation (1) is interacted with an indicator for firms that *lack* other cash sources (*OtherCashSource*), as described in the column subheadings. *Treat x OtherCashSource* is not included in the model because it is fully subsumed by year-cohort fixed effects. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 6. Cross-Sectional Tests: Tax Planning Opportunity

	(1) *TaxPlan_Cash*
Treat x Post	**0.042***
	(2.632)
Post x TaxPlanOpp	**0.108***
	(6.515)
Treat x Post x TaxPlanOpp	**0.087***
	(2.651)
Control Variables	Yes
Year-Cohort FEs	Yes
Firm-Cohort FEs	Yes
Observations	4,221
Adjusted R-squared	0.351

This table presents cross-sectional tests in a stacked DiD, in which *Treat x Post* from equation (1) is interacted with an indicator for firms with opportunities to increase tax planning, measured as firms with low pre-period tax planning (*TaxPlanOpp*). *Treat x TaxPlanOpp* is not included in the model because it is fully subsumed by year-cohort fixed effects. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 7. Cash Tax Planning by Cohort

	(1) PTP Lend	(2) Rideshare	(3) Homeshare	(4) Caretaking	(5) Gig (misc.)	(6) Food deliv	(7) Bike share	(8) Grocery
Cohort:								
Treat x Post	**0.124***	**0.066***	0.020	**0.201****	0.055	**0.089****	0.047	0.007
	(3.185)	**(1.739)**	(0.399)	**(2.277)**	(1.450)	**(2.066)**	(0.651)	(0.133)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,439	528	360	74	270	287	199	64
Adjusted R-squared	0.271	0.332	0.525	0.713	0.564	0.297	0.248	0.391

This table presents results of estimating equation (1) within each individual cohort. The cohort is indicated in the column heading, and the dependent variable is *TaxPlan_Cash*. Cohorts represented in columns (1) through (6) have data for three years in each of the pre- and post-even periods; due to data availability, the bike share (column (7)) and grocery delivery (column (8)) cohorts have two years and one year in the post period, respectively. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 8. Tax Planning Types: Aggressive or GAAP-Affected

Panel A. Aggressive Tax Avoidance

	(1)	(2)
	TaxHaven	*ShelterScore*
Treat x Post	0.036	0.020
	(1.429)	(1.376)
Control Variables	Yes	Yes
Year-Cohort FEs	Yes	Yes
Firm-Cohort FEs	Yes	Yes
Observations	4,221	1,549
Adjusted R-squared	0.836	0.924

This panel presents results of estimating equation (1) in a stacked DiD, in which the cash tax planning dependent variable is replaced with variables for tax aggressiveness, as indicated in the column headings. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Panel B. GAAP-Affected Tax Avoidance

	(1)
	TaxPlan_GAAP
Treat x Post	-0.000
	(-0.013)
Control Variables	Yes
Year-Cohort FEs	Yes
Firm-Cohort FEs	Yes
Observations	4,221
Adjusted R-squared	0.357

This panel presents results of estimating equation (1) in a stacked DiD, in which the cash tax planning dependent variable is replaced with *TaxPlan_GAAP*. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 9. Tax Persistence

	(1) TaxPlanVol	(2) TaxPlanVol
Treat x Post	-0.030**	-0.011
	(-2.276)	(-0.611)
Treat x Post x IncrTaxPlan		-0.036*
		(-1.917)
Control Variables	Yes	Yes
Year-Cohort FEs	Yes	Yes
Firm-Cohort FEs	Yes	Yes
Observations	4,040	4,040
Adjusted R-squared	0.384	0.385

This table presents results of estimating an extension of equation (1) in which I replace the dependent variable with *TaxPlanVol*, add relevant controls and, in column (2), interact *Treat x Post* with an indicator for firms that increase tax planning following SE emergence (*IncrTaxPlan*). I include the control variables from equation (1) and add controls common to the tax volatility literature; see Section 5.1.2. I estimate the results in a stacked DiD. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.

Table 10. Investment Outcomes

	(1) R&D	(2) Acquisitions	(3) Capex	(4) Labor
Treat x Post	0.001**	-0.002	0.004*	-0.001
	(2.535)	(-0.593)	(1.648)	(-1.516)
Control Variables	Yes	Yes	Yes	Yes
Year-Cohort FEs	Yes	Yes	Yes	Yes
Firm-Cohort FEs	Yes	Yes	Yes	Yes
Observations	4,067	3,740	3,740	4,067
Adjusted R-squared	0.952	0.425	0.860	0.968

This table presents results of estimating a stacked DiD with investment measures as the dependent variables, as indicated in the column headings. Control variables vary based on the dependent variable; see Section 5.2. In parentheses, below each coefficient, are *t*-statistics based on standard errors that are clustered on firm. *, **, *** indicate significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed test). All variables are defined in Appendix B.