Corporate Patent Transfers to Tax Havens

by

Angela Pae

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Doctoral Committee:

Professor Christopher D. Williams, Chair
Professor James R. Hines Jr.
Assistant Professor James D. Omartian
Professor Emeritus Joel B. Slemrod

Angela Pae

angiepae@umich.edu

ORCID iD: 0009-0001-3362-5731

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Table of Contents

Acknowledgements ii

List of Figures v

List of Tables vi

List of Appendices vii

Abstract viii

Chapter 1 Introduction 1

Chapter 2 Background 6

2.1 Tax Avoidance using Patent Transfers 6

2.1.1 Stylized Framework 7

2.2 Recent IP Tax Reform 9

2.3 Prior Empirical Literature 11

Chapter 3 Data and Sample 13

3.1 USPTO Assignments Data 13

3.2 USPTO Tax Haven Assignments 14

3.3 Firm-Level Sample Construction 17

Chapter 4 Empirical Analysis 19

4.1 Which Firms Transfer Patents to Tax Havens? 19

4.1.1 Industry-Level Descriptives 19

4.1.2 Univariate Analysis 20

4.1.3 Determinants Analysis 21

4.2 Estimating Tax Outcomes 22

4.2.1 Change in ETRs 22
4.2.2 Change in Tax Uncertainty 25
4.3 Patent-Level Analysis 27
4.3.1 Number of Patent Assignments to Tax Havens 27
4.3.2 Repatriations of Dot Patents 28
4.3.3 Patents Transfers from Dot Havens to Big 8 Havens 30
4.3.4 Timing of Patent Transfers 32
Chapter 5 Conclusion 35
Figures 36
Tables 43
Appendices 59
Bibliography 63

List of Figures

Figure 1: Patent Transfers to Dot Tax Havens 37

Figure 2: Patent Transfers to Big 8 Tax Havens 38

Figure 3: Tax Haven Patent Transfers by Inventor Location 39

Figure 4: Share of U.S. Firms with Tax Haven Patents by Industry 40

Figure 5: Robustness Tests 41

Figure 6: Patent Transfers Out of Dot Tax Havens 42

List of Tables

Table 1: Patent Assignments by Dot Haven Country 44

Table 2: Descriptive Statistics 45

Table 3: Patent Assignments by Industry 46

Table 4: Determinants Analysis 48

Table 5: Change in Effective Tax Rates 50

Table 6: Change in Uncertain Tax Benefits 54

Table 7: TCJA Haven Patent Transfers 55

Table 8: Repatriations of Dot Patents to U.S. 56

Table 9: Repatriations of Dot Patents - U.S. vs Big 8 57

Table 10: Timing of Tax Haven Patent Transfers 58

List of Appendices

Appendix A: Variable Definitions 59

Appendix B: List of Tax Haven Countries 61

Abstract

This paper examines how U.S. public corporations transfer ownership of intangible property (IP) to tax havens. Using patent transaction data from the United States Patent and Trademark Office, I find firms report worldwide effective tax rates 3.8 to 4.2 percentage points lower after assigning patents to "dot" tax havens – small, low-tax countries where little economic activity takes place. As firms accumulate a greater number of patents in dot havens, the magnitude of tax savings and tax uncertainty increases. Firms systematically transfer patents to dot havens early in their lifecycles when the realized value is low, consistent with firms strategically timing patent transfers to tax havens to minimize taxes due upon the outbound transfer. Despite provisions targeting IP-related tax avoidance, I do not find a significant change in the number of tax haven patent transfers following the 2017 Tax Cuts & Jobs Act (TCJA). Foreign firms increase repatriations of patents from dot havens to the U.S. following the TCJA, while American firms increase patent transfers from smaller dot havens to larger "Big 8" havens. By leveraging granular patent transaction data, this study offers new evidence on corporate use of patent transfers to tax havens.

Chapter 1 Introduction

Corporate income shifting to tax havens - low-tax jurisdictions offering zero or near-zero tax rates – is a primary concern for governments seeking to safeguard their corporate tax bases. One method of shifting income to tax havens has attracted increasing scrutiny from tax regulators, policymakers, and the public worldwide: the transfer of intangible property (IP) to tax haven countries. Using public data on patent transactions from the United States Patent & Trademark Office (USPTO), I provide novel large sample, microeconomic evidence of corporate patent transfers to tax haven affiliates. I examine which firms transfer patents to tax havens, estimate the magnitude of tax savings and tax uncertainty faced by these firms, and evaluate how these firms respond to recent tax reform targeting IP-based tax avoidance.

Although there are various strategies firms use to shift income to tax havens, IP as a vehicle for income shifting is important for several reasons. IP is a key driver of both firm value and overall economic growth in today's information economy (Goolsbee and Jones, 2021). The substantial income generated from IP combined with its intangible nature, however, offers opportunity for tax avoidance that may considerably erode the tax base. A firm may perform the underlying research and development (R&D) in the U.S., file for a patent at the USPTO, then transfer ownership of the patent to its tax haven affiliate. Income generated from the patent may then be attributed to the firm's tax haven affiliate, subject to a zero percent tax rate. Revelations of firms such as Uber (ICIJ, 2022) and Abbvie (Senate Finance Committee, 2022) transferring patents to tax havens have heightened public concern over firms offshoring valuable IP to avoid taxes. In response, policymakers worldwide have recently enacted reforms specifically targeting low-taxed, corporate intangible income.

While anecdotal reports shed some light on how corporations use IP to shift income to tax havens, there is little large sample evidence of the very firms shifting IP to tax havens. Prior studies find IP location is sensitive to changes in tax rates, with a disproportionately high number of patents located in tax haven countries (Karkinsky and Riedel, 2011; Griffith et al., 2014; Bilicka et al., 2023). However, due to non-standardized data and lack of clear connection to

firms, it is not obvious which firms are responsible for these tax haven patents. Because tax policy and enforcement are implemented at the firm-level, understanding the unique characteristics of which firms choose to transfer patents to tax havens, the outcomes these firms face, and how these firms heterogeneously respond to tax reform is crucial in designing and evaluating effective enforcement and compliance policies.

To examine this, I create a novel, hand-collected database linking tax haven patent transfers to public firms in Compustat. To identify tax haven patent transfers, I use publicly available patent assignment records from the USPTO, which tracks changes in legal title or ownership for U.S. patents since 1970.[1] Prior studies use the USPTO assignments data to study the marketplace for patents and the use of patents as collateral for loans (Serrano, 2010; Mann, 2018; Hochberg et al., 2018; Arora et al., 2021; Kim and Valentine, 2023). I link tax haven assignees to public firms in Compustat to track the stock of patents assigned to tax haven affiliates for each firm-year, where the number of patents varies across time as patents are traded and expire. By combining the granularity of the patent transaction data with firm characteristics and outcomes in Compustat, I am able to 1) identify which firms are engaging in this tax avoidance strategy to help policymakers target relevant firms for tax reform and enforcement, 2) estimate the magnitude of tax benefits and uncertainty, and 3) examine how U.S. and foreign firms heterogeneously respond to recent tax provisions aimed at curbing the use of intangibles for tax avoidance.

Approximately 11.6% of USPTO patents transferred to foreign affiliates over the years 1980 through 2022 involve a corporate assignee in a tax haven. This equates to approximately 548,000 unique USPTO patents and patent applications transferred to tax haven countries. Approximately a quarter of these tax haven patents are transferred to a corporate assignee in a "dot" tax haven. Dot tax havens are small, often island countries "as small as a dot" with little infrastructure and local economy (Hines and Rice, 1994). U.S. public firms collectively assigned patents to 42 distinct dot tax haven countries over the sample period.[2] Firms choosing to transfer patents to dot havens are, on average, larger, more R&D-intensive, derive a greater proportion of

[1] Legally, an assignment is a transfer by an assignor of its right, title, and interest in a patent or patent application (37 CFR §3.1). I use the terms "assignment", "transaction", "conveyance", and "transfer" interchangeably throughout the paper to refer to the assignment of ownership rights of a patent or patent application.

[2] See Appendix B for the full list of tax haven countries (Hines & Rice, 1994; Desai et al., 2006; De Simone & Olbert, 2022).

sales from foreign customers, and are more likely to disclose a tax haven subsidiary (Dyreng et al., 2019; Bilicka et al., 2023). Consistent with firms minimizing any taxable gain upon transfer, I find firms systematically transfer patents to dot tax havens early in their lifecycles when the value is low, relative to other patents sent abroad.

I start by estimating the average reduction in tax burdens reported by U.S. firms after assigning patents to dot havens. I find U.S. firms report worldwide cash effective tax rates approximately 3.8 percentage points lower, and GAAP effective tax rates 4.2 percentage points lower after assigning at least one patent to a dot tax haven affiliate. As firms accumulate a greater number of patents in dot havens, the magnitude of tax savings and tax uncertainty increases. Firms report (6.3) 4.9 lower (cash) effective tax rates and 90% higher additions to uncertain tax benefits (UTB) upon accumulating over 75 patents in dot havens (i.e., the upper tercile of dot haven patents). To estimate these magnitudes, I incorporate firm and year fixed effects, as well as augment the original Dyreng and Lindsey (2009) methodology with firm and year-specific tax rates to control for unobserved heterogeneity across firms and time. However, I emphasize these estimated magnitudes are associations and not causal in nature; the decrease in tax burdens captures an average, equilibrium outcome taking into account the various choices managers make along with a patent assignment to a dot haven.

Despite provisions targeted towards reducing the benefits of shifting intangible income offshore, U.S. public firms with patents in dot tax havens continue to enjoy lower tax burdens in the years following the 2017 Tax Cuts & Jobs Act (TCJA). Consistent with continued tax benefits, I find no evidence public firms significantly change the number of patents transferred to tax havens following the TCJA. However, I find some *foreign* firms increase the number of patents repatriated out of dot haven affiliates to the U.S. following the TCJA. This increase in repatriations suggests some foreign firms perceive increased benefits of locating IP in the U.S., perhaps due to the lower tax rate offered by the Foreign Derived Intangible Income (FDII) provision and decrease in statutory tax rate from 35% to 21% on ordinary income.

On the other hand, U.S. public firms do not significantly increase repatriations of dot haven patents back to the U.S. following the TCJA, contrary to policymaker objectives. Rather, U.S. public firms increasingly transfer patents out of affiliates in smaller, dot haven countries to affiliates located in larger, "Big 8" tax haven countries. This shift in moving patents out of dot havens to "Big 8" tax havens mirrors recent trends in the location of reported U.S. corporate

profits. IRS country-by-country data documents an increase in U.S. corporate profits reported in larger tax havens such as Ireland, Singapore, and Switzerland and a decrease in profits reported in smaller tax havens such as Bermuda, the Cayman Islands, and Luxembourg (IRS, 2025). With increasing regulatory scrutiny over tax avoidance strategies with little economic substance, these findings suggest U.S. public firms may be shifting away from "paper" tax avoidance strategies in dot havens to tax avoidance strategies that may be backed by economic substance in larger, "Big 8" havens.

This paper offers several contributions relevant to both policymakers and academics. First, this paper offers information for policymakers in evaluating the effectiveness of anti-income shifting provisions. Existing studies examining how overall income shifting changes after the TCJA find mixed results: Clausing (2020), Garcia-Bernando et al. (2023), and Overesch et al. (2023) find no change in U.S. corporate income shifting, while Krull and Wu (2022) find a decrease in income shifting, particularly among R&D-intensive firms. By using granular, patent transaction data matched to firm-level financial information, I offer new evidence on how U.S. and foreign firms heterogeneously respond to the TCJA.

Second, this paper contributes to the literature examining the role of intangibles in corporate tax avoidance (Grubert and Slemrod, 1998, Grubert, 2003). Prior studies find R&D and patent-intensive firms report lower effective tax rates, consistent with IP facilitating tax avoidance (Gao et al., 2016; Cheng et al., 2021). However, innovative activities are explicitly given preferential tax treatment, such as through R&D tax credits, due to the inability of the firm to fully internalize the returns to their innovation (Hall, 2019). By focusing my analysis on patent transfers to *dot* tax havens, I offer relevant empirical evidence of an aggressive tax avoidance strategy scrutinized by policymakers worldwide.

Finally, by creating a novel database linking publicly available tax haven patent transfers to Compustat firms, I offer a useful empirical tool for future studies interested in exploring corporate usage of tax havens. Lester and Olbert (2025) note that while the policy issue of firms' tax haven use is longstanding, empirical evidence of firm activity within tax havens is young and underdeveloped. Firms are incentivized to hide aggressive tax planning strategies to avoid drawing unwanted scrutiny (Bozanic et al., 2017; Dyreng et al., 2020), resulting in few publicly observable measures of corporate tax avoidance. Some studies use legal or media revelations of tax avoidance; however, these only capture tax avoidance strategies ultimately "caught" and

revealed ex post (Wilson, 2009; Hanlon and Slemrod, 2009). By exploiting patent statute that incentivizes public disclosure of a tax avoidance strategy, I offer a large sample approach of measuring corporate tax avoidance within firm and across time using widely available, public data.

Chapter 2 Background

2.1 Tax Avoidance using Patent Transfers

Income arising from the exploitation of an intangible is generally taxed in the location of the economic owner of the intangible. A firm may decrease the tax burden levied upon IP income by locating ownership of the IP to an affiliate in a low-tax country.[3] While this is true of any income-generating property, the intangible nature distinguishing IP from its tangible counterparts is its lack of physical presence to "anchor" itself geographically to a single location. Combined with its ability to be exploited, managed, and controlled from afar, from the perspective of the tax regulator, it may not be entirely obvious where the IP is located. This is problematic for multinational tax allocation purposes as it then becomes unclear which jurisdiction has taxing rights over the resulting income. In the case of intangibles, this income may be economically significant, and, due to its nonrival benefits, may be geographically dispersed across multiple international taxing jurisdictions.

Firms may assert economic ownership by transferring legal ownership of the asset. U.S. Treasury Regulations §1.482.4T(f)(3) use the legal owner of IP as the starting point in determining the economic owner, "unless such ownership is inconsistent with the economic substance of the underlying transactions."[4] In the case of patents, transferring legal ownership is a relatively simple process as patents are "assignable in law by an instrument in writing" (MPEP § 301), in which the holder of a patent (the "assignor") can assign ownership rights to another party (the "assignee") by executing and signing a written agreement that identifies the parties

[3] In this paper, I use "intangible property" (IP) to denote any income-generating property lacking a physical nature. Within the context of U.S. tax regulations (§936(h)(3)(B), "intangible property" includes any of the following: patents, inventions, formulas, processes, designs, patterns, or know-how; copyrights or literary, musical, or artistic compositions; trademarks, trade names, or brand names; franchises, license, or contracts; methods, programs, systems, procedures, campaigns, surveys, studies, forecasts, estimates, customer lists, or technical data; or any similar items. The 2017 TCJA amended the definition of intangible property to include goodwill, going concern value, and workforce in place, as well as replaced the "any similar item" with "any other item the value of which is not attributable to tangible property of the services of any individual."

[4] Firms assigning legal ownership rights as a conduit for assigning economic ownership rights over the resulting income may have their tax positions challenged by tax authorities, exposing these firms to significant tax uncertainty

involved and property interests conveyed. Firms may take advantage of tax haven countries offering the lowest tax rates with little infrastructure to host real economic activity because the IP can be controlled, managed, and exploited from afar. Geographic and mobility frictions are significantly lessened when offshoring IP, compared to the considerable costs associated with moving workers, capital equipment, or production facilities.

Relatedly, a firm need not transfer legal ownership of IP to shift income to low-taxed affiliates. A firm may engage in a cost sharing agreement, in which the foreign affiliate financially contributes to the development of the patent and is thus, entitled to a portion of the resulting income (De Simone and Sansing, 2019; Dobridge et al., 2024; Jenniges et al., 2019). While cost sharing does not require a transfer of legal ownership, the foreign affiliate must make an upfront "buy-in" payment taxable to the U.S. entity. The firm also risks losing the portion of R&D deductions shifted to the foreign affiliate if the R&D is unsuccessful (Avi-Yonah, 2024).[5]

Because I use publicly disclosed transfers of legal ownership of patents, my analysis captures only a subset of firms shifting IP income to tax havens and thus, a lower bound of IP-related tax avoidance used by multinational firms.

2.1.1 Stylized Framework

To illustrate how a firm can minimize its tax burden by transferring IP ownership to a tax haven affiliate, consider a simplified example. Consider a U.S.-incorporated firm engaging in R&D in the U.S. subject to tax rate τ. Once the product of R&D activity is realized, the U.S. entity files for patent protection at the United States Patent and Trademark Office (USPTO). After filing the patent application, the U.S. entity sells the patent to its foreign affiliate incorporated in Bermuda with tax rate $\hat{\tau}$. The sale of the patent is generally a taxable transaction, in which the U.S. entity (the seller) is taxed on q: the difference between the sale price and tax basis of the patent.[6] The tax law requires all intrafirm transfers be priced at "arm's length", or comparable to prices charged between unrelated entities (IRC §482).

[5] Avi-Yonah (2024) writes, "The idea behind cost sharing was that the MNE cannot know whether the development will be successful, and risks losing [x] percent of the research and experimentation deduction if it is unsuccessful because the deduction is shifted to the controlled foreign corporation (CFC), which does not have U.S.-source income. This, it was thought, would inhibit MNEs from taking too aggressive a position in their cost sharing agreements."

[6] If the patent is transferred abroad as part of a tax-free exchange (e.g., a §351 or §361 transaction), the transfer is treated as a sale in exchange for deemed annual royalty payments contingent on the productivity, use, or disposition

The first opportunity for tax avoidance occurs at the time of outbound transfer: the U.S. entity can reduce the amount of taxable gain reported to U.S. tax authorities by asserting an artificially low sale price for the patent. The second opportunity for tax avoidance occurs in all future years: as the owner of the patent, the Bermuda affiliate may then charge royalty fees to related foreign entities located in high-tax jurisdictions. For simplicity, I assume straight-line amortization for *n* years that is fully deductible in the low-tax affiliate. If the Bermuda entity reports pre-tax profits π from the patent for *n* years, the benefit of selling the patent is equal to the change in present value of expected after-tax profits:

$$\boldsymbol{\Delta E(\Pi) = -\tau q + PV\left[\pi(\tau - \hat{\tau}) + \hat{\tau}\frac{q}{n}\right]} \quad (1)$$

The firm weighs the costs of paying tax upfront on *q* against the present value of expected tax savings from reporting π income in the low-tax jurisdiction plus any amortization tax shield. We can see the firm is incentivized to set the sale price *q* as low as possible because $\frac{PV}{n} < 1$ for all *r* > 0 and thus, $\frac{\partial \Delta E(\Pi)}{\partial q} < 0$ when $\tau > \hat{\tau}$.

The threshold q^* where the firm will choose to transfer if $q < q^*$ is:

$$\boldsymbol{\frac{q^*}{PV\pi} = \frac{(\tau - \hat{\tau})}{\tau - PV\frac{\hat{\tau}}{n}}} \quad (2)$$

If, under arms-length pricing, the firm must set *q* to exactly equal to the present value of the future π income streams (i.e. $\frac{q^*}{PV\pi} = 1$), the firm will never have an incentive to transfer the intangible. At best, under arms-length pricing, when $\hat{\tau} = 0\%$, the firm will be indifferent between shifting and keeping the intangible at home.

We can see from Equation (1) that the benefits from transferring IP offshore depend on the wedge between the true income π generated and the initial sale price *q* at the time of transfer. In the setting of IP, this wedge can be economically large, resulting in significant erosion of the corporate tax base. Particularly in today's information economy, IP, including patents, has become the most valuable asset for an increasing number of firms. The combination of a potentially very high π along with a likely zero tax basis in self-created IP due to the

of the property. These deemed royalty receipts are taxed as ordinary income and must be commensurate with the income attributable to the intangible (IRC §367(d)).

deductibility of R&D creates an incentive for the firm to assert as low a sales price as possible. The setting of IP provides an opportunity for this wedge: due to the often idiosyncratic and unique nature of IP, firms may exploit their information advantage regarding the true value of the intangible. For patents in which novelty is an explicit characteristic, tax regulators may have few, if any, comparable transactions available to enforce arm's length pricing regulations.[7]

I use patents in this paper as offshore transfers of patents are empirically observable using publicly available data; yet, the basic framework can be applied to any other type of intangible property, in which the expected benefits depend on the wedge between the true arm's length price and the sale price asserted upon transfer. I caution, however, that my empirical findings cannot generalize to the corporate transfer behavior of other types of intangible property.

2.2 Recent IP Tax Reform

Although high-profile reports have only recently heightened media, political, and public scrutiny of firms offshoring valuable IP to tax havens, corporate use of IP as a vehicle for international tax avoidance has been a long-standing concern for governments seeking to combat erosion of their corporate tax bases. For example, in 1984, Congress enacted the §367(d) deemed annual income inclusion regime, fearing companies may "reduce their U.S. taxable income by deducting substantial research and experimentation expenses associated with the development of the transferred intangible and, by transferring the intangible to a foreign corporation at the point of profitability, to ensure deferral of U.S. tax on the profits generated by the intangible."[8]

Yet within the past ten years, the corporate tax landscape regarding the treatment of low-taxed intangible income has drastically changed, particularly as corporations operate in an increasingly multinational economy with intangibles driving overall firm value and corporate income. One major worldwide development occurred in 2015, when the OECD Base Erosion and Profit Shifting (BEPS) project released an entire Action item (Action 8) regarding intracompany transactions involving intangibles, with requirements for economic substance. The guidance clarifies that "legal ownership alone does not necessarily generate a right to all (or indeed any) of the return generated by the exploitation of the intangible", emphasizing that

[7] In line with this, firms may transfer the IP as early in its lifecycle as possible, when little information revealing the true value of the IP is available to the tax regulator. I explore this empirically in Section 4.3.4.

[8] Tax Reform Act of 1984, H.R. Rep No. 432 (II), 98th Cong., 2d Sess. 1316 (Mar. 5, 1984).

returns must be allocated based on which entities perform key functions, manage risks, and use assets, rather than merely holding legal title (OECD, 2015). This emphasis on economic substance with a functional analysis of where the key functions of IP are performed (the development, enhancement, maintenance, protection, and exploitation functions, or "DEMPE") may increase the tax uncertainty associated with locating mere legal ownership of a patent in a dot tax haven. This may then increase the relative attractiveness of larger, Big 8 tax havens capable of hosting economic activity that may satisfy economic substance requirements.

In the U.S., the 2017 Tax Cuts & Jobs Act (TCJA) was a major overhaul of the tax system, with specific provisions targeting low-taxed intangible income. Prior to the TCJA, the U.S. operated under a worldwide taxation regime that subjected all the firm's income to U.S. corporate income tax, regardless of where the income was earned. The firm, however, may defer any U.S. tax on its foreign affiliate's earnings until the earnings are repatriated to the U.S. The firm may also avoid any recognition of deferred income tax expense on its financial statements by designating its foreign earnings as "indefinitely reinvested abroad".[9] With the passage of the TCJA, the U.S. shifted to a modified territorial tax regime that no longer subjects a firm's foreign-sourced income to U.S. taxation. The firm now enjoys permanent savings of U.S. income tax, rather than mere deferral until repatriation.

While this shift to a territorial regime increases the relative attractiveness of shifting income to a tax haven, other provisions in the TCJA were designed to decrease the relative attractiveness of income shifting, particularly involving intangibles such as patents. First, the Global Intangible Low-Tax Income (GILTI) levies a roughly 10.5% minimum tax on excess foreign income reported by U.S. multinationals, which may reduce the expected tax savings from assigning a patent to a tax haven. Second, the Foreign-Derived Intangible Income (FDII) deduction offers a preferential 13.125% tax rate targeting income generated by IP located within the U.S., further increasing the relative attractiveness of locating IP in the U.S. (Sharma et al., 2023). Third, the Base Erosion and Anti-Abuse Tax (BEAT) levies a 10% "top up" tax on large multinationals' corporate income after adding back related-party deductions, including royalties

[9] ASC 740-10-25-3

for use of IP.[10] Thus, firms may decrease the number of patents transferred to and/or kept within dot havens due to the decrease in relative attractiveness of locating IP offshore post-TCJA.

Yet the design and administration of GILTI and FDII may result in an insignificant change in corporate patent transfers to tax havens. Because GILTI is a "blended" minimum tax calculated on the tax burden of *all* foreign income streams, income reported in low-tax foreign jurisdictions such as dot havens can be used to offset income earned in high-tax foreign jurisdictions (Garcia-Bernando et al., 2023; Dyreng et al., 2023). Additionally, the incentives of FDII to keep IP onshore in the U.S. and/or repatriate offshore IP back to the U.S. may be muted due to uncertainty around its lasting nature and considerable compliance and administrative costs (Vari, 2021, Avi-Yonah, 2025). Whether and how corporate patent transfers to tax havens change over time in response to these reforms is largely an open question.

2.3 Prior Empirical Literature

The use of tax instruments to influence a firm's decision in where to locate its IP is aligned with the empirically well-documented phenomenon that patent location choice is sensitive to corporate tax rates. Karkinsky and Riedel (2012), Baumann et al. (2020), and Ciaramella (2023) use aggregate patent data from the European Patent Office and find multinationals systematically distort patents toward lower taxed affiliates, and that more valuable patents are more likely to be located in lower-tax affiliates. Bilicka et al. (2023) and LaBelle and Santacreu (2023) use worldwide patent transaction data and find a disproportionately high number of patents are held in tax havens, relative to the number of inhabitants and local innovation activity. Within a domestic context, Li et al. (2021) use USPTO Assignments data and find firms assign fewer patents to states that do not tax intangible income (Delaware, Nevada, Wyoming, and Michigan) after the adoption of state addback statutes. Taken together, these findings suggest taxes matter in the location choice of a patent within a firm: an estimated one percentage point increase in an affiliate's corporate tax rate is associated with a 0.5-3.9% fall in patent holdings for that affiliate (Griffith et al., 2014). These studies establish the sensitivity of patent location to changes in tax rates in aggregate, yet due to non-obvious connections to firms,

[10] On July 4, 2025, President Trump signed the One Big Beautiful Bill Act (OBBBA) into law, which includes changes to GILTI, FDII, and BEAT effective for tax years beginning after December 31, 2025. These changes include slight increases in the effective rates, as well as changes in the tax base calculation that may be ultimately favorable or unfavorable for tax haven patent transacting firms. Due to lack of data availability, I am currently unable to examine any incremental changes in patent transaction behavior following the OBBBA.

we know little about the firm characteristics and outcomes of those responsible for tax haven patents and how they may heterogeneously respond to reforms targeting intangible income.

Another stream of literature uses firm-level financial data to examine the relationship between intangible investment and various measures of corporate tax avoidance. Firms with high levels of R&D expense (Grubert and Slemrod, 1998; Grubert, 2003; Gao et al., 2016) and a large number of patents (Dyreng et al., 2019; Cheng et al., 2021) report lower tax burdens than their less innovative counterparts, aligned with IP facilitating tax avoidance. However, innovative activities are explicitly given preferential tax treatment by policymakers (e.g. R&D tax credits) due to the inability of firms to fully internalize the returns to their innovative activities (Hall, 2019). The negative relationship between intangible investment and tax burdens may capture a very different type of tax avoidance – one that is explicitly provisioned by policymakers.

In this paper, I create a novel database linking publicly traded firms to tax haven patent transactions to provide a microeconomic perspective of the firm-level determinants and outcomes of this tax avoidance strategy. By focusing my analysis on dot tax havens, I provide relevant evidence of a tax avoidance structure of concern to regulators and policymakers worldwide.

Chapter 3 Data and Sample

3.1 USPTO Assignments Data

I use the publicly available data on legal patent assignments from the United States Patent and Trademark Office (USPTO) to identify changes in patent ownership. The USPTO Patent Assignment Dataset contains roughly 10.5 million patent assignments recorded at the USPTO since 1976, involving approximately 18.8 million patents and patent applications (USPTO, 2023). The USPTO records and publishes these assignments to give third parties notice of any changes in legal title or ownership interests for patents and patent applications. As such, numerous transactions involving USPTO patents including sales to external parties, internal transfers within an organization, employee assignments of patents to employers, mergers, and security interests are recorded in the USPTO Assignments dataset.

The USPTO Assignments dataset is compiled from all patent transactions voluntarily disclosed by the transacting parties to the USPTO. After the transacting parties execute and sign a written agreement to transfer patent ownership rights, the parties may optionally record the assignment electronically [11] or by mail with the USPTO Assignment Services Branch.[12] While it is not mandatory for firms to disclose changes in patent ownership, 35 USC §261 outlines potential legal risks for failure to disclose assignment of ownership rights to the USPTO. Failure to record a patent assignment may result in an inability to take future legal action involving the patent at the USPTO, loss of entitlement to priority, and loss of standing in court to protect the patent in case of future infringement. (Graham et al., 2018). I use this public dataset of USPTO patent assignments to identify when firms transfer ownership of patents to tax haven affiliates.

It is important to note the USPTO Assignments dataset captures *legal* assignments of patent ownership rights. The taxable income generated from a patent is assigned to the patent's *economic* owner, which may not be synonymous with the patent's legal owner. Because I only

[11] Electronic filings of assignments to the USPTO began in 2003.

[12] There is a fee of $40 per property, which was eliminated for conveyances recorded electronically after December 31, 2013. Graham et al., (2018) describes the "prescribed fee for recording was negligible for most transactions".

observe the subset of firms that use the transfer of legal title as a mechanism to assign economic ownership rights *and* voluntarily disclose this transfer to the USPTO, I capture a lower bound of the scope of firms shifting IP to tax haven countries.

The Assignments dataset includes details of each transaction including: assignor name, assignee name, assignee country, execution date, patent and/or application numbers involved, and conveyance type. I remove duplicate transactions following Graham et al. (2018) and any transactions missing patent or assignee information. I exclude transactions related to security interest agreements[13] as well as transactions involving multiple assignees from separate firms.[14] To capture corporate patent transfers, I remove any transaction involving assignees that are likely individuals, universities, government bodies, or non-profit institutions using a name standardization algorithm developed by Cockburn et al. (2009).[15] I include transactions executed in years 1980 through 2022 due to limited filings prior to 1980 and truncation in recent years due to reporting lags.

Matching tax haven entity names in the Assignments dataset to public Compustat firms is a nontrivial task due to frequent misspellings, lack of name standardization, and non-obvious connection to firms. I leverage a combination of fuzzy string matching, hand-collection, and the updated dataset from Kogan et al. (2017)[16] to match tax haven assignees to Compustat firms.

3.2 USPTO Tax Haven Assignments

I begin by descriptively examining corporate patent transfers to tax havens at the patent-transaction level. Of the approximately 4.74 million unique USPTO patents and patent applications assigned to corporate entities outside of the U.S., 11.54% (approximately 548,000 patents) are assigned to a corporate affiliate in a tax haven country.

I further distinguish between types of tax havens. I separate assignees in "dot" tax havens and assignees in "Big 8" tax havens. Big 8 tax havens (Hines and Rice, 1994; Desai et al., 2006; De Simone and Olbert, 2022) are larger tax haven countries with local infrastructure to

[13] This includes conveyance types "security" and "release". I also remove any assignments falling on the exact date of a security assignment involving the same set of patents and assignees, regardless of conveyance type.

[14] Multiple assignees may occur due to transferring partial ownership interests. It is unclear what rights, benefits, and control an assignee has with only a partial ownership interest.

[15] The algorithm was developed specifically for standardizing assignee names for the NBER Patent Data Project.

[16] I use the 2022 update of the dataset. I thank Noah Stoffman for the data.

support real economic activity (e.g., Hong Kong, Ireland, Singapore), while "dot" tax havens are small, often island economies with little economic activity (ex. Bermuda, Cayman Islands, Bahamas).[17] Transfers to assignees in Big 8 havens may not be purely tax motivated, and true economic activity involved in the development and exploitation of the patent may be occurring within these countries. Transfers of patents to assignees in dot tax havens are likely purely tax motivated; it is highly unlikely these transfers are driven by non-tax, economic considerations such as the local innovation ecosystem or technological spillovers (Bloom et al., 2013; Feng and Jaravel, 2020).

Of the patents assigned to tax havens, a quarter (approximately 112,000 unique patents) are transferred to corporate dot haven entities. I match 72% of these patents to dot haven affiliates of approximately 800 unique U.S. and foreign-incorporated firms in Compustat Global and North America.

To examine how tax haven patent assignments evolve over time, I graph the number of patents transferred to dot (Big 8) havens in Figure 1 (Figure 2) Panel A, and the number of unique Compustat firms transferring patents to dot (Big 8) havens in Figure 1 (Figure 2) Panel B. To mitigate volatility from large, one-time transfers, I log-transform the number of patents in Panel A to capture the intensive margin of patent shifting to tax havens. The solid line represents U.S.-incorporated Compustat firms; the dashed line represents transfers executed by foreign-incorporated Compustat firms, excluding firms incorporated in dot (Big 8) tax havens for Figure 1 (Figure 2).[18] The dotted line in Panel A in Figures 1 and 2 represents patents transferred to corporate haven entities unmatched to a Compustat firm.

As shown in Panel A in Figures 1 and 2, the number of patents transferred to dot and Big 8 tax havens rises over time for both foreign and U.S. Compustat firms, with a dramatic spike in the number of patents transferred to dot havens by U.S. firms in 1997 (Figure 1, Panel A). This coincides with the passage of the 1997 Check-the-Box (CTB) regulations, which allowed U.S. multinationals to circumvent anti-income shifting provisions around passive income, including royalty income (Mutti and Grubert, 2009; Blouin and Krull, 2018; Altshuler et al., 2024). In

[17] The full list of tax haven countries is in Appendix B.

[18] Patent assignments to dot haven affiliates of foreign firms incorporated in dot havens may capture primarily trends in true innovation activity rather than tax avoidance activity (ex. Employees assigning patents to the parent entity incorporated in Bermuda). Similarly, patent assignments to Big 8 haven affiliates of foreign firms incorporated in Big 8 havens may capture primarily innovation trends, rather than tax avoidance.

contrast to the dramatic spike in patents transferred to dot tax havens, U.S. firms only modestly increase the number of patents transferred to Big 8 haven affiliates after CTB (Figure 2 Panel A). The sharp rise in patent assignments to dot haven countries, and a lack of response to Big 8 haven countries, suggests CTB may have facilitated a decoupling of real production activity from the location of intangible assets, allowing U.S. multinationals to take advantage of smaller, dot haven countries with little infrastructure to support real activity (Altshuler and Grubert, 2005). As further support of CTB facilitating this decoupling of real activity from intangible output, I find the increase in patents assigned by U.S. firms to Big 8 havens following CTB is primarily driven by patents with U.S.-only inventors, rather than an increase in innovation abroad (Figure 3, Panel B).

On the extensive margin, the number of unique U.S. and foreign Compustat firms transferring patents to dot havens follow each other closely, with an apparent decline for both U.S. and foreign firms starting around 2015 (Figure 1, Panel B). This coincides with the OECD Base Erosion & Profit Shifting (BEPS) Action 8 directive on transfer pricing of intangibles. While the OECD BEPS directive itself does not change legal risk or penalties assessed (individual countries must change their own tax laws and regulations to align with BEPS), firms may still respond by decreasing usage of dot havens due to increased perceived regulatory scrutiny or increased expected penalties and compliance costs.[19]

Consistent with the directive increasing the perceived expected costs of IP tax avoidance structures with little economic substance, the extensive margin of firms transferring patents to Big 8 havens does not exhibit a similar decline. Instead, the number of unique U.S. and foreign firms rises and plateaus, with the number of U.S. firms transferring patents to the Big 8 declining starting in 2018, which coincides with the U.S. Tax Cuts and Jobs Act (TCJA). In Section 4.3.3, I empirically examine if firms transfer patents previously stashed in dot tax havens to Big 8 tax havens following the TCJA.

In Table 1, I present descriptive statistics regarding the number of unique patents and firms assigning patents to dot tax havens by country. The dot tax haven countries with the greatest number of USPTO patents assigned by Compustat firms are the Cayman Islands,

[19] There is some anecdotal evidence aligned with this, as one transfer pricing practitioner states, "Clearly there has been a fundamental shift in the way we look at the division of profits due to the introduction of Base Erosion & Profit Shifting (BEPS)…in a post-BEPS world, less emphasis is placed on legal ownership and more on economic aspects of substance." (Hill, 2016).

Bermuda, Luxembourg, and Barbados, in order. The country with the greatest number of unique corporate assignees is the Cayman Islands, with 159 unique U.S. and foreign Compustat firms assigning at least one patent, followed by Luxembourg (134 firms) and the British Virgin Islands (117 firms).

3.3 Firm-Level Sample Construction

I restrict my sample to non-regulated firms with non-missing assets in Compustat. [20] For the purposes of this study, I focus my main empirical analysis on U.S.-incorporated firms. By using the USPTO data, I do not capture patents filed only in foreign patent offices, and not in the U.S. However, firms typically file for patent protection in key product markets, unless they relate to products or services unlikely to be sold in those markets. Because I focus my analysis on U.S.-incorporated firms, I expect most patenting behavior to be captured by USPTO filings; however, I caution my analysis does not generalize to any foreign patents held by these firms.[21]

I start my sample in 1989, as this is the initial year firms are required to disclose cash taxes paid in the Statement of Cash Flows.[22] I end my sample in 2022 due to downward truncation bias in later years in the patent data, as transactions executed in recent years may not yet be disclosed. Using the matched USPTO-Compustat Assignments data, I create a dynamic patent portfolio at the firm-year level. I sum the number of patents and patent applications held by the firm at the country-year level, where a firm-country's patent stock increases with any new assignments and decreases when any patents are transferred out of the country. If there is no subsequent transaction for a patent, I assume the patent stays within that firm-country until expiration. I estimate patent expiration dates as twenty years after the filing date for granted patents, and three years after the filing date for ungranted patents.[23]

[20] I define regulated as firms with SIC codes between 4900-4999 and 6000-6999 (utilities, financial firms). I also exclude firms with "TRUST" or "LP" in the parent name, indicating likely pass-through entities (Dyreng et al., 2023).

[21] In line with this, I do not capture patents directly filed in tax haven jurisdictions, and not in the U.S. While firms may employ this strategy to attribute ownership of patents to tax haven affiliates, Bilicka et al. (2023) use global patent data from *Orbis IP* to find the share of initial patent applications in tax havens is minimal relative to other countries, "consistent with the location of the application being the market where firm seek protection for their innovation."

[22] FASB Statement No. 95, effective fiscal years ending after July 15, 1988.

[23] Estimations remain unchanged when adjusting the expiration date to 1 year after filing date for ungranted patents.

I use this dynamic patent portfolio to calculate the number of patents assigned to affiliates in dot tax haven countries and Big 8 tax haven countries for each firm-year, where the number of patents varies across time as patents are traded and expire. I require non-missing control variables and pretax income greater than zero, as firms with losses do not incur tax expenses or receive current tax benefits (Dyreng et al., 2017). My main empirical sample consists of 52,514 firm-years between 1989 and 2022, with 6,974 unique firms.

Table 2 presents descriptive statistics for the full sample. 2.2% of firm-years have at least one patent located in a dot tax haven (*DotPatent*), while 5.4% of firm-years have at least one patent located in a Big 8 tax haven (*Big8Patent*). The average (cash) effective tax rate is (27%) 29.3%,[24] but there is considerable variation, with (cash) ETRs as low as (0.8%) 0% in the 10th percentile and as high as (53.3%) 43.2% in the 90th percentile.

[24] This aligns with estimates from prior literature; Dyreng et al. (2017) find ETRs range from 26-31% pre-TCJA.

Chapter 4 Empirical Analysis

4.1 Which Firms Transfer Patents to Tax Havens?

4.1.1 Industry-Level Descriptives

To examine which firms transfer patents to tax havens, I begin by examining the industry composition of U.S. public firms transferring patents to tax havens. In Table 3, Panel A, I present descriptive statistics of patent transactions by SIC-2 industry. The industries with the greatest number of patents assigned to dot tax havens are Electronic Equipment (12,920 *N Dot Patents*), Medical Equipment (2,853), and Chemicals (1,247). Chemicals, Electronic Equipment, and Services[25] have the greatest number of unique U.S. public firms assigning patents to dot tax havens (Column 3). In Panel B, I provide the names of the ten U.S.-incorporated firms assigning the greatest number of patents to dot havens. Semiconductor companies under the Electronic Equipment industry, an industry heavily dependent on patent protections, clearly dominate, accompanied by Medical Equipment and Chemicals companies.

Two descriptive observations are of note. First, offshoring patents to tax havens is not limited to technology or pharmaceutical companies, although these industries clearly dominate. Firms in industries such as Manufacturing, Transportation, and Wholesale Trade also assign patents to dot havens. Second, the aggregate number of U.S. public firms linked to a patent assignment to a dot tax haven is limited: approximately 350 unique firms. To account for differences in patenting across industries, I scale by the total number of U.S. public firms once involved in a patent assignment during the 1980-2022 period (*N Total Firms* Column 5). Even among the pool of public firms assigning patents, only 6% of firms in the Electronic Equipment and Wholesale Trade: Durables industries assign patents to dot havens (*% Dot Firms* Column 6). No more than 14% of U.S. public patent-transacting firms in any industry assign patents to Big 8 havens (*% Big 8 Firms* Column 7).

[25] Services includes SIC-2 code 73 – Business Services, which includes many technology companies..

I graph how the share of firms assigning patents to tax havens changes over time by industry in Figure 4. In Panel A, I graph the share of firms with at least one patent assigned to a dot tax haven affiliate. Technology and pharmaceutical firms in Electronic Equipment, Services, and Chemicals were somewhat "first-movers", with firms transferring patents to dot havens as early as the 1980s. Firms in the Retail industry started transacting patents to dot havens much later, in the late 1990s.

The descriptive evidence reveals considerable heterogeneity in firms choosing to engage in tax haven patent transfers, even within patent-intensive industries. While patent assignments do not capture the full scope of IP-based tax avoidance (notably, cost-sharing agreements need not involve any legal assignment of a patent), firms clearly face heterogeneous costs in transferring patent ownership to tax havens abroad. I examine firm characteristics associated with the likelihood of transferring a patent to a dot haven in the univariate and determinants analyses below.

4.1.2 Univariate Analysis

While the prior industry descriptive analysis provides insight to the types of industries assigning patents to dot havens, I examine firm-level characteristics associated with transferring patents to dot havens. I first conduct a univariate analysis in which I compare the differences in sample means for three groups of firm-year observations: 1) the first year a firm transfers a patent to a dot tax haven, 2) the first year a firm transfers a patent to a Big 8 tax haven, and 3) the first year a firm transfers a patent to a foreign non-tax haven country. I present the results of this univariate analysis in Table 4, Panel A.

2003 is the average year firms in my sample first begin sending patents to tax havens. The average year firms begin sending patents to non-tax haven foreign countries is four years earlier, in 1999 (*Year*). While I find little difference in firm characteristics when comparing the first years in which firms send patents to dot havens versus Big 8 havens (Column 4), firm-years are vastly different when comparing the first year a patent is sent to a tax haven versus a non-tax haven foreign country (Columns 5 & 6). The first year in which a firm transfers a patent to a tax haven is on average, larger, has lower inventory and capital intensity, and higher likelihood of disclosing a tax haven subsidiary in Exhibit 21. I further explore this in a multivariate regression analysis below.

4.1.3 Determinants Analysis

To evaluate which firm characteristics are associated with the presence of a patent in a dot haven affiliate, I run the following linear probability model:

$$\begin{aligned} DotPatent_{it+1} = {} & \beta_1 CashETR_{it} + \beta_2 ETR_{it} + \beta_3 Big8Patent_{it} + \beta_4 ForeignPatent_{it} \\ & + \beta_5 TotalPatent_{it} + \beta_6 \%ForeignSales_{it} + \beta_7 Size_{it} + \beta_8 Leverage_{it} \\ & + \beta_9 Inventory_{it} + \beta_{10} CapEx_{it} + \beta_{11} ROA_{it} + \beta_{12} R\&D_{it} + \beta_{13} Loss_{it} \\ & + \beta_{14} HavenSub_{it} + FixedEffects + \varepsilon_{it+1} \end{aligned} \quad (3)$$

$DotPatent_{i,t+1}$ is a binary variable equal to 1 if firm *i* in year *t* has at least one patent in a dot haven affiliate. I estimate Equation (3) on two subsamples of firm-years: 1) All patent-transacting firms (i.e., all firms transferring at least one patent domestically or abroad during 1989-2022), and 2) All patent-transacting firms with at least one foreign transaction (i.e., firms transferring at least one patent abroad to a foreign haven or non-haven affiliate during the sample period).

I present the results of Equation (3) in Table 4, Panel B with a variety of fixed effects structures; Columns 1-3 present results on the sample of all patent-transacting firms; Columns 4-6 on the subsample of multinational patent-transacting firms. Unsurprisingly, firms with at least one patent in a Big 8 tax haven, higher R&D-intensity, and a disclosed haven subsidiary in year *t* are more likely to have at least one patent located in a dot haven affiliate in year *t+1*. Effective tax rates (*ETR)* are significantly negatively associated with $DotPatent_{i,t+1.}$ Because *DotPatent* is highly sticky within a firm (once a firm transfers a patent to a dot haven, that firm usually keeps at least one patent in a dot haven in years thereafter), the negative relation between ETR_{it} and $DotPatent_{it+1}$ likely reflects autocorrelation in tax savings. Similarly, $CashETR_{it}$ is negatively associated with $DotPatent_{it+1}$ across all specifications, though generally not statistically significant at the 10% level.

Firms with a higher percentage of sales derived from foreign customers ($\%ForeignSales_{it}$) are also more likely to shift patents to dot tax havens.[26] *Ex ante*, I expect firms with greater amounts of foreign sales to have a greater incentive to transfer IP to a dot tax haven, as tax on foreign revenues generated from IP may be deferred until repatriation. U.S. tax regulations (e.g. Subpart F anti-deferral provisions) make it nearly impossible for multinationals

[26] The percentage of sales derived from foreign customers (*%ForeignSales*) is from the firm's geographic Segment disclosures within its 10-K. U.S. accounting standards require firms to disclose sales based on the geographic location of its external customers, not the amount of foreign revenues reported for tax purposes (SFAS 131).

to successfully defer taxation on domestic U.S. revenues generated from IP; however, a multinational may avoid Subpart F anti-deferral provisions on *foreign* revenues generated from IP using, say, a check-the-box election.

$Size_{it}$ is one of the few covariates strongly associated with $DotPatent_{i,t+1}$ across all specifications. This aligns with conventional wisdom that larger firms engage in greater tax avoidance, particularly tax avoidance schemes involving foreign low-tax jurisdictions (Bilicka et al., 2023). The low adjusted R-squared illustrates the difficulty in predicting patent transfers to dot havens, highlighting the unexplained variation within industries consistent with idiosyncratic costs and benefits that come with engaging in this tax avoidance strategy.

4.2 Estimating Tax Outcomes

4.2.1 Change in ETRs

For my main empirical analysis, I estimate how average worldwide tax burdens change in relation to the number of patents owned in tax haven affiliates. I use the Dyreng and Lindsey (2009) methodology to estimate incremental changes in worldwide tax burdens using financial statement data. A firm's GAAP effective tax rate (ETR) is calculated as the ratio of tax expense to pre-tax financial accounting income.[27] To examine how a firm's ETR changes when patents are assigned to dot tax havens, I estimate the following regression:

$$TXT_{it} = \beta_1 PI_{it} * DotPatent_{it} + \sum_k \beta_2 PI_{it} * Controls_{it}^k + \beta_i PI_{it} + \beta_t PI_{it} + \delta_i + \gamma_t + \varepsilon_{it} \quad (4)$$

where *TXT* represents worldwide income tax expense, *PI* represents pre-tax financial accounting income; thus, the coefficient on *PI* can be interpreted as the average ETR. I augment the original Dyreng and Lindsey (2009) model with firm (β_i) and year (β_t) specific slopes on *PI* to allow for time-invariant heterogeneity in average tax rates across firms and common changes in tax rates across time, as well as additive firm (δ_i) and year fixed effects (γ_t).[28]

The coefficient of interest, β_1, captures the average deviation from each firm-specific ETR in years when the firm has patents transferred to dot tax haven affiliates. $DotPatent_{it}$ is a variable to capture the use of patent transfers to dot tax havens: 1) a binary indicator equal to 1 if firm *i* has at least one patent or patent application in a dot tax haven affiliate in year *t,* 2) the

[27] ASC 740-270

[28] Results are robust to omitting additive firm and year fixed effects and using a purely proportional model.

logged number of patents accumulated in dot haven affiliates for firm *i* in year *t* (*Log(1+DotPatentStock*$_{it}$)) and 3) three indicator variables partitioning *DotPatentStock* to terciles: *DotPatentStock = [1-25]* if between 1 and 25 patents in dot havens; *DotPatentStock = [26-75]* if between 26 and 75, and *DotPatentStock > 75* if greater than 75 patents (the upper tercile of *DotPatentStock*). A negative sign on β_1 indicates average income tax expense reported for each dollar of pre-tax income is lower in years when patents are assigned to dot tax havens, consistent with patents in dot tax havens facilitating tax avoidance.[29] However, β_1 may be insignificantly different from zero, even if transferring patents to dot havens facilitates tax avoidance, as the average change in ETR captures an overall equilibrium change including not only the transfer of a patent to a dot tax haven but also all other tax avoidance and non-tax avoidance choices made by the firm.

I also estimate Equation (4) by replacing income tax expense (*TXT*) with various tax outcomes: total cash taxes paid (*TXPD*) from the firm's Statement of Cash Flows (i.e., the "cash ETR", Dyreng et al., 2008), current worldwide tax expense (*TXC*), current federal tax expense (*TXFED*), and current foreign tax expense (*TXFO*). The vector of *k Controls* includes various time-varying firm characteristics associated with changes in ETRs that may be correlated with patents in dot tax havens: total assets (*Size*), leverage *(Leverage*), R&D expense (*R&D)*, the presence of a tax loss carryforward (*Loss*), disclosed haven subsidiaries in a firm's Exhibit 21 (*HavenSub*)[30], total patents granted to the firm (*TotalPatent*), patents assigned to non-haven foreign affiliates (*ForeignPatent*), and the presence of at least one patent in a Big 8 haven affiliate (*Big8Patent*). For all continuous independent variables, I log-transform to account for proportional effects and center to ease interpretation. I cluster standard errors by firm to adjust for correlation within firm.

Table 5 Panel A reports estimates of the regression shown in Equation (4). I find firms report, on average, 4.2 fewer cents of total income tax expense, 3.8 fewer cents of cash taxes paid, and 6 fewer cents of current income tax expense per dollar of pre-tax income (Columns 2,

[29] Theoretically, if the outbound transfer is structured as an outbound tax sale, I would *ceteris paribus* expect cash taxes paid to increase the year of transfer to reflect the taxable gain. Prior to 2017, income tax expense would be unaffected, as companies did not recognize the income tax consequences of intercompany asset transfers excluding inventory (ASU 2016-16).

[30] Exhibit 21 data is available for years 1993 and on. Missing values of *HavenSub* are imputed with a 0. I thank Scott Dyreng for providing Exhibit 21 data.

4, and 6) after assigning at least one patent or patent application to a dot haven affiliate. This translates to a 14% reduction in cash and GAAP ETR for the average firm. The average reduction in worldwide ETRs is larger than estimates related to disclosure of tax havens in prior literature, with haven subsidiaries in a firm's Exhibit 21 filing associated with a 1.5 percentage point decrease (Dyreng and Lindsey, 2009), and the indication of an actively operating tax haven subsidiary associated with a 2.4 percentage point decrease (Law and Mills, 2022).[31]

Table 5 Panel B presents the results using continuous measures of *DotPatent*. When partitioning *DotPatent* into terciles, I find the absolute magnitude of the coefficient on *PI x DotPatentStock* monotonically increases as the number of patents in dot havens increases. Firms report 3.5 fewer cents of cash taxes paid when there are between 1 and 25 patents accumulated in dot tax haven affiliates, with the magnitude increasing to 4.4 fewer cents of cash taxes paid in the next tercile, and 6.3 fewer cents of cash taxes paid in the top tercile (over 75 patents accumulated in dot havens). Similarly, the magnitude of the coefficient on *DotPatentStock* for income tax expense (*TXT*) is highest among the top tercile of *DotPatent* firms, with 4.9 fewer cents of income tax expense per dollar of pre-tax income. Taken together, firms report lower effective tax rates when a greater number of patents are assigned to dot tax haven affiliates.

4.2.1.1 Robustness Tests

I examine the robustness of the differential tax outcomes associated with dot haven patents to an alternative empirical specification: a staggered stacked cohort difference-in-difference (DiD) event study design. I separate firms that choose to transfer a patent to a dot tax haven into a separate adoption group, with firms that never transfer a patent to a dot tax haven during the 1989-2022 sample period but transfer at least one patent abroad to a foreign non-tax haven country as the benchmark non-adoption group. I define each cohort based on the adoption year ($t = 0$), which represents the first year firm i transfers a patent to a dot tax haven, with year $tx=-1$ as the reference year. For each cohort, I include years $t=-3$ through $t=+4$; thus, I exclude early adopters (i.e., firms with $t = 0$ prior to 1992) and late adopters (firms with $t = 0$ after 2018) from this analysis. I include cohort-by-firm and cohort-by-year specific slopes on pre-tax income (*PI*), cohort-by-firm and cohort-by-year fixed effects, and the same vector of time-varying, firm-specific vector of *Controls* used in the main empirical analysis. Due to repeated control

[31] Results are robust to inclusion of an *ActiveHaven* indicator from Law & Mills (2022).

observations used across various cohorts, I cluster standard errors by firm, rather than by cohort-by-firm. Again, the choice to transfer a patent to a dot haven affiliate is endogenously determined and thus, coefficient estimates cannot be interpreted as causal evidence.

Figure 5 presents event study plots with various *TAX* outcomes as the dependent variable. This alternative specification confirms parallel pre-period trends in tax outcomes among adopting and non-adopting firms, with total ETRs significantly dropping for adopting firms by year $t = +3$.

4.2.1.2 Post 2017 Tax Cuts & Jobs Act

The landscape of U.S. corporate income taxation has dramatically changed over recent years, particularly with the passage of the 2017 Tax Cuts & Jobs Act. To examine how the association between effective tax rates and dot patent assignments changes in today's tax environment, I interact *PI x DotPatent* with $PostTCJA_t$, an indicator equal to 1 for the years after the TCJA (2018-2022).

Table 5 Panel C presents the results. For total income tax (*TXT*), the tax savings from *DotPatent* seem to disappear in the post-TCJA period. However, this may be due to the accrual of the mandatory one-time deemed repatriation tax imposed on undistributed foreign earnings (IRC §965). To mitigate the inclusion of the one-time repatriation tax, I examine current income tax expense (*TXC*) and find an insignificant coefficient on the interaction *PI x DotPatent x PostTCJA*, suggesting a lack of incremental change in the average tax savings enjoyed by *DotPatent* firms post-TCJA. Overall, U.S. firms with patents in dot tax havens continue to enjoy decreases of 4.9 to 5.7 cents in current income tax expense and cash taxes paid per dollar of pre-tax income in the post-TCJA period.

4.2.2 Change in Tax Uncertainty

I examine additions to the firm's balance of uncertain tax benefits (UTB) to estimate the tax uncertainty associated with corporate patent transfers to dot tax havens. Starting in 2007, FIN 48 requires public firms to disclose any tax positions that may not be sustained if examined by a relevant taxing authority. *Ex ante*, I expect a positive relation between UTB additions and patents stashed in dot tax havens due to lack of economic substance that may challenge a dot haven's

affiliate status as the beneficial owner of any resulting income stream.[32] However, firms may choose not to increase reported UTBs, even under significant tax uncertainty, to avoid drawing unwanted scrutiny from the IRS (Bozanic et al., 2017).

I formally test the relation between uncertain tax benefits and the presence of patents in dot tax havens using the following OLS regression:

$$LogUTBAdds_{it} = \beta_1 DotPatent_{it} + \sum_k \beta_2 Controls_{it}^k + \delta_i + \gamma_t + \varepsilon_{it} \quad (5)$$

where *LogUTBAdds* represents logged additions to uncertain tax benefits disclosed in the firm's 10-K, and $DotPatent_{it}$ is an indicator equal to one if firm *i* has at least one patent or patent application in a dot haven affiliate in year *t*. A positive coefficient on *DotPatent* (β_1) is consistent with firms disclosing greater additions to uncertain tax benefits in years with at least one patent in a dot haven. Mirroring Equation (4), I include the same vector of firm-year controls, firm and year fixed effects, and cluster standard errors by firm.

Table 6 presents UTB results. Firms recognize greater additions to uncertain tax benefits when at least one patent is assigned to a dot tax haven relative to when there are no patents assigned to dot havens (Columns 1 & 2). In Columns 3 and 4, I split *DotPatent* to terciles based on the number of patents accumulated in dot havens. Similar to the results in Table 5, Panel B, I find a monotonic increase in the positive and significant association between dot haven patents and UTB additions. Firm-years with the lowest tercile of *DotPatentStock* recognize a 30% increase in UTB additions, with a 90% increase in additions to uncertain tax benefits when the firm has cumulatively transferred over 75 patents to dot tax havens.

Taken together, the tax savings in Table 5 and tax uncertainty in Table 6 suggest firms recognize greater tax savings as firms accumulate a greater number of patents in dot tax haven affiliates. Yet these tax savings come at a cost: tax uncertainty. The tax uncertainty itself not only increases the uncertainty over the firm's claim of future tax benefits but also results in 1) a financial reporting cost in the form of higher income tax expense and lower after-tax income (Dyreng et al., 2019), 2) higher precautionary cash holdings (Hanlon et al., 2017), and 3) increased IRS scrutiny (Bozanic et al., 2017). The probable lack of economic activity within dot

[32] The *Internal Tax Review*'s Intangibles Guide states, "Sustaining the benefits of an IP tax structure depends critically on the firm's ability to put operational substance into the legal entity that owns the IP….Naked IP structures that have little operational substance yet capture all the residual IP profit are therefore susceptible to challenge." (Deloitte, 2013).

tax havens and the lack of comparables regarding an arms-length transfer price are aligned with firms bearing significant tax uncertainty in order to enjoy the significant reduction in effective tax rates. [33]

4.3 Patent-Level Analysis

I complement the above analysis on firm-level determinants and outcomes associated with dot patent transfers with a more granular analysis at the patent-transaction level. The relative attractiveness of locating a patent abroad in a tax haven may have changed due to drastic reforms and increased scrutiny on IP income in the corporate tax landscape within the past 15 years. Firms' perceived changes in the expected costs and benefits may be revealed at the patent-transaction level, as firms may respond to this decrease in relative attractiveness by 1) transferring fewer patents offshore to tax havens, 2) repatriating offshored haven patents back home, or 3) shifting patents between dot havens and Big 8 tax havens.

To examine how corporate patent transfers change over time, I focus my analysis on the time period after the passage of the 2017 TCJA. However, any changes cannot be causally attributed to merely the TCJA, as numerous other changes to the corporate tax landscape such as country-by-country reporting, the OECD BEPS Action 8 directive, and innovation box regimes occur during a similar time period. To examine heterogeneous responses, I separately examine if U.S.-incorporated firms respond differently than foreign-incorporated firms. *Ex ante*, I expect U.S. firms to be more heavily affected by the TCJA than their foreign counterparts, although foreign-incorporated firms, particularly those conducting substantial activities in the U.S., were also heavily affected by the TCJA. For example, while GILTI is levied upon U.S. firms, both U.S.-incorporated and U.S. subsidiaries of foreign-incorporated firms may benefit from the preferential tax rate offered by FDII.

4.3.1 Number of Patent Assignments to Tax Havens

I first examine if public firms change their tax haven patent transfer behavior in the years following the TCJA. The number of patents transferred to tax havens is quite volatile over time (Figures 1 & 2, Panel A); it is difficult to visually evaluate if the trend in the number of patents

[33] Graham et al. (2014) survey corporate tax executives and find the top 3 reasons firms do not implement a tax strategy are: lack of business purpose and/or economic substance, followed by reputational harm, and risk of IRS detection. All of which are associated with the use of dot havens and the resulting UTB additions recognized.

transferred to tax havens significantly changes in the years surrounding the TCJA. To examine this, I estimate the following Poisson regression for any foreign or U.S. public firm *i* assigning a patent to a tax haven affiliate in year *t* in the ten years surrounding the TCJA (2013-2022):

$$NHavenPatents_{it} = \beta_0 + \beta_1 USFirm_{it} + \beta_2 PostTCJA_t + \beta_3 PostTCJA_t * USFirm_{it} + \varepsilon_{it} \quad (6)$$

where $NHavenPatents_{it}$ is $NDotPatents_{it}$ or $NBig8Patents_{it}$: the number of unique patents assigned by firm *i* in year *t* to dot or Big 8 haven affiliates, respectively. $USFirm_{it}$ is a binary indicator equal to 1 if firm *i* is incorporated in the U.S. in year *t*, and 0 otherwise.[34] When *NDotPatents* (*NBig8Patents*) is the outcome variable, foreign firms incorporated in dot (Big 8) havens are excluded to primarily capture tax avoidance activity, rather than innovation activity. $PostTCJA_t$ is an indicator equal to 1 for years 2018-2022, and 0 for years 2013-2017.

The coefficients of interest are $PostTCJA_t$ (β_2)and $PostTCJA_t$ *x* $USFirm_{it}$ (β_3). A negative coefficient on *PostTCJA* indicates a decrease in the expected number of patents transferred to tax havens by foreign firms post-TCJA. Foreign firms filing patents at the USPTO may choose to keep these patents within the U.S. rather than transfer abroad to a tax haven, consistent with the lower tax rate offered on domestic U.S. income from the FDII. A negative coefficient on *PostTCJA*USFirm* indicates an even greater decrease by U.S. firms, possibly due to GILTI. I augment Equation (6) with industry fixed effects (γ_s) and cluster standard errors by firm.

Table 7 presents the results of Equation (6). The coefficients on *PostTCJA* and *PostTCJA x USFirm* are insignificant for both *NDotPatents* (Columns 1 & 2) and *NBig8Patents* (Columns 3 & 4). Consistent with continued tax benefits from locating IP abroad (Table 5, Panel C), firms do not seem to significantly change the number of patents transferred to tax havens after the TCJA.

4.3.2 Repatriations of Dot Patents

Next, I examine the repatriation behavior of firms with patents in dot tax havens. GILTI and FDII may have sufficiently increased the relative attractiveness of the U.S. as a destination for IP. Increased scrutiny over tax avoidance strategies lacking economic substance may further incentivize firms to repatriate patents out of dot haven affiliates back to the U.S., particularly after the OECD Base Erosion and Profit Shifting (BEPS) project in 2015.

[34] $USFirm_{it}$ is time-varying within firm if firm *i* changes its country of incorporation during the sample period (ex. tax inversion).

Figure 6, Panel A presents the logged number of dot haven patents internally transferred *out* of a dot haven to either an assignee in a 1) Big 8 tax haven or 2) the U.S. by public firms over time. The number of patents repatriated out of dot havens back to the U.S. by U.S. firms (the bottom dark green area) appears quite stable over time, with no sign of a spike in dot patent repatriations post-TCJA by U.S. public firms. The number of patents transferred out of dot havens to the U.S. by foreign public firms (the light green area) is quite volatile, with increases in 2019 and 2020.

To formally examine how the number of dot patents repatriated back to the U.S. changes post-TCJA, I estimate the following Poisson regression on any U.S. or foreign public firm *i* with at least one patent or patent application in a dot haven affiliate in year *t*:

$$NTransfersOut_{US_{it}} = \beta_0 + \beta_1 PostTCJA_t + \varepsilon_{it} \quad (7)$$

where *NTransfersOut_US*$_{it}$ is the number of patents located in dot tax haven affiliates that are repatriated back to the U.S. by firm *i* in year *t.* The coefficient of interest is on *PostTCJA*$_t$ (β_1), which captures the average change in repatriation behavior of dot patents back to the U.S. following the TCJA by U.S. and foreign firms. To examine how U.S.-incorporated firms respond differently to the TCJA than foreign firms, I modify Equation (7) by including an indicator *USFirm*$_{it}$:

$$NTransfersOut_{US_{it}} = \beta_0 + \beta_1 PostTCJA_t + \beta_2 USFirm_{it} + \beta_3 PostTCJA_t * USFirm_{it} + \varepsilon_{it} \quad (8)$$

The coefficient on *PostTCJA*$_t$ (β_1) now captures the change in repatriation behavior for foreign firms following the TCJA, while the coefficient on *USFirm*$_{it}$ (β_2) captures the average difference in repatriation behavior between U.S. and foreign firms in the 5 years prior to the TCJA. The interaction (β_3) captures how U.S. firms react differently to the TCJA than foreign firms. I predict a positive coefficient on *PostTCJA* (β_1) if the benefits of locating IP within the U.S. sufficiently increased for foreign firms. For U.S. firms, the increase in expected costs of locating IP in a dot haven due to GILTI combined with the benefits of FDII may additionally increase their responsiveness to the TCJA (i.e., $\beta_3 > 0$).

Table 8 presents repatriation results. I find foreign and U.S. public firms with at least one patent in a dot tax haven repatriate significantly more patents in the 5 years following the TCJA (2018-2022) relative to the 5 years prior (Column 1). However, this increase in repatriations back to the U.S. is driven by *foreign* firms (Column 2). The expected number of dot patents

repatriated back to the U.S. by foreign firms increases significantly from approximately 0.61 patents per year in the pre-TCJA period to 6.39 patents repatriated in the post-TCJA period.

While transfers to dot havens may be primarily tax-motivated, transfers of patents previously stashed offshore to the U.S. may be driven by a multitude of business factors, including marginal tax rates. The significant increase in transfers of dot haven patents to the U.S. by foreign firms may be driven by the lower tax rate on intangible income offered by the FDII, as well as the overall decrease in corporate statutory tax rate (35% to 21%). If, and how much, economic activity and investment followed these patents by foreign firms is uncertain. In an aggregate perspective, as shown in Figure 6, Panel B, the greatest number of unique foreign public firms transferring patents out of dot havens to the U.S. in any given year *t* is only 13, in 2019.

American firms, in contrast, have no significant change in repatriation behavior following the TCJA, with the expected number of dot patents repatriated back to the U.S. rising an insignificant amount from 1.06 patents to 1.14 patents in post-TCJA (Column 2). The lack of significant change in repatriation behavior by American firms suggests GILTI may not have sufficiently increased the costs associated with stashing patents offshore in dot affiliates.

4.3.3 Patents Transfers from Dot Havens to Big 8 Havens

If U.S. firms are not increasing repatriations of dot haven patents back to the U.S. – are they instead transferring dot haven patents to other, larger Big 8 tax haven affiliates? To examine this, I restrict my sample to U.S. public firms with at least one patent or patent application in a dot haven affiliate and estimate the following Poisson regression:

$$NTransfersOut_{itp} = \beta_1 PostTCJA_t + \beta_2 Big8_p + \beta_3 PostTCJA_t * Big8_p + \gamma_s + \varepsilon_{itp} \quad (9)$$

where $NTransfersOut_{itp}$ is the number of patents transferred out of a dot haven affiliate by firm *i* in year *t* to affiliate *p*, where affiliate *p* is located either within the U.S. or a Big 8 haven country. The coefficient on $PostTCJA_t$ captures any change in the number of patents repatriated out of dot havens back to the U.S. by U.S. public firms in the post-TCJA period. I expect β_1 to be insignificant, aligned with the results in Table 8. The coefficient on *Big8* captures any difference in the number of patents transferred out of dot havens to a Big 8 haven relative to the number of patents transferred out of dot havens to the U.S. in the pre-TCJA period. The coefficient of interest is *PostTCJA x Big8*, which captures any differences in repatriation behavior of dot haven patents by U.S. firms after the TCJA. A positive coefficient on *PostTCJA x Big8* ($\beta_3 > 0$) would

indicate U.S. firms increase the number of patents transferred out of dot havens to Big 8 havens, relative to the number of patents transferred out of dot havens to the U.S., in the post-TCJA period.

Table 9 presents the results. In Column 1, I include industry fixed effects; in Column 2, firm fixed effects. Across both specifications, I find a positive and significant coefficient on *PostTCJA x Big8,* consistent with an increase in the number of patents transferred out of dot havens to the Big 8 in the post-TCJA period by U.S. public firms, relative to the insignificant change in the number of patents repatriated out of dot havens back to the U.S. While the results in Table 7 show no significant increase in the overall number of USPTO patents transferred to Big 8 tax havens post-TCJA by U.S. or foreign public firms, the results in Table 9 suggest U.S. public firms may be shifting IP out of smaller dot tax havens to larger, Big 8 tax havens. Visually, this is apparent in Figure 6, Panel A, in which the dark blue area (patents transferred out of dot havens to Big 8 havens by U.S. firms) widens considerably over time, while the dark green area (patents repatriated out of dot havens back to the U.S. by U.S. firms) remains stable.

The increase in patents transferred out of dot havens to Big 8 havens by U.S. firms may indicate a shift away from IP-based tax avoidance strategies with little economic substance, particularly after the OECD Base Erosion and Profit-Shifting Project. This trend largely mirrors where U.S. multinationals are reporting before-tax profits on country-by-country reports to the IRS. Recent IRS data show an increase in U.S. multinational profits reported in Big 8 havens such as Ireland, Singapore, and Switzerland. Meanwhile, the share of U.S. multinational profits in smaller dot tax havens such as Bermuda, the Cayman Islands, and Luxembourg has plummeted since 2018 (IRS, 2025). Whether patent transfers to Big 8 tax havens are accompanied by shifts in the underlying real R&D production is an open question and may present even greater concerns, as the majority of R&D is comprised of wages to highly skilled labor (Glaeser et al., 2025.)

Overall, these findings suggest provisions targeting IP-based tax avoidance in the TCJA were largely ineffective in 1) reducing the number of patents transferred to dot and Big 8 tax havens and 2) increasing the number of patents repatriated from dot havens back to the U.S. by public U.S. firms. I find evidence of some foreign firms increasing repatriations of dot patents back to the U.S. after the TCJA; however, U.S. public firms increasingly transfer dot patents not to the U.S., but rather, to other larger, Big 8 tax havens.

4.3.4 Timing of Patent Transfers

Additionally, I conduct a patent-transfer level analysis to examine if firms strategically time dot haven patent transfers to maximize tax benefits. Firms may be incentivized to transfer the patent as early as possible after filing, when the value of the patent is relatively low. The assignor firm is generally taxed on the built-in gain of the patent at the time of transfer, where the taxable base is defined as the sale price minus the tax basis. If the patent were internally generated (rather than externally acquired), the patent likely has zero basis due to immediate deductibility of R&D expenditures. Thus, firms transferring patents for purposes of tax avoidance may strategically transfer internally generated patents early in their lifecycles to reduce the amount of taxable gain recognized upon transfer. Edward Kleinbard, former chief of staff at the Joint Committee of Taxation, remarked: "Good ideas are identified early and transferred early…We're being gamed because of the low value at the time of transfer." While most patent transfers occur prior to grant (Ciaramella et al., 2017; Graham et al., 2018), we have little large sample evidence if firms transfer patents early in their lifecycles to minimize taxes.

To explore this, I narrow down a subsample of patent transactions in which I expect firms to have relatively greater discretion in timing the transaction of each individual patent. I remove employee assignments, which involve inventor employees assigning patent rights to their employers. I also remove any transactions with conveyance type "merger" or involve over 100 patents and patent applications conveyed, as these likely may also be mergers. Finally, I limit my analysis to *foreign* patent transactions (the assignee is located outside of the U.S.) to examine if dot haven patent transactions differ from other, foreign patent transactions.

I expect internally generated patents assigned to dot tax havens to be transferred earlier in their lives than externally generated patents assigned to dot tax havens. To formally test if internally-generated patents assigned to dot tax havens are transferred relatively early after filing, I run the following linear probability model:

$$\begin{aligned} EarlyTransfer_{i,p,t} &= \beta_1 Internal_{i,p,t} + \beta_2 Big8Haven_{i,p,t} + \beta_3 DotHaven_{i,p,t} \\ &+ \beta_4 Internal_{i,p,t} * DotHaven_{i,p,t} + \beta_5 Internal_{i,p,t} * Big8Haven_{i,p,t} \\ &+ \sum_k \beta_k Controls^k_{i,p,t} + \delta_i + \gamma_t + \Lambda + \varepsilon_{i,p,t} \end{aligned} \quad (10)$$

where *i* indexes the assignee firm, *p* the patent or patent application, *t* the year of transfer. *EarlyTransfer_30 (EarlyTransfer_180)* is an indicator variable equal to one if the patent is assigned within 30 (180) days of the application filing date. *Internal* is an indicator variable

capturing an internally generated patent, equal to one if the patent had never been transacted before, or only transacted within firm *i*. *DotHaven* and *Big8Haven* are indicator variables for the location of the assignee of the patent transaction.

Controls is a vector of patent specific characteristics that may be correlated with how quickly firms assign patents. I include controls for the number of total forward citations (*ForwardCitations*), the number of inventors (*#Inventors*), the presence of a foreign inventor (*ForeignInventor*), the number of claims (*#Claims*), existence of a pre-grant publication (*Published*), and if the patent is ultimately granted (*Granted*)[35]. Importantly, I include filing year by technology class fixed effects (Λ) to account for rightward truncation (Hall et al., 2001) and differences across technology classes.[36] I also include firm fixed effects (δ_i) and transfer year fixed effects (γ_t). Because citations and claims data for ungranted patent applications are only available for published pre-grant applications after the America Inventor's Protection Act enacted on November 29, 2000, I limit my patent analysis to the years after 2000.

Because the sample of assignments is restricted to *foreign* patent assignees, the coefficient on *Internal* (β_1) represents the incremental probability an internally generated patent is transferred early, relative to externally acquired patents also sent abroad. I would expect any transaction costs associated with acquiring patents from a third party that may affect the timing of transfer to be captured by β_1. The coefficients on *Big8Haven* (β_2) and *DotHaven* (β_3) indicate if the probability of early transfer differs among externally acquired patents sent to Big 8 havens or dot havens, relative to externally acquired patents sent to non-haven foreign countries. The coefficient of interest is β_4 on the interaction of *Internal * Dot Haven*. A positive coefficient would indicate firms are more likely to transfer internally generated patents to dot tax havens within one to six months after filing, incremental to externally acquired patents also sent to dot havens and other internally generated patents sent abroad, within the same filing year and technology class.

In Table 10, I present the results from estimating Equation (10). Columns 1 and 2 present the results for *EarlyTransfer_30*, and Columns 3 and 4 present the result for *EarlyTransfer_180*.

[35] These patent characteristics are not time-varying and are instead, ex post revealed characteristics. For example, *Granted* takes on a value of one for all patent applications eventually granted, regardless of whether the application was granted at the time transfer.

[36] I use the Cooperative Patent Classification (CPC) to identify technology classes (Kim and Valentine, 2021).

I find internally generated patents sent to foreign non-havens are 4.6% more likely to be transferred within 30 days (Table 10, Column 2) than externally acquired patents. However, internally generated patents sent to dot havens are 16.4% more likely to be transferred within 30 days of filing the application (Table 10, Column 2) relative to other internally generated patents abroad. Results are similar for *EarlyTransfer_180*; internal patents sent to dot havens are 21.2% more likely to be sent within 180 days of the filing date (Table 10, Column 4). Taken together, these results present evidence consistent with firms transferring internally generated patents to dot havens when the value of the patent is low, soon after filing the application. A low valuation allows the firm to minimize the tax levied at the time of transfer, particularly for internally generated patents with likely zero tax basis.

Chapter 5 Conclusion

I examine how corporations transfer patents to tax havens. Even with no change in underlying economic activity, firms may transfer legal patent ownership to affiliates in tax haven countries, allowing future income to be taxed at minimal or zero tax rates. This practice has raised considerable concern from policymakers, leading to reforms worldwide. Prior studies have established the relation between aggregate patent flows and tax rates, yet we have little understanding of how much firms actually benefit from shifting patents to dot tax havens. I seek to fill this gap in the literature by providing large-sample, firm-level evidence of which firms are engaging in this tax avoidance strategy, the estimated magnitude of tax benefits and uncertainty faced by these firms, and how U.S. and foreign public firms heterogeneously change patent transfer behavior to tax havens following the TCJA.

I find transferring patents to dot tax havens is significantly associated with meaningful reductions in worldwide tax burdens. Firms transfer patents to dot tax havens early in their lifecycles when the value is low, consistent with minimizing the tax due upon transfer. After assigning patents to dot tax havens, firms report (cash) effective tax rates (3.8) 4.2 percentage points lower, on average, consistent with dot haven patents facilitating tax avoidance. I find no evidence of any change in tax savings nor the overall number of patents transferred to tax havens following the TCJA. I find evidence of some foreign firms increasing repatriations of dot haven patents back to the U.S. post-TCJA. However, U.S. firms increasingly transfer patents out of smaller, dot havens to larger, Big 8 tax havens instead.

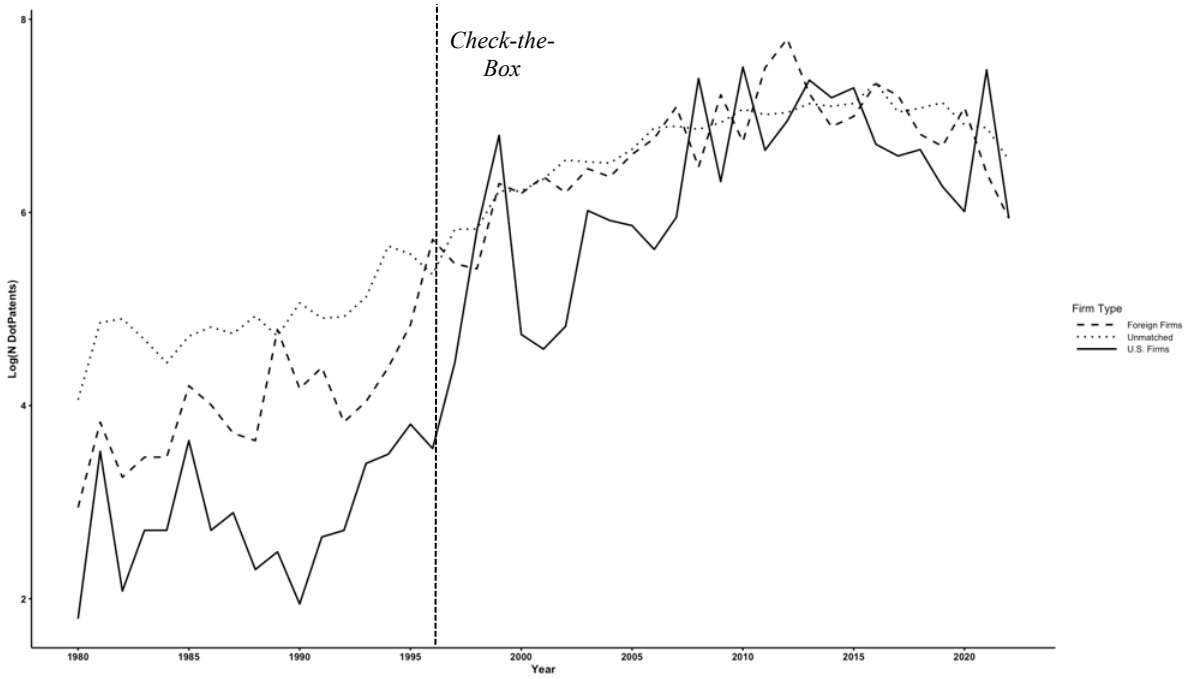
This paper contributes to the rich literature on corporate tax avoidance by providing relevant microeconomic evidence of a specific income shifting strategy increasingly scrutinized by policymakers worldwide: the transfer of patent ownership to tax haven countries. By creating a novel database linking publicly available USPTO assignments data to financial information in Compustat, I develop a firm-level, large-sample approach to assessing a specific tax avoidance strategy at the firm-level, offering insights into corporate tax avoidance strategies often hidden from the public eye.

Figures

Figure 1: Patent Transfers to Dot Tax Havens

This figure plots patent transfer activity to dot havens by U.S. (solid line) and foreign-incorporated (dashed line) firms from 1980-2022. Panel A presents the logged number of patents assigned to dot havens in year *t*. The dotted line represents dot haven patents unmatched to a public firm. Panel B presents the number of Compustat firms assigning at least one patent to a dot haven affiliate in year *t*. Patent transaction activity for foreign firms incorporated in dot havens are excluded.

Panel A: Logged Number of Dot Patent Transfers



Panel B: Number of Firms Transferring Patents to Dot Havens

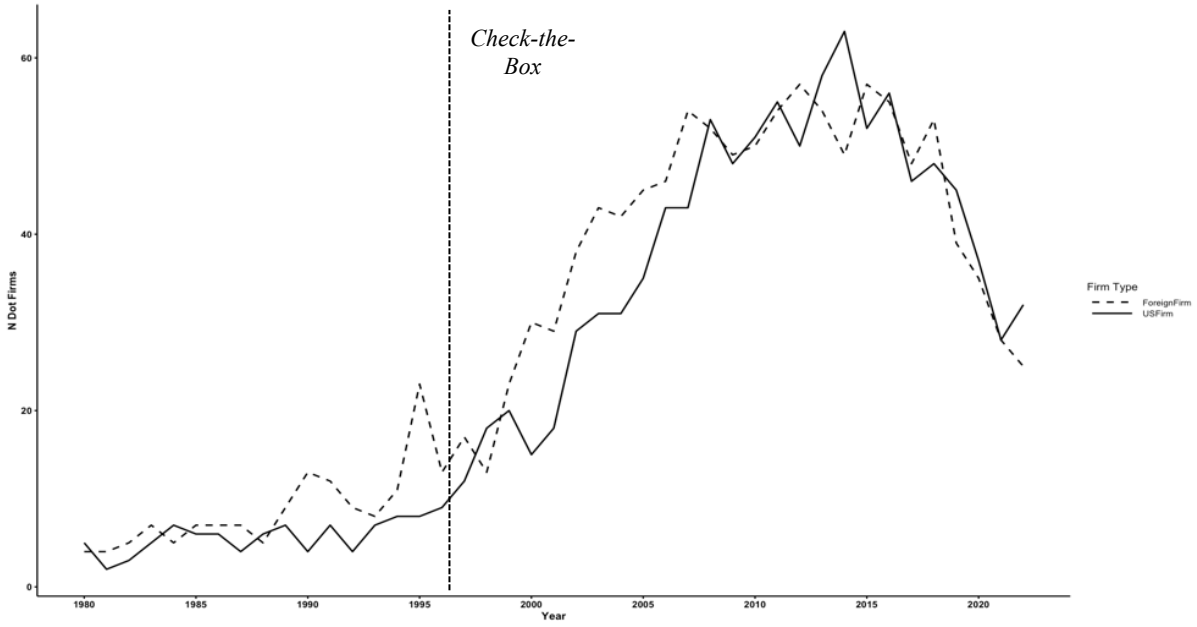
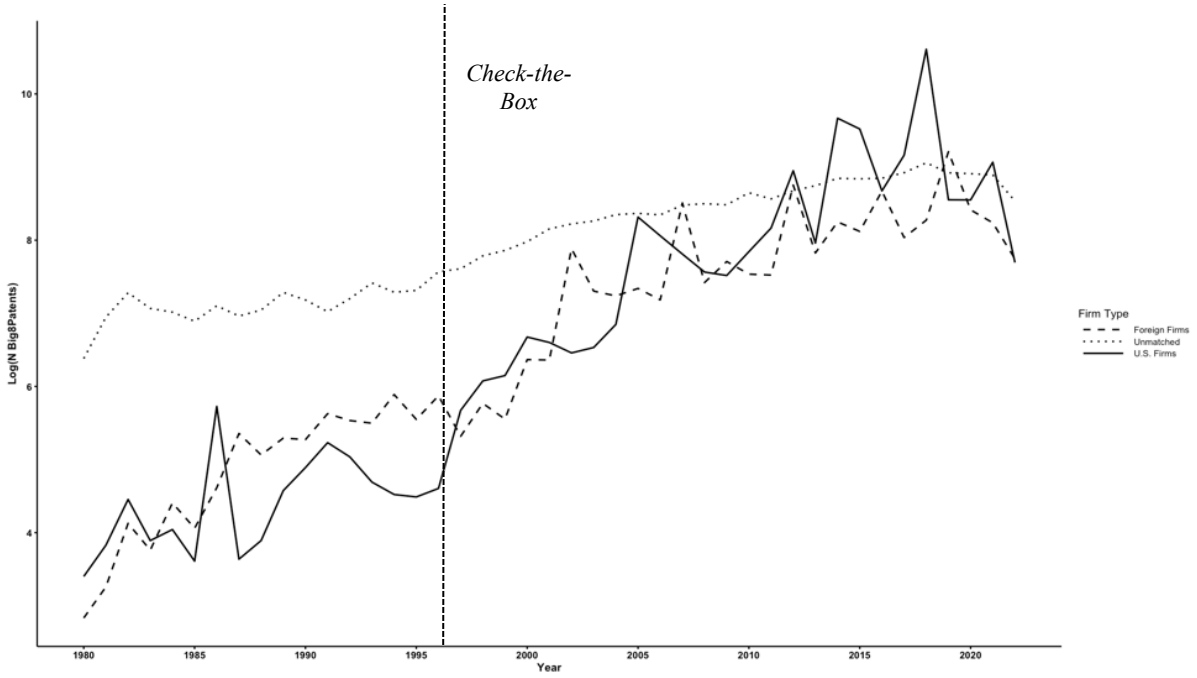


Figure 2: Patent Transfers to Big 8 Tax Havens

This figure plots patent transfer activity to Big 8 havens by U.S. (solid line) and foreign-incorporated (dashed line) firms from 1980-2022. Panel A presents the logged number of patents assigned to Big 8 havens in year t. The dotted line represents Big 8 haven patents unmatched to a public firm. Panel B presents the number of Compustat firms assigning at least one patent to a Big 8 haven affiliate in year t. Patent transaction activity for foreign firms incorporated in Big 8 havens are excluded.

Panel A: Logged Number of Big 8 Patent Transfers



Panel B: Number of Firms Transferring Patents to Big 8 Havens

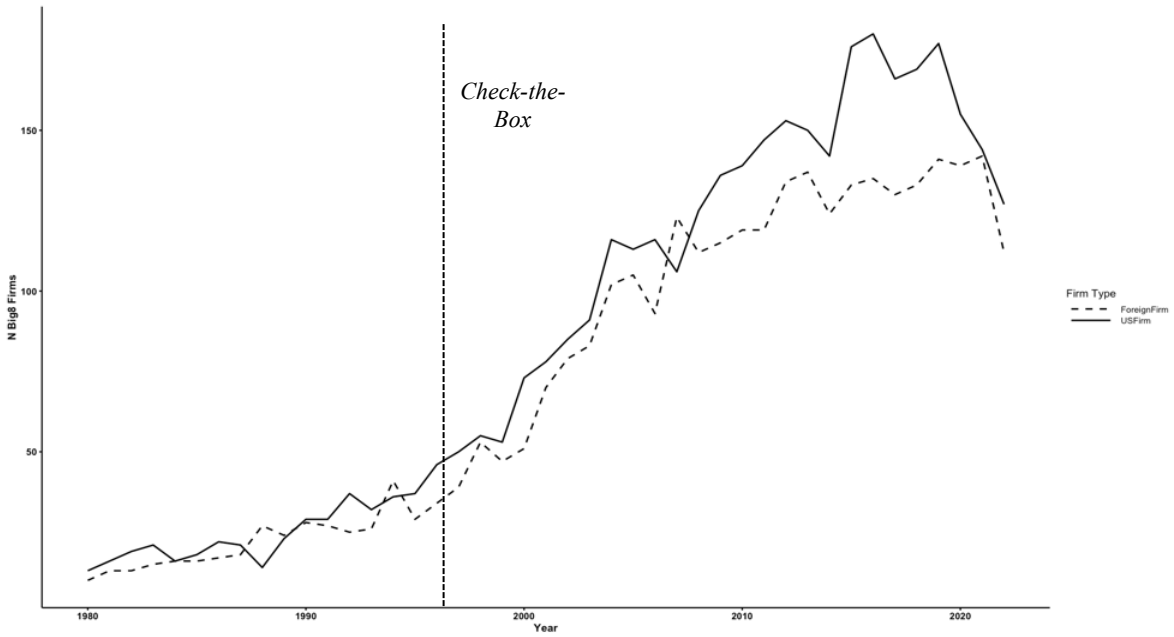
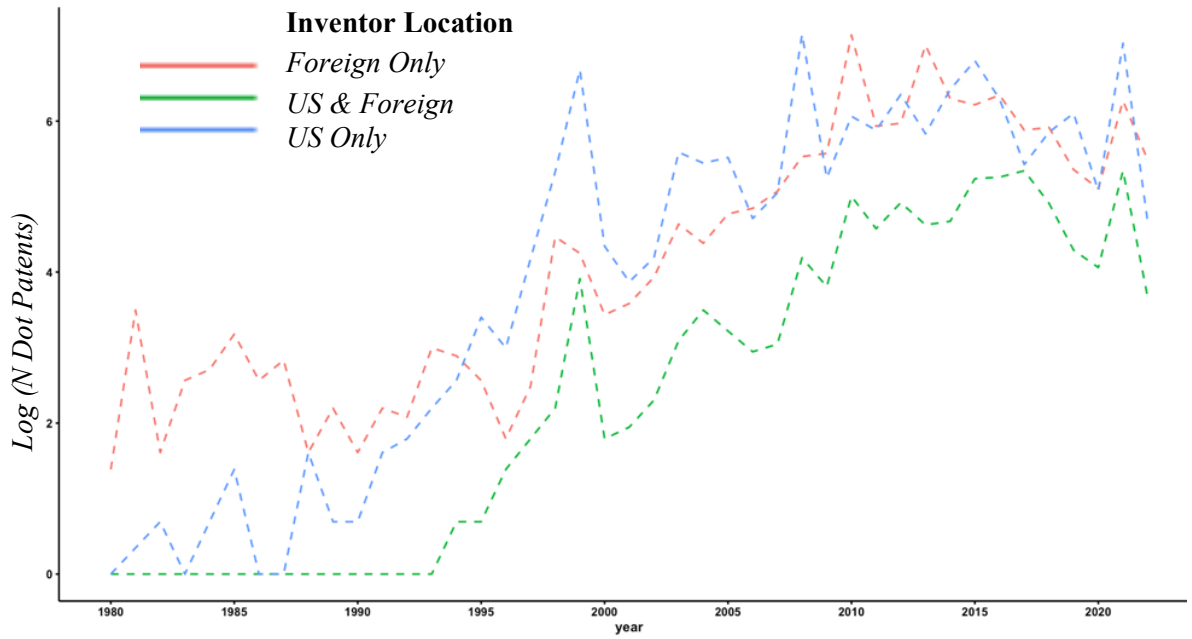


Figure 3: Tax Haven Patent Transfers by Inventor Location

This figure plots patent transfer activity to tax havens by U.S.-incorporated Compustat firms from 1980-2022 by location of the patent's inventor(s). Panel A presents the logged number of granted patents assigned to dot havens. Panel B presents the logged number of granted patents assigned to Big 8 havens.

Panel A: Dot patent transfers by inventor location



Panel B: Big 8 Patent transfers by inventor location

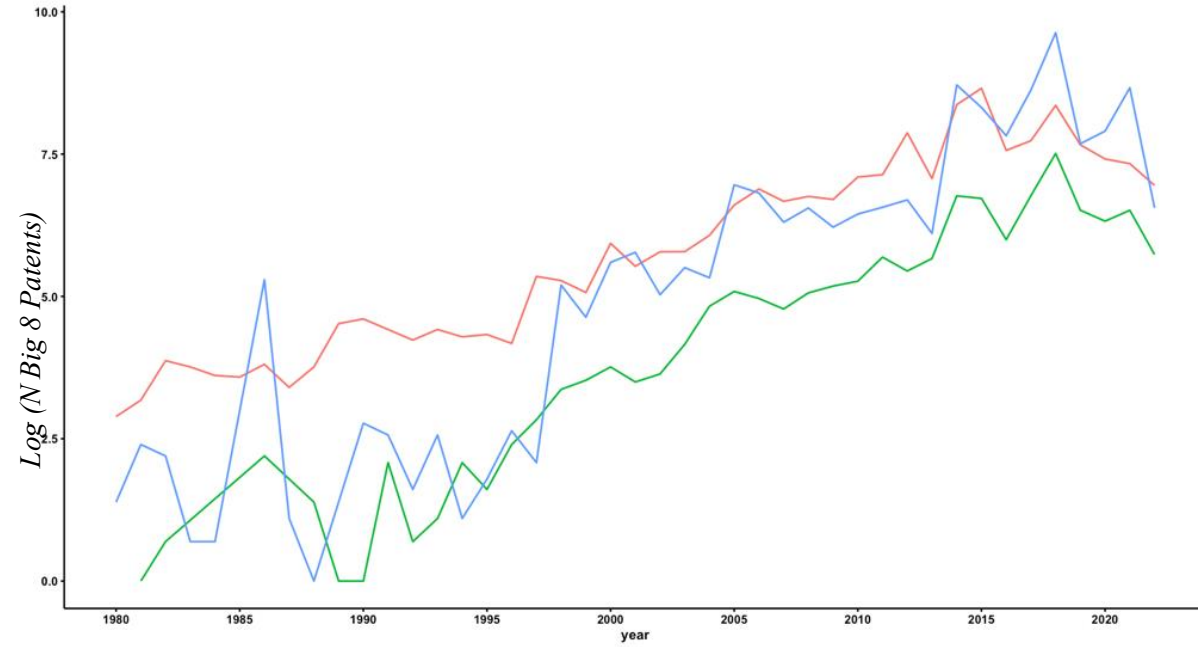
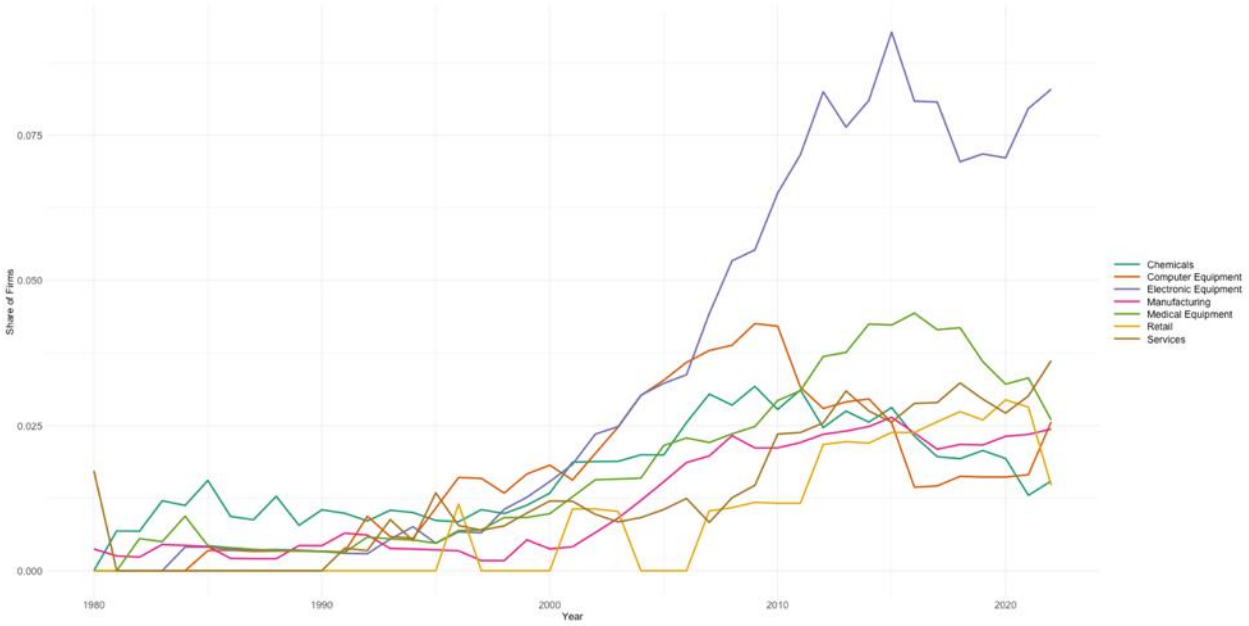


Figure 4: Share of U.S. Firms with Tax Haven Patents by Industry

This figure presents the proportion of patent-assigning public U.S.-incorporated firms with at least one patent or patent application assigned to a tax haven affiliate by SIC-2 industry. Out of all public U.S. firms with at least one patent or patent applications assigned to any affiliate worldwide in year *t*, Panel A presents the share of firms with at least one patent in a dot haven affiliate. Panel B presents the share of firms with at least one patent in a Big 8 haven affiliate.

Panel A: Share of DotPatent Firms



Panel B: Share of Big8Patent Firms

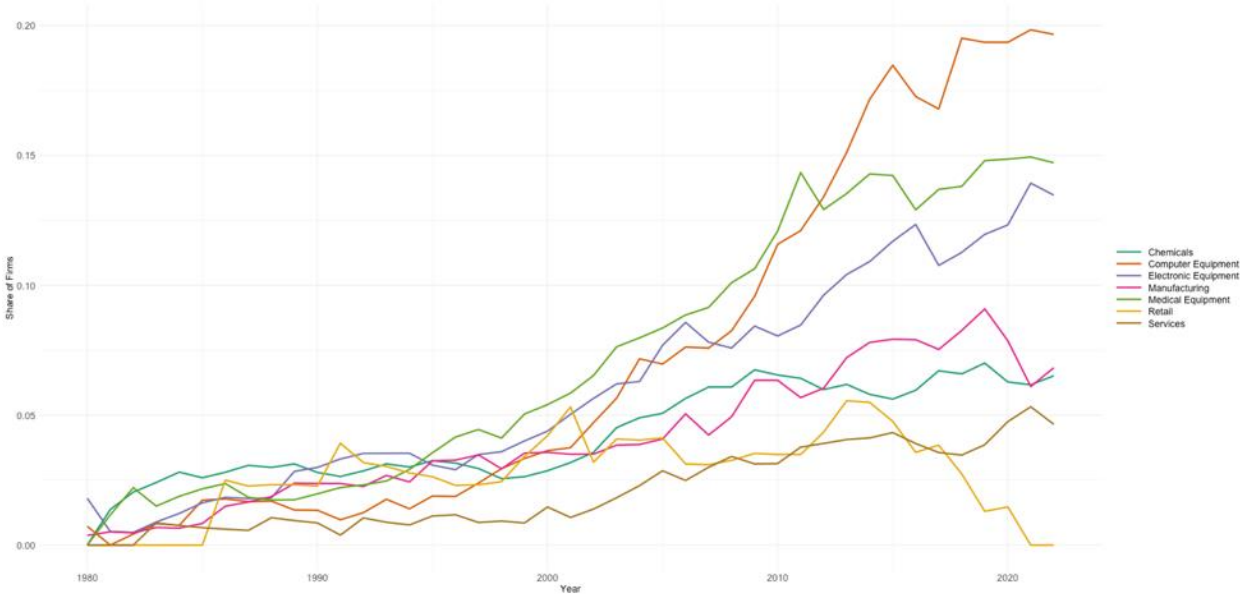


Figure 5: Robustness Tests

These figures present coefficient estimates and 90% confident intervals for the change in tax outcomes using a stacked cohort difference-in-difference in event time. The Y-axis represents the difference-in-difference (DiD) estimates; the X-axis presents the year relative to the adoption year, where year $t = 0$ is the first year firm i transfers a patent to a dot tax haven during the 1989-2022 sample period. The solid (dashed) line reports results with (without) the inclusion of time-varying, firm-specific controls. In all regression models, cohort-firm and cohort-year specific slopes on pre-tax income (*PI*) are included, as well as cohort-firm and cohort-year specific fixed effects. Standard errors are clustered by firm.

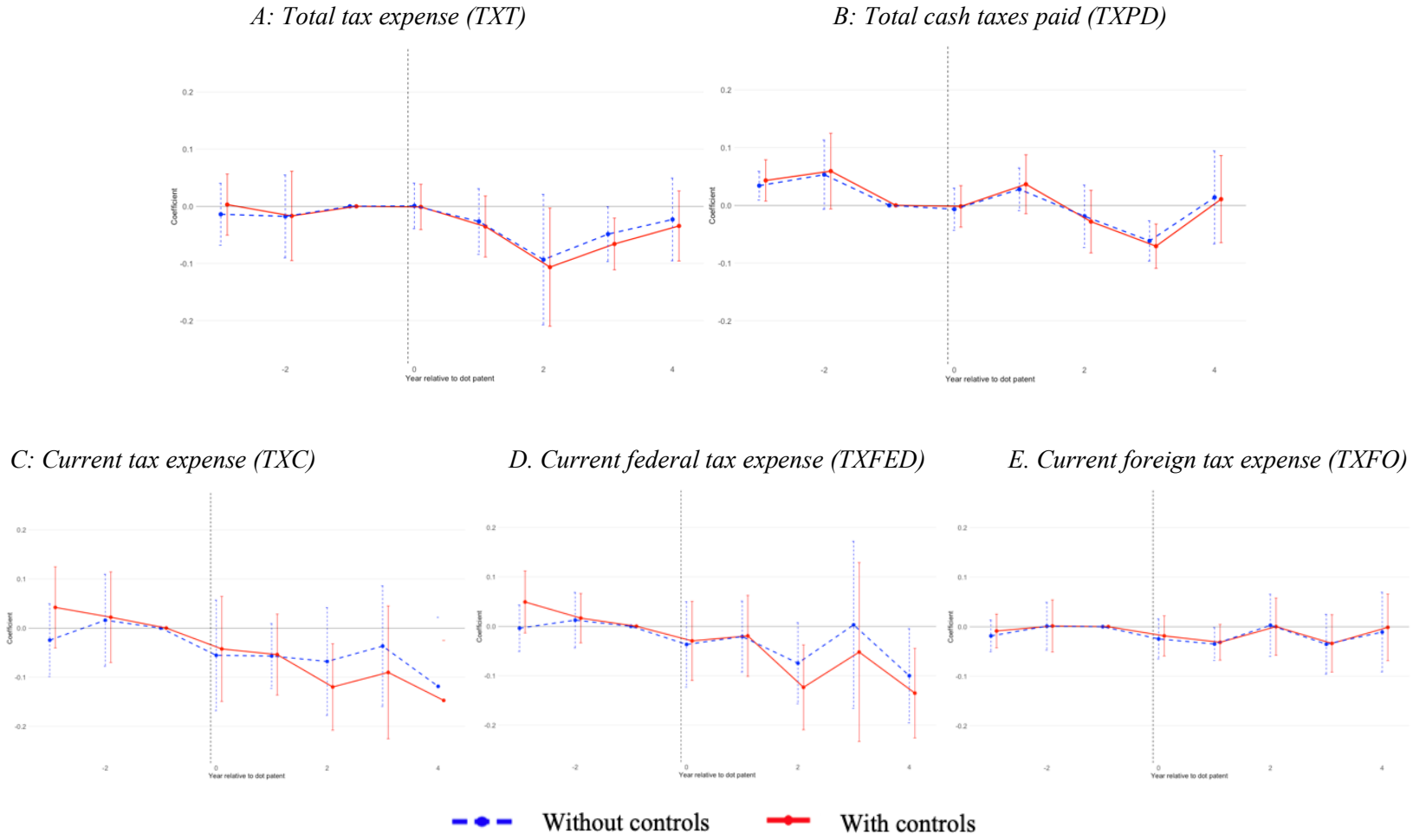
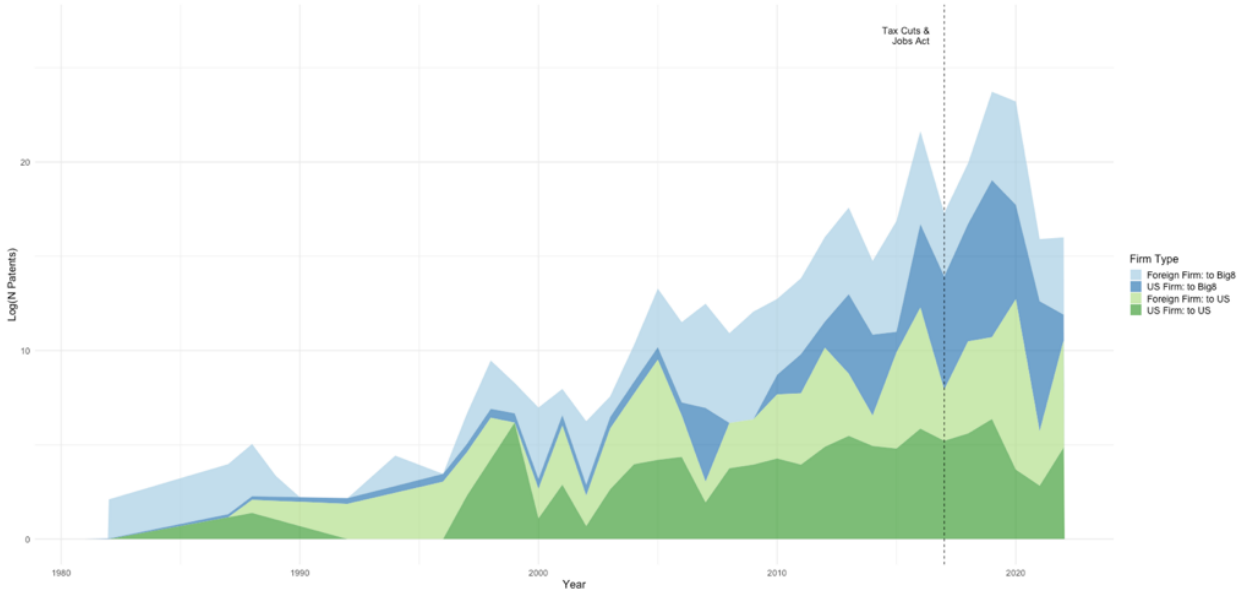


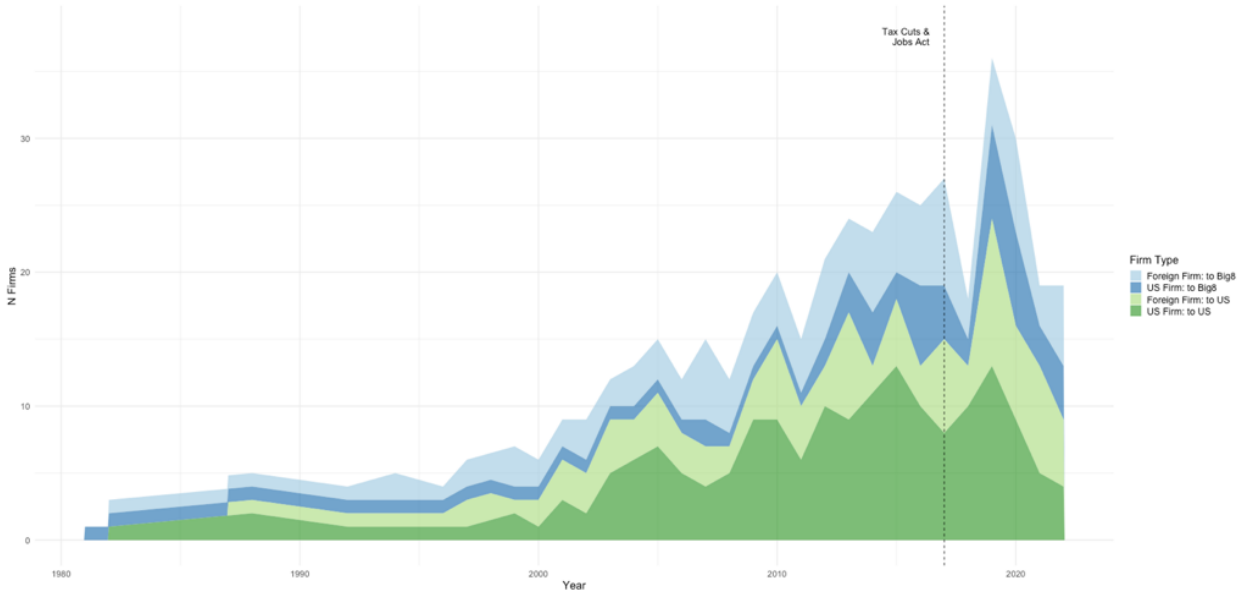
Figure 6: Patent Transfers Out of Dot Tax Havens

This figure plots patent transfer activity out of dot tax havens to either Big 8 tax havens or the U.S. by U.S. and foreign-incorporated public firms from 1980-2022. Panel A presents the logged number of patents internally transferred out of a dot tax haven to Big 8 havens (upper blue areas) or to the U.S. (lower green areas) by public foreign (lighter blue and green areas) and U.S (darker blue and green areas) firms. Panel B presents the number of public firms transferring at least one patent out of a dot tax haven to either a Big 8 haven or the U.S. The dashed vertical line represents the passage of the 2017 U.S. Tax Cuts & Jobs Act.

Panel A: Logged Number of Patent Transfers out of Dot Havens



Panel B: Number of Firms Transferring Patents out of Dot Havens



Tables

Table 1: Patent Assignments by Dot Haven Country

This table provides descriptive statistics of patent assignments from 1980-2022 to dot tax haven countries by U.S. and foreign-incorporated public firms matched to Compustat Global and North America. *N Patents* provides the total number of unique patents and patent applications assigned to the country during the 1980-2022 period. *N Firms* provides the total number of unique public firms that have assigned at least one patent or patent application to the country during the 1980-2022 period.

Country	*N Patents*	*N Firms*	Country	*N Patents*	*N Firms*
Anguilla	47	6	Isle of Man	246	18
Bahamas	241	37	Liechtenstein	3,985	31
Bahrain	9	2	Luxembourg	9,244	134
Barbados	7,306	48	Macao	430	4
Belize	21	8	Malta	1,229	22
Bermuda	10,056	100	Mauritius	119	9
Bouvet Island	7	6	Monaco	12	6
British Virgin Islands	4,895	117	Netherlands Antilles*	1,034	35
Cayman Islands	38,523	159	Other†	36	25
Channel Islands*	756	56	Saint Kitts And Nevis	24	7
Christmas Island	7	7	St. Vincent & the Grenadines	52	2
Costa Rica	60	6	Samoa	819	14
Curacao	811	23	Seychelles	163	16
Dominica	7	2	Turks & Caicos Islands	10	6
Georgia	308	46	U.S. Virgin Islands	21	10
Gibraltar	430	18			

* Patent assignees located in Guersey and Jersey are grouped under "Channel Islands"; Aruba, Curaçao, Bonaire, Sint Eustatius, Saba, and Sint Maarten are grouped under "Netherlands Antilles."

† "Other" includes countries with 5 or fewer patents and patent applications assigned during the sample period: Antigua and Barbuda, Baker Island, Brunei Darussalam, Cook Islands, Falkland Islands, Heard Island, Norfolk Island, Northern Mariana Islands, Saint Helena, Saint Lucia, San Marino, Solomon Islands, Uruguay, Vanuatu, and Wake Island.

Table 2: Descriptive Statistics

This table provides descriptive statistics on the sample. The sample includes all U.S.-incorporated Compustat firm-years between 1989-2022 with non-missing variables for analysis. All variables are defined in Appendix A.

	N	Mean.	Std.Dev.	P10	P25	Median	P75	P90
Patent Variables								
$DotPatent_{i,t}$	52,514	0.022	0.147	0.000	0.000	0.000	0.000	0.000
$Big8Patent_{i,t}$	52,514	0.054	0.226	0.000	0.000	0.000	0.000	0.000
$ForeignPatent_{i,t}$	52,514	0.671	1.414	0.000	0.000	0.000	0.693	2.773
$TotalPatent_{i,t}$	52,514	2.460	2.510	0.000	0.000	1.946	4.317	6.169
$DotPatentStock_{i,t}$	52,514	1.057	19.831	0.000	0.000	0.000	0.000	0.000
$Big8PatentStock_{i,t}$	52,514	6.264	229.768	0.000	0.000	0.000	0.000	0.000
$ForeignPatentStock_{i,t}$	52,514	19.477	145.275	0.000	0.000	0.000	1.000	15.000
Tax Outcomes								
$TXT_{i,t}$	52,514	100.590	679.478	0.000	0.576	5.472	33.322	146.000
$TXPD_{i,t}$	49,620	98.476	626.946	0.014	0.555	4.910	29.928	133.510
$TXC_{i,t}$	50,580	106.580	705.212	0.002	0.669	5.915	34.108	151.852
$TXFED_{i,t}$	48,287	59.941	396.313	0.000	0.105	2.815	19.291	89.887
$TXFO_{i,t}$	48,411	43.922	453.264	0.000	0.000	0.121	6.024	41.500
$ETR_{i,t}$	52,514	0.293	0.188	0.000	0.182	0.328	0.384	0.432
$CashETR_{i,t}$	49,620	0.270	0.235	0.008	0.088	0.240	0.366	0.533
$LogUTBAdds_{i,t}$	42,070	0.896	1.406	0.000	0.000	0.094	1.368	2.990
Firm Characteristics								
$PI_{i,t}$	52,514	384.003	2375.69	0.802	3.805	20.700	115.384	525.318
$Size_{i,t}$	52,514	5.660	2.307	2.663	3.988	5.612	7.259	8.683
$Sales_{i,t}$	52,514	5.740	2.242	2.869	4.109	5.718	7.305	8.679
$\%ForeignSales_{i,t}$	52,514	0.237	0.300	0.000	0.000	0.090	0.415	0.711
$Leverage_{i,t}$	52,514	3.165	2.903	0.000	0.088	2.699	5.599	7.253
$R\&D_{i,t}$	52,514	2.035	2.015	0.000	0.073	1.573	3.355	4.893
$Loss_{i,t}$	52,514	0.392	0.488	0.000	0.000	0.000	1.000	1.000
$HavenSub_{i,t}$	52,514	0.243	0.429	0.000	0.000	0.000	0.000	1.000

Table 3: Patent Assignments by Industry

This table provides descriptive statistics of tax haven patent assignments by public U.S. firms from 1980-2022 by SIC-2 Industry. In Panel A, *N Dot Patents* and *N Big 8 Patents* provide the total number of unique patents and patent applications assigned to dot and Big 8 tax haven affiliates, respectively, by industry. *N Dot Firms* and *N Big 8 Firms* provide the total number of unique U.S. public firms assigning at least one patent to dot and Big 8 tax haven affiliates, respectively, by industry. *N Total Firms* provides the total number of unique U.S. Compustat firms assigning at least one patent to any affiliate worldwide by industry. *% Dot Firms* and *% Big 8 Firms* are *N Dot Firms* and *N Big 8 Firms* scaled by *N Total Firms*, respectively. Panel B provides the ten U.S.-incorporated firms assigning the greatest number of patents to dot tax havens during the sample period. For a firm that changes its country of incorporation during the sample period, *N Dot Patents* includes only patents assigned while the firm is incorporated in the U.S.

Panel A: Tax Haven Patent Assignments by Industry

Industry Name	*N Dot Patents* (1)	*N Big 8 Patents* (2)	*N Dot Firms* (3)	*N Big 8 Firms* (4)	*N Total Firms* (5)	*% Dot Firms* (6)	*% Big 8 Firms* (7)
Chemicals	1,247	13,881	63	149	1,573	4.01%	9.47%
Computer Equipment	872	3,078	28	99	869	3.22%	11.39%
Electronic Equipment	12,920	40,812	60	125	1,010	5.94%	12.38%
Manufacturing	1,078	5,769	45	124	1,420	3.17%	8.73%
Medical Equipment	2,853	7,794	33	114	1,018	3.24%	11.20%
Oil, Gas, Mining	136	607	10	24	241	4.15%	9.96%
Other	229	169	5	16	223	2.24%	7.17%
Retail	130	162	7	18	280	2.50%	6.43%
Services	1,009	2,694	49	120	1,929	2.54%	6.22%
Transportation	307	6,632	21	51	590	3.56%	8.64%
Wholesale Trade: Durables	136	607	10	24	172	5.81%	13.95%
Wholesale Trade: NonDurables	333	659	2	9	83	2.41%	10.84%

Table 3: Patent Assignments by Industry (continued)

Panel B: Top 10 U.S. Firms Assigning Patents to Dot Havens

Company Name	Industry Name	N Dot Patents
Micron Technology	Electronic Equipment	1,232
TE Connectivity[a]	Electronic Equipment	958
Marvell Technology[b]	Electronic Equipment	913
Ciena Corp	Electronic Equipment	784
Analog Devices	Electronic Equipment	680
Broadcom[c]	Electronic Equipment	666
Teleflex	Medical Equipment	658
Trident Microsystems	Electronic Equipment	532
Mohawk Industries	Manufacturing	511
Stryker Corp	Medical Equipment	455
Purdue Pharma	Chemicals	424

[a] Spin-off to Switzerland in 2007. *N Dot Patents* only includes patents assigned prior to spin-off.

[b] Redomiciled from Bermuda to USA in 2021. *N Dot Patents* only includes patents assigned to dot havens after U.S. domiciliation

[c] Incorporated in Singapore from February 2016 to April 2018.

Table 4: Determinants Analysis

This table examines firm characteristics associated with the transfer of patents to dot haven affiliates. Panel A presents sample means (Columns 1-3) and differences in sample means (Columns 4-6) across various firm characteristics for 3 unique firm-year subsamples: 1) *First Dot Haven Year* is the first year *t* firm *i* transfers patent ownership to a dot tax haven affiliate during the 1980-2022 sample period, 2) *First Big 8 Haven* to a Big 8 tax haven affiliate, 3) *First Foreign Non-Haven Year* to a foreign non-tax haven affiliate. Differences in sample means are presented in Columns 4-6 from a two-tailed t-test. Continuous variables (except *Size, Sales, %ForeignSales,* and raw *PatentStock* variables) are scaled by lagged total assets to facilitate comparison across firms. Standard errors are clustered by firm. All variable definitions are provided in Appendix A. Differences in bold are statistically significant at the 10% level.

Panel A: Univariate Analysis

	First Dot Haven Year$_{it}$	*First Big 8 Haven Year$_{it}$*	*First Foreign Non-Haven Year$_{it}$*	*Difference (1) - (2)*	*Difference (1) - (3)*	*Difference (2) - (3)*
	(1)	(2)	(3)	(4)	(5)	(6)
Year$_{it}$	2003.334	2003.192	1999.368	0.142	**3.966**	**3.824**
DotPatentStock$_{it}$	16.975	3.101	0.203	**13.874**	**16.772**	**2.898**
Big8PatentStock$_{it}$	18.450	9.656	0.860	8.795	17.590	**8.795**
ForeignPatentStock$_{it}$	40.991	23.028	6.019	**17.963**	**34.972**	**17.009**
ETR$_{it}$	0.224	0.233	0.233	-0.009	-0.009	-0.001
CashETR$_{it}$	0.193	0.212	0.190	-0.019	0.004	0.022
DotPatent$_{it}$	1.000	0.054	0.013	**0.947**	**0.987**	**0.040**
Big8Patent$_{it}$	0.165	1.000	0.052	**-0.835**	**0.113**	**0.948**
ForeignPatent$_{it}$	1.050	0.980	1.107	0.069	-0.057	**-0.127**
TotalPatent$_{it}$	2.745	2.332	2.722	**0.413**	0.023	**-0.390**
Size$_{it}$	6.787	6.591	5.165	0.196	**1.621**	**1.426**
Sales$_{it}$	6.381	6.332	4.934	0.048	**1.446**	**1.398**
%ForeignSales$_{it}$	0.434	0.389	0.219	**0.045**	**0.215**	**0.170**
Leverage$_{it}$	0.194	0.220	0.192	-0.026	0.002	**0.028**
Inventory$_{it}$	0.129	0.155	0.174	**-0.026**	**-0.045**	**-0.019**
CapEx$_{it}$	0.056	0.056	0.077	0.000	**-0.021**	**-0.021**
ROA$_{it}$	-0.137	-0.053	-0.198	-0.084	0.061	**0.145**
R&D$_{it}$	0.134	0.113	0.149	0.021	-0.015	**-0.036**
Loss$_{it}$	0.283	0.240	0.262	0.043	0.020	-0.023
HavenSub$_{it}$	0.224	0.195	0.122	0.028	**0.102**	**0.074**

Table 4: Determinants Analysis (continued)

This panel presents results from a linear probability model regressing an indicator $DotPatent_{i,t+1}$ equal to one if firm *i* transfers a patent to a dot haven in year *t+1* on firm covariates in year *t.* Columns (1-3) present results on all U.S. public firms with at least one patent transaction in the USPTO Assignments dataset. Columns (4-6) present results on all U.S. public firms with at least one patent transaction to a foreign affiliate. Continuous variables (except *Size* and *%ForeignSales*) are scaled by lagged total assets. Standard errors are clustered by firm. All variable definitions are provided in Appendix A.

Panel B: Determinants of $DotPatent_{i,t+1}$

	$DotPatent_{i,t+1}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$CashETR_{i,t}$	-0.009*	-0.007	-0.007	-0.018*	-0.010	-0.011
	(0.005)	(0.005)	(0.005)	(0.010)	(0.010)	(0.010)
$ETR_{i,t}$	-0.019***	-0.018***	-0.017***	-0.039***	-0.036***	-0.034***
	(0.006)	(0.006)	(0.006)	(0.012)	(0.012)	(0.012)
$Big8Patent_{i,t}$	0.064***	0.062***	0.063***	0.059***	0.056***	0.058***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
$ForeignPatent_{i,t}$	0.008***	0.008***	0.008**	0.001	0.001	0.002
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
$TotalPatent_{i,t}$	0.002	0.002	0.002	0.001	0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
$\%ForeignSales_{i,t}$	0.020**	0.020**	0.018*	0.026	0.027*	0.027
	(0.010)	(0.009)	(0.009)	(0.016)	(0.016)	(0.016)
$Size_{i,t}$	0.005***	0.006***	0.006***	0.011***	0.012***	0.011***
	(0.001)	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)
$Leverage_{i,t}$	0.000	0.001	0.002	0.000	0.003	0.005
	(0.005)	(0.005)	(0.005)	(0.012)	(0.012)	(0.012)
$Inventory_{i,t}$	-0.006	-0.006	-0.005	-0.017	-0.022	-0.024
	(0.010)	(0.011)	(0.011)	(0.027)	(0.027)	(0.027)
$CapEx_{i,t}$	0.001	0.008	0.012	0.004	0.019	0.027
	(0.018)	(0.017)	(0.018)	(0.047)	(0.044)	(0.046)
$ROA_{i,t}$	0.000***	0.000**	0.000	0.000**	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$R\&D_{i,t}$	0.010**	0.007*	0.006	0.031**	0.026**	0.024*
	(0.004)	(0.004)	(0.004)	(0.013)	(0.013)	(0.013)
$Loss_{i,t}$	-0.001	-0.001	0.000	0.000	0.001	0.001
	(0.004)	(0.004)	(0.004)	(0.009)	(0.009)	(0.009)
$HavenSub_{i,t}$	0.012**	0.012**	0.013**	0.017*	0.018*	0.019*
	(0.006)	(0.006)	(0.006)	(0.010)	(0.010)	(0.010)
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Fixed Effects	Year	SIC-2,Year	SIC-2*Year	Year	SIC-2,Year	SIC-2*Year
Observations	54,656	54,656	54,656	26,842	26,842	26,842
Adj. R2	0.062	0.070	0.058	0.048	0.066	0.053
Within Adj. R2	0.051	0.050	0.049	0.030	0.032	0.031

Table 5: Change in Effective Tax Rates

This table examines the relation between effective tax rates and patent ownership in dot tax havens. The outcomes are income tax expense (*TXT*), cash taxes paid (*TXPD*), current income tax expense (*TXC*), current federal tax expense (*TXFED*), or current foreign tax expense (*TXFO*). *PI* is worldwide pre-tax income; *DotPatent* is an indicator equal to 1 if firm *i* has at least 1 patent or patent application in a dot tax haven affiliate in year *t*. Standard errors are clustered by firm. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Change in tax burdens

	$TXT_{i,t}$		$TXPD_{i,t}$		$TXC_{i,t}$		$TXFED_{i,t}$		$TXFO_{i,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$PI_{i,t}$ x $DotPatent_{i,t}$	-0.037***	-0.042***	-0.056**	-0.038**	-0.051**	-0.060***	-0.021	-0.044***	-0.030	-0.012
	(0.009)	(0.011)	(0.023)	(0.016)	(0.021)	(0.019)	(0.014)	(0.016)	(0.024)	(0.012)
$PI_{i,t}$ x $Big8Patent_{i,t}$		-0.025		0.034		-0.019		-0.028*		0.011
		(0.018)		(0.021)		(0.023)		(0.016)		(0.014)
$PI_{i,t}$ x $ForeignPatent_{i,t}$		0.009		0.001		0.006		-0.004		0.006
		(0.006)		(0.009)		(0.008)		(0.008)		(0.004)
$PI_{i,t}$ x $TotalPatent_{i,t}$		0.005		0.000		0.001		-0.006		0.004
		(0.005)		(0.007)		(0.011)		(0.005)		(0.007)
$PI_{i,t}$ x $Size_{i,t}$		0.003		0.013		0.056***		0.041**		0.017
		(0.010)		(0.016)		(0.017)		(0.019)		(0.013)
$PI_{i,t}$ x $Leverage_{i,t}$		0.002		-0.004		0.004		0.008**		-0.004***
		(0.002)		(0.003)		(0.004)		(0.003)		(0.001)
$PI_{i,t}$ x $R\&D_{i,t}$		-0.005		0.071***		0.026*		-0.032***		0.059***
		(0.010)		(0.016)		(0.014)		(0.010)		(0.009)
$PI_{i,t}$ x $Loss_{i,t}$		-0.009		0.002		0.011		0.013		-0.003
		(0.017)		(0.011)		(0.016)		(0.011)		(0.008)
$PI_{i,t}$ x $HavenSub_{i,t}$		0.006		0.004		-0.005		-0.013		0.010***
		(0.007)		(0.005)		(0.011)		(0.012)		(0.003)

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Fixed Effects	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Varying *PI* Slopes	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Observations	52,514	52,514	49,620	49,620	50,580	50,580	48,287	48,287	48,411	48,411
Adj. R2	0.925	0.926	0.932	0.944	0.885	0.892	0.682	0.696	0.943	0.964
Within Adj. R2	0.008	0.020	0.025	0.193	0.010	0.067	0.002	0.045	0.017	0.388

Table 5: Change in Effective Tax Rates (continued)

This panel examines the relation between effective tax rates and patent ownership in dot tax havens based on a continuous measure of *DotPatent*. The outcomes are income tax expense (*TXT*), cash taxes paid (*TXPD*), current income tax expense (*TXC*), current federal tax expense (*TXFED*), or current foreign tax expense (*TXFO*). *PI* is worldwide pre-tax income. *DotPatentStock* is the number of patent and patent applications in dot tax haven affiliates for firm *i* in year *t*. where *DotPatentStock = [n-m]* is an indicator equal to 1 if firm *i* has between *n* and *m* patents or patent applications in a dot tax haven affiliate in year *t*. Standard errors are clustered by firm. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Number of Dot Patents

	$TXT_{i,t}$		$TXPD_{i,t}$		$TXC_{i,t}$		$TXFED_{i,t}$		$TXFO_{i,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$PI_{i,t}$ x $DotPatentStock_{i,t}$=[1-25]	-0.041***		-0.035**		-0.059***		-0.047***		-0.008	
	(0.012)		(0.018)		(0.021)		(0.017)		(0.014)	
$PI_{i,t}$ x $DotPatentStock_{i,t}$=[26-75]	-0.032**		-0.044***		-0.069***		-0.040**		-0.027***	
	(0.013)		(0.012)		(0.023)		(0.020)		(0.011)	
$PI_{i,t}$ x $DotPatentStock_{i,t}$>75	-0.049***		-0.063*		-0.037		0.021		-0.064***	
	(0.017)		(0.036)		(0.050)		(0.028)		(0.022)	
$PI_{i,t}$ x $Log(1+DotPatentStock_{i,t})$		-0.013***		-0.015**		-0.017***		-0.007		-0.008***
		(0.004)		(0.006)		(0.006)		(0.007)		(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Varying *PI* Slopes	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Observations	52,514	52,514	49,620	49,620	50,580	50,580	48,287	48,287	48,411	48,411
Adj. R2	0.926	0.925	0.944	0.944	0.892	0.891	0.695	0.693	0.965	0.964
Within Adj. R2	0.018	0.014	0.206	0.204	0.067	0.060	0.043	0.036	0.391	0.389

Table 5: Change in Effective Tax Rates (continued)

This panel examines the change in the association between dot haven patent transfers and effective tax rates in the period pre vs post the U.S. 2017 Tax Cuts and Jobs Act, *PostTCJA* is an indicator equal to 1 for the years after the TCJA (2018-2022) and 0 otherwise. Standard errors are clustered by firm. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel C: Pre vs. Post TCJA

	$TXT_{i,t}$		$TXPD_{i,t}$		$TXC_{i,t}$		$TXFED_{i,t}$		$TXFO_{i,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$PI_{i,t}$ x $DotPatent_{i,t}$	-0.054***	-0.057***	-0.057***	-0.049***	-0.056***	-0.067***	-0.025	-0.043*	-0.030*	-0.021**
	(0.011)	(0.015)	(0.017)	(0.011)	(0.019)	(0.021)	(0.020)	(0.023)	(0.015)	(0.008)
$PI_{i,t}$ x $DotPatent_{i,t}$ x *PostTCJA*	0.043*	0.051*	0.003	0.033	0.014	0.025	0.009	-0.003	0.001	0.027
	(0.025)	(0.028)	(0.046)	(0.025)	(0.060)	(0.050)	(0.034)	(0.045)	(0.040)	(0.021)
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Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Fixed Effects	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Varying *PI* Slopes	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year	Firm,Year
Observations	52,514	52,514	49,620	49,620	50,580	50,580	48,287	48,287	48,411	48,411
Adj. R2	0.926	0.927	0.932	0.945	0.885	0.892	0.682	0.695	0.943	0.965
Within Adj. R2	0.017	0.028	0.025	0.213	0.011	0.068	0.002	0.042	0.017	0.396

Table 6: Change in Uncertain Tax Benefits

This table examines the relation between additions to uncertain tax benefits (UTB) and patent ownership in dot tax haven affiliates. *DotPatent* is an indicator equal to 1 if firm *i* has at least 1 patent or patent application in a dot tax haven affiliate in year *t*. *DotPatentStock = [n-m]* is an indicator equal to 1 if the firm has between *n* and *m* patents or patent applications in dot haven affiliates. Standard errors are clustered by firm and presented in parentheses below. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	$LogUTBAdds_{i,t}$			
	(1)	(2)	(3)	(4)
$DotPatent_{i,t}$	0.378***	0.322***		
	(0.124)	(0.105)		
$DotPatentStock_{i,t}$=[1-25]			0.287*	0.264**
			(0.148)	(0.110)
$DotPatentStock_{i,t}$= [26-75]			0.460**	0.298**
			(0.231)	(0.144)
$DotPatentStock_{i,t}$>75			0.650**	0.645***
			(0.254)	(0.194)
$Big8Patent_{i,t}$	0.094	0.161**	0.092	0.159**
	(0.071)	(0.071)	(0.071)	(0.070)
$ForeignPatent_{i,t}$	0.069***	0.064***	0.070***	0.064***
	(0.014)	(0.020)	(0.014)	(0.020)
$TotalPatent_{i,t}$	0.035***	0.048***	0.035***	0.047***
	(0.009)	(0.013)	(0.009)	(0.013)
$Size_{i,t}$	0.069***	0.062***	0.070***	0.063***
	(0.008)	(0.008)	(0.008)	(0.008)
$Leverage_{i,t}$	0.093***	0.030***	0.092***	0.030***
	(0.005)	(0.005)	(0.005)	(0.005)
$R\&D_{i,t}$	0.190***	0.154***	0.189***	0.154***
	(0.014)	(0.014)	(0.014)	(0.014)
$Loss_{i,t}$	-0.088***	-0.019	-0.088***	-0.018
	(0.022)	(0.015)	(0.022)	(0.015)
$HavenSub_{i,t}$	0.141***	0.041***	0.141***	0.041***
	(0.019)	(0.012)	(0.019)	(0.012)
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Fixed Effects	SIC-2,Year	Firm,Year	SIC-2,Year	Firm,Year
Observations	42,070	42,070	42,070	42,070
Adj. R2	0.561	0.799	0.562	0.799
Within Adj. R2	0.537	0.063	0.538	0.063

Table 7: TCJA Haven Patent Transfers

This table presents the results of a Poisson regression examining how the number of patents transferred to tax haven countries by U.S. and foreign-incorporated firms changes over time, where the outcome variable is either the number of patents transferred to dot or Big 8 tax haven affiliates by firm *i* in year *t. NDotPatents (NBig8Patents*) is the number of patents and patent applications assigned to dot (Big 8) haven affiliates by U.S.-incorporated and non-Dot (non-Big8) foreign-incorporated firms *i* in year *t. USFirm* is an indicator equal to 1 if firm *i* in year *t* is incorporated in the U.S., and 0 otherwise. For Columns 1 and 2 (3 and 4), firms assigning a patent to a dot (Big 8) haven in year *t* are included. The sample period is the 10 years surrounding the Tax Cuts and Jobs Act (2013-2022.) Standard errors are clustered by firm and presented in parentheses below. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	$NDotPatents_{it}$		$NBig8Patents_{it}$	
	(1)	(2)	(3)	(4)
Constant	3.023***		3.154***	
	(0.246)		(0.215)	
$USFirm_{it}$	-0.061	0.003	0.594	0.801*
	(0.317)	(0.345)	(0.385)	(0.412)
$PostTCJA_t$	0.159	0.091	0.356	0.289
	(0.158)	(0.164)	(0.415)	(0.420)
$PostTCJA_t$ x $USFirm_{it}$	-0.217	-0.132	-0.109	-0.016
	(0.332)	(0.363)	(0.531)	(0.549)
	---	---	---	---
Fixed Effects	None	SIC-2	None	SIC-2
Observations	901	901	2,581	2,581
Pseudo R2	0.003	0.157	0.014	0.182

Table 8: Repatriations of Dot Patents to U.S.

This table presents the results of a Poisson regression examining how the repatriation of dot haven patents back to the U.S. changes following the 2017 Tax Cuts & Jobs Act, where *NTransfersOut _US$_{it}$* represents the number of patents transferred out of a dot tax haven affiliate to a U.S. affiliate by firm *i* in year *t*. *PostTCJA* is equal to 1 for the years following the passage of the TCJA (2018-2022) and 0 otherwise. *USFirm$_{it}$* is equal to 1 if firm *i* in year *t* is incorporated in the U.S. and 0 otherwise. Public U.S. and foreign-incorporated firms with at least one patent or patent application in a dot tax haven in year *t* in the period 2013-2022 are included in the estimation. Standard errors are clustered by firm and presented in parentheses below. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

U.S. and Foreign Firms

	NTransfersOut_US$_{i,t}$			
	(1)	(2)	(3)	(4)
Constant	-0.226	-0.489		
	(0.383)	(0.737)		
PostTCJA$_t$	1.693*	2.344**	1.708*	2.355**
	(0.881)	(1.120)	(0.882)	(1.116)
USFirm$_{it}$		0.545		0.551
		(0.814)		(0.808)
PostTCJA$_t$ x USFirm$_{it}$		-2.266*		-2.258*
		(1.275)		(1.269)
	---	---	---	---
Fixed Effects	None	None	SIC-2	SIC-2
Observations	4,634	4,634	4,042	4,042
Pseudo R2	0.038	0.066	0.141	0.166
PostTCJA + PostTCJA x USFirm$_{it}$ = 0		χ^2= 0.0245 (*pval* = 0.8757)		

Table 9: Repatriations of Dot Patents - U.S. vs Big 8

This table presents the results of a Poisson regression examining how U.S. firms change their transfer behavior of patents out of dot tax havens back to either the U.S. or Big 8 tax havens following the 2017 TCJA, where $NTransfersOut_{itp}$ represents the number of patents transferred out of a dot tax haven affiliate to affiliate p by firm i in year t, where p is either an affiliate in the U.S. or an affiliate in a Big 8 tax haven. *PostTCJA* is equal to 1 for the years following the passage of the TCJA (2018-2022) and 0 otherwise. $Big8_p$ is equal to 1 if affiliate p is located in a Big 8 tax haven, and 0 if the affiliate is located in the U.S. Public U.S.-incorporated firms with at least one patent or patent application in a dot tax haven in year t in the period ten years surrounding the TCJA (2013-2022) are included in the estimation. Standard errors are clustered by firm and presented in parentheses below. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

U.S. Firms only

	$NTransfersOut_{i,t,p}$	
	(1)	(2)
$PostTCJA_t$	0.150	-0.433
	(0.614)	(0.767)
$Big8_p$	-1.773***	-1.773***
	(0.619)	(0.620)
$PostTCJA_t$ x $Big8_p$	2.377**	2.377**
	(0.975)	(0.977)
	---	---
Fixed Effects	SIC-2	Firm
Observations	2,964	1,098
Pseudo R2	0.140	0.425

Table 10: Timing of Tax Haven Patent Transfers

This table provides results of a linear probability model examining the relation between the timing of assignments relative to patent filing dates and the location of the patent assignee. *EarlyTransfer_30* (*EarlyTransfer_180*) is an indicator equal to 1 if the patent or patent application is assigned within 30 (180) days of the filing date. *Internal* is an indicator equal to 1 if the patent has never been transacted prior, or has only been transacted within, the same firm. *DotHaven* is an indicator equal to 1 if the assignee is located in a dot tax haven. All continuous independent variables are logged. Standard errors are clustered by firm and presented in parentheses below. All variable definitions are provided in Appendix A. ***,**, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	EarlyTransfer_30$_{i,p,t}$		*EarlyTransfer_180*$_{i,p,t}$	
	(1)	(2)	(3)	(4)
Internal$_{i,p,t}$	0.046***	0.045***	0.061***	0.059***
	(0.010)	(0.010)	(0.012)	(0.012)
DotHaven$_{i,p,t}$	-0.052*	-0.047	-0.067**	-0.060**
	(0.028)	(0.031)	(0.027)	(0.029)
Big8Haven$_{i,p,t}$	0.017	0.016	0.021	0.022
	(0.027)	(0.026)	(0.025)	(0.023)
Internal$_{i,p,t}$ *x DotHaven*$_{i,p,t}$	0.178*	0.164**	0.228**	0.212**
	(0.091)	(0.079)	(0.104)	(0.092)
Internal$_{i,p,t}$ *x Big8Haven*$_{i,p,t}$	-0.017	-0.017	-0.016	-0.015
	(0.018)	(0.018)	(0.019)	(0.019)
ForwardCitations$_p$		0.004**		0.003
		(0.002)		(0.003)
#Inventors$_p$		0.007		0.019***
		(0.005)		(0.005)
ForeignInventor$_p$		0.003		0.012
		(0.023)		(0.022)
#Claims$_p$		-0.015**		-0.002
		(0.007)		(0.006)
Published$_p$		-0.061**		-0.073***
		(0.026)		(0.018)
Granted$_p$		0.069**		0.020
		(0.028)		(0.022)
	---	---	---	---
Deal Year FE	Yes	Yes	Yes	Yes
Filing Year x Tech Class FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	41,030	41,030	41,030	41,030
Adj. R2	0.557	0.559	0.591	0.592

Appendices

Appendix A: Variable Definitions

Variable Name	Definition	Source
TXT_{it}	Total income tax expense	COMPUSTAT
$TXPD_{it}$	Total cash taxes paid	COMPUSTAT
TXC_{it}	Total current income tax expense	COMPUSTAT
$TXFED_{it}$	Total current federal income tax expense	COMPUSTAT
$TXFO_{it}$	Total current foreign income tax expense	COMPUSTAT
ETR_{it}	Effective tax rate (TXT/PI)	COMPUSTAT
$CashETR_{it}$	Cash effective tax rate (TXPD/PI)	COMPUSTAT
$LogUTBAdds_{it}$	Logged additions to unrecognized tax benefits (UTB)	COMPUSTAT
PI_{it}	Pre-tax worldwide financial accounting income	COMPUSTAT
$PIDOM_{it}$	Pre-tax domestic income	COMPUSTAT
$PIFO_{it}$	Pre-tax foreign income	COMPUSTAT
$DotPatent_{it}$	An indicator equal to 1 if there is at least 1 patent or patent application assigned to a dot tax haven	USPTO Assignments Data
$DotPatentStock_{it}$	The total number of patents and patent applications assigned to dot tax haven affiliates of firm *i* in year *t*	USPTO Assignments Data
$DotPatentStock_{it}$ = *[n-m]*	An indicator equal to 1 if there are between *n* and *m* patent and patent applications assigned to dot tax havens	USPTO Assignments Data
$Big8Patent_{it}$	An indicator equal to 1 if there is at least 1 patent or patent application assigned to a Big 8 tax haven.	USPTO Assignments Data
$ForeignPatent_{it}$	Logged number of patents assigned to foreign non-haven affiliates. For Table 4 (Determinants Analysis), number of foreign non-haven patents scaled by lagged total assets.	USPTO Assignments Data
$TotalPatent_{it}$	Logged number of patents assigned to affiliates worldwide. For Table 4 (Determinants Analysis), number of patents scaled by lagged total assets.	USPTO Assignments Data
$TransfersOut_US_{it}$	Number of patents transferred out of a dot haven affiliate to a U.S. affiliate	USPTO Assignments Data
$TransfersOut_{itp}$	Number of patents transferred out of a dot haven affiliate to either a U.S. affiliate or a Big 8 affiliate	USPTO Assignments Data

Variable Name	Definition	Source
$PostTCJA_t$	Indicator for sample period after the Tax Cuts & Jobs Act; equal to one for years 2018 through 2022 and 0 otherwise	COMPUSTAT
$USFirm_{it}$	Indicator equal to 1 if incorporated in the U.S. and 0 otherwise	COMPUSTAT
$Size_{it}$	Logged total assets	COMPUSTAT
$Sales_{it}$	Logged total sales	COMPUSTAT
$\%ForeignSales_{it}$	Percentage of total sales generated by foreign operations.	COMPUSTAT
$Leverage_{it}$	Logged long-term debt. For Table 4 (Determinants Analysis), long-term debt scaled by lagged total assets.	COMPUSTAT
$Inventory_{it}$	Logged inventory. For Table 4 (Determinants Analysis), inventory scaled by lagged total assets.	COMPUSTAT
$CapEx_{it}$	Logged capital expenditures. For Table 4 (Determinants Analysis), capital expenditures scaled by lagged total assets.	COMPUSTAT
ROA_{it}	Return on Assets, calculated as pre-tax income scaled by total assets.	COMPUSTAT
$R\&D_{it}$	Logged R&D expense. For Table 4 (Determinants Analysis), R&D expense scaled by lagged total assets.	COMPUSTAT
$Loss_{it}$	An indicator equal to 1 if there is a positive tax loss carryforward and 0 otherwise	COMPUSTAT
$HavenSub_{it}$	An indicator equal to 1 if the firm disclosed a material significant subsidiary in a tax haven. Missing values set to 0.	Dyreng Exhibit 21 data
Patent-Transaction Variables		
EarlyTransfer_30	An indicator equal to 1 if the patent assignment occurred within 30 days of the application filing date	USPTO Assignments Dataset
EarlyTransfer_180	An indicator equal to 1 if the patent assignment occurred within 180 days of the application filing date	USPTO Assignments Dataset
Internal	An indicator equal to 1 if a patent or patent application is considered internally generated. For a patent to be considered internally generated, assignees of any prior assignments for the patent must be of the same firm.	USPTO Assignments Dataset
ForwardCitations	Total number of forward citations received by a patent or patent application.	PatentsView
#Inventors	Total number of inventors listed on the patent or patent application	PatentsView
ForeignInventor	Indicator equal to 1 if at least one inventor's address is located in a foreign country	PatentsView
#Claims	Total number of claims listed on a patent or patent application	PatentsView
Published	Indicator equal to 1 if there exists a pre-grant publication for the patent	PatentsView
Granted	Indicator equal to 1 if a patent is eventually granted	PatentsView

Appendix B: List of Tax Haven Countries

This table present the full list of tax haven countries (Dyreng and Lindsey, 2009). Countries in bold are "Big 8" tax havens (Hines and Rice, 1994; Desai et al., 2006; De Simone and Olbert, 2022), with the addition of Puerto Rico. Remaining countries are classified as "dot" tax havens.

Country Name	
Andorra	**Lebanon**
Anguilla	**Liberia**
Antigua and Barbuda	Liechtenstein
Aruba	Luxembourg
Bahamas	Macao
Bahrain	Malta
Baker Island	Marshall Islands
Barbados	Mauritius
Belize	Monaco
Bermuda	Montserrat
Botswana	Nauru
Bouvet Island	**Netherlands**
British Virgin Islands	Netherlands Antilles
Brunei	Niue
Cayman Islands	Norfolk Island
Channel Islands	Palau
Christmas Island	**Panama**
Cook Islands	**Puerto Rico**
Costa Rica	Saint Helena
Curacao	Saint Kitts and Nevis
Cyprus	Saint Lucia
Dominica	Saint Vincent and the Grenadines

Country Name	
Falkland Islands	Samoa
Georgia	San Marino
Gibraltar	Seychelles
Grenada	Solomon Islands
Guernsey	**Singapore**
Heard Island	**Switzerland**
Hong Kong	Turks and Caicos Islands
Ireland	Uruguay
Isle of Man	U.S. Virgin Islands
Jersey	Vanuatu
Latvia	Wake Island

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