

**Are Tax Havens and Offshore Financial Centers Cracked Down On? An Examination of the  
International Standard of Exchange of Information on Request**

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**ABSTRACT**

To “crack down” on tax havens and offshore financial centers, the Organisation for Economic Co-operation and Development (OECD) has promoted an internationally agreed tax standard of exchange of information on request since 2009. Using a difference-in-differences analysis, we find that the implementation of the standard significantly reduces aggressive tax avoidance by affected U.S. multinational firms with material subsidiaries in tax havens and other offshore financial centers. The effects are stronger when firms have more incentives and opportunities for income-shifting or when tax enforcement is stronger. Overall, our study helps the OECD and other regulators better understand the effect of the internationally agreed standard on corporate tax avoidance.

**Keywords:** Corporate Tax Avoidance, Tax Havens, Exchange of Information on Request, Offshore Financial Centers, U.S. Multinational Firms

**Data Availability:** All data are available at the source indicated.

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## INTRODUCTION

The last several decades have witnessed a rapid increase in corporate tax avoidance around the world. The role of tax havens and offshore financial centers in this global trend has attracted significant attention from researchers, politicians, and the public. To avoid taxes, multinational firms aggressively shift their taxable income from high-tax countries to low-tax countries through sophisticated transactions (e.g., Klassen, Lang, and Wolfson 1993; Rego 2003; Beuselinck, Deloof, and Vanstraelen 2015).<sup>1</sup> Tax havens and offshore financial centers are usually well-governed small and affluent countries with low tax rates, which account for only a small portion of the world population and GDP (Dharmapala and Hines 2009). However, these countries account for a significant portion of the after-tax foreign income of corporations, particularly those from high-tax countries (Hines and Rice 1994; Hines 2010).

Jurisdictions and international organizations around the world have taken a number of measures to “crack down” on multinational firms' tax avoidance through the use of tax havens and offshore financial centers (e.g., Johannesen and Zucman 2014). One of the most important measures is the Harmful Tax Practices Initiative of the Organisation for Economic Co-operation and Development (OECD) (Weiner and Ault 1998; Devereux 2002; Hines 2005). As a core part of the initiative, the OECD has promoted the implementation of the internationally agreed tax standard on the exchange of information on request (hereafter, the EOIR standard). The EOIR standard requires a country to cooperate with competent tax authorities from another country in the exchange of information *on request* where it is foreseeably relevant to the administration and enforcement of the requesting country's domestic tax laws (see the second section for more

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<sup>1</sup> For simplicity, we use the term “countries” loosely to refer to sovereign nations, offshore territories, and financial centers.

details). This study examines whether the implementation of the EOIR standard effectively curbs U.S. multinational firms' aggressive tax avoidance.<sup>2</sup>

To encourage the implementation of the EOIR standard, the OECD introduced a peer-review process in 2009.<sup>3</sup> The OECD periodically issues a progress report that provides updates of the peer-review process. Each report provides a list of countries that have not made a commitment to eliminate harmful tax practices (i.e., the black list) and a list of countries that have not fully implemented the legal and regulatory framework into practice (i.e., the gray list). In total, there are 42 tax havens and offshore financial centers on the black and gray lists (hereafter, listed countries) in the first OECD progress update in April 2009. To be removed from the lists, a country needs to effectively adopt the EOIR standard. Specifically, a country is moved from the black list to the gray list if it has the required legal and regulatory framework and has successfully completed the first-phase review. Further, after a satisfactory second-phase review, the country is further moved from the gray list to the white list, which indicates that the EOIR standard is effectively implemented. By the end of 2012, most countries were removed from the black and gray lists.

The EOIR standard is expected to enable tax authorities to collect more information and thus better detect tax underpayments. As a result, the higher probability of detection may deter

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<sup>2</sup> We define aggressive tax avoidance as tax-planning strategies in the legal gray area and those that do not fully comply with tax rules. Hereafter, we use the term "tax avoidance" and "aggressive tax avoidance" interchangeably.

<sup>3</sup> Prior to 2009, the implementation of the EOIR standard was largely not effective. In 2009, G20 leaders called for the adoption of standards of transparency and information exchange in tax matters. In response to the call, the OECD reorganized its Global Forum on Transparency and Exchange of Information for Tax Purposes as the agent responsible for implementing the EOIR standard. OECD's Global Forum further initiated a review process to encourage the implementation of the EOIR standard. More details about the Global Forum and its review process are available at <http://www.oecd.org/tax/transparency/exchange-of-information-on-request/peer-review/>; <http://www.oecd.org/tax/transparency/abouttheglobalforum.htm>.

multinational firms from aggressively avoiding taxes.<sup>4</sup> However, the effectiveness of the current standard has also been heavily criticized (e.g., Sheppard 2009; Tax Justice Network 2012), because a country shares information only when a partner country *requests* specific information. Yet, it is hard for the partner country's tax authority to know what information to request before the exact problem is identified. Such limited scope to place requests limits the amount of information actually shared between different tax authorities (Government Accountability Office 2011; Johannesen and Zucman 2014). Therefore, whether the threat imposed by the EOIR standard effectively deters multinational firms' tax avoidance is an empirical and policy-relevant question.

We collect peer-review opinions on the implementation of the EOIR standard from progress update reports issued by the OECD. Our empirical analyses employ a sample of U.S. multinational firms from 2007 to 2015, a period surrounding the OECD's effort to implement the EOIR standard from 2009 to 2012. Different countries implemented the EOIR standard at different times, thus providing staggered changes for difference-in-differences (DiD) analyses. Prior research suggests that U.S. multinational firms have aggressively utilized their affiliates in tax havens and offshore financial centers to avoid paying taxes (Hines and Rice 1994; O'Donovan, Wagner, and Zeume 2019).<sup>5</sup> Therefore, we use a measure of tax avoidance in the aggressive end of the tax avoidance continuum (Hanlon and Heitzman 2010) based on increases in unrecognized tax benefits (UTBs) related to current-year tax positions. Larger increases in UTBs indicate more aggressive tax avoidance.

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<sup>4</sup> After the implementation of the EOIR standard, firms could continue to avoid taxes using subsidiaries in tax havens and offshore financial centers as long as those tax avoidance activities fully comply with the arm's length principle and other tax rules, but these remaining activities are less aggressive.

<sup>5</sup> For example, O'Donovan et al. (2019) suggest that approximately 20 percent of the public firms revealed by the Panama Papers, which use secret offshore vehicles in tax havens, are U.S. multinationals. U.S. multinational firms may use these secret offshore vehicles to aggressively avoid income taxes in both the United States and other high-tax countries. Our measure of aggressive tax avoidance captures all these tax avoidance behaviors.

A U.S. multinational firm is identified as a treated firm if it has material subsidiaries in at least one listed country with a Tax Information Exchange Agreement (TIEA) with the United States. We find a significant positive association between treated firms and tax avoidance prior to the implementation of the EOIR standard. However, the positive association is mitigated after the listed countries pass the OECD's review and are removed from the black list or the gray list. We also document cross-sectional evidence that the effects of the EOIR standard are more pronounced when incentives and opportunities to engage in income-shifting behavior are greater or when there is stronger tax enforcement. Overall, our findings are consistent with the implementation of the EOIR standard significantly reducing U.S. multinational firms' aggressive tax avoidance.

We conduct several additional tests. First, we find that treated firms' settlements with tax authorities increase after the implementation of the EOIR standard, consistent with the increased transparency enabling tax authorities to better detect tax avoidance. Second, treated firms' operations in listed countries decrease after the implementation of the EOIR standard. Third, our findings are not explained by other potentially confounding events, time-invariant variables, or a general time-trend.

Our study has important policy implications and makes several contributions to the literature. First, our study contributes to the literature on international cooperation in tax information exchange. Prior studies have examined the effect of international information exchange on personal tax avoidance, shifts in bank deposits, and corporate investment (e.g., Johannesen and Zucman 2014; Hanlon, Maydew, and Thornock 2015; Braun and Weichenrieder 2015). We extend the literature by documenting the effects of international cooperation in information exchange on corporate tax avoidance. Our study contributes to the debate on the

effectiveness of the EOIR standard and supports the argument that aggressive corporate tax avoidance is reduced by the OECD's efforts to implement and enforce the standard. Understanding the consequences of the EOIR standard is especially important because the OECD is conducting post-implementation reviews to ensure continued compliance with and implementation of the EOIR standard.

Second, our study contributes to an emerging line of literature on tax transparency and enforcement initiatives, such as the country-by-country reporting (CbCr), the Luxembourg Leaks, and the European Commission's illegal state aid investigations (e.g., Nesbitt, Outslay, and Persson 2017; Hrushko 2017; Fox et al. 2021; Joshi 2020; Joshi, Outslay, and Persson 2020).<sup>6</sup> Closely related to our setting, the CbCr increases corporate tax transparency by providing a detailed geographic breakdown of a firm's income and activities to tax authorities and/or the public.<sup>7</sup> The greater transparency could deter corporate tax avoidance by assisting tax enforcement and increasing public pressure and political costs faced by a firm. Recent studies have documented the effects of the European Union's (EU) public and private CbCr requirements on corporate tax avoidance and income-shifting behavior (Joshi et al. 2020; Joshi 2020). Compared to the CbCr, the EOIR standard also increases the transparency of the corporate tax environment but has a different effect. Specifically, there is a disconnect between information provided under the CbCr and the current arm's-length principle of transfer pricing (Hanlon 2018). Tax authorities cannot use a geographic breakdown of corporate income to assess whether the income reported in a jurisdiction or the transfer prices are appropriate (Hanlon 2018; Joshi 2020). Therefore, detailed transfer pricing analyses are not entirely replaceable by the

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<sup>6</sup> Nesbitt et al. (2017) examine how Luxembourg Leaks affect the stock market's valuation of tax avoidance. Fox et al. (2021) document the real effect of the European Commission's illegal state aid investigations on investment.

<sup>7</sup> Public CbC reports are available to the public, and private CbC reports are submitted by firms privately to tax authorities. Information in the private CbC reports could sometimes be leaked to the public (Joshi 2020).

CbCr data. Information requestable under the EOIR standard remains important in transfer pricing audits because the documents needed are often located outside the country that is conducting the audits (OECD 2006, 2015).<sup>8</sup> Therefore, we view the EOIR standard and the CbCr to complement each other.

Third, prior studies suggest that operations in tax havens and offshore financial centers have significant impacts on corporate tax reporting, transparency, and other corporate behavior (e.g., Graham and Tucker 2006; Dyreng and Lindsey 2009; Dyreng, Hanlon, and Maydew 2012). Our study suggests that the implementation of the EOIR standard has significantly affected firms' use of tax havens and offshore financial centers. Therefore, future studies in this area should examine the effect of tax havens in the periods before and after EOIR implementation separately.

## **BACKGROUND AND HYPOTHESIS**

### **International Tax Competition**

After decades of globalization, the economy of different countries is highly integrated. The tax policies of one country could have a significant impact on other countries. Countries need to compete in attracting multinational firms and investment with friendly tax policies (Wilson 1999; Clausing 2009). Healthy tax competition could generate many positive effects on the global economy (e.g., Tiebout 1956). However, certain tax policies may benefit some countries at a significant cost to other countries. For example, many tax havens and offshore financial centers have no or minimal income taxes. To reduce their overall tax burden, multinational firms have aggressively used structured transactions to shift their taxable income from high-tax countries to low-tax countries. For example, Starbucks' U.K. subsidiary is able to significantly reduce its taxable income and avoid paying U.K. taxes by paying a royalty fee to Starbucks' subsidiaries in

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<sup>8</sup> See OECD (2006) for examples of how the EOIR standard could directly help tax authorities in auditing possibly questionable transactions.

low-tax countries for using the company's intellectual property, such as its brand, coffee-roasting technology, and other business processes (e.g., Reuters 2012). Such harmful tax competition has contributed to a worldwide increase in corporate tax avoidance and hurts the ability of high-tax countries to provide public services and social welfare (e.g., Weiner and Ault 1998).

Prior studies have provided evidence consistent with multinational firms using tax-motivated income shifting to avoid taxes. Early statistics from the U.S. Department of Commerce in 1982 suggest the aggregated net income of affiliates in tax haven countries accounts for more than 30 percent of the after-tax foreign income of U.S. corporations (Hines and Rice 1994).<sup>9</sup> Using monthly international trade data, Clausing (2003) offers substantive evidence that U.S. multinational firms are engaging in tax-motivated transfer pricing. Dyreng and Lindsey (2009) find that on average U.S. firms that disclosed material operations in at least one tax haven country have a worldwide tax burden approximately 1.5 percentage points lower than the firms without such operations. The phenomenon is not limited to U.S. multinational firms. Gumpert, Hines, and Schnitzer (2016) suggest that German firms also establish tax haven affiliates for tax avoidance purposes.

### **The OECD and the Internationally Agreed Tax Standard**

In 1996, the OECD initiated a project to eliminate harmful tax competition. The OECD council of ministers released a report titled *Harmful Tax Competition: An Emerging Global Issue* in 1998. According to the report, the lack of transparency and effective exchange of information for tax purposes between countries is one of the most important factors that contributes to harmful tax competition. Many low-tax countries were unwilling to share information with tax authorities in other countries. The report also provides a set of guidelines to identify and

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<sup>9</sup> Prior to the Tax Cuts and Jobs Act of 2017, U.S. firms do not need to pay taxes on foreign income until it is repatriated.



eliminate harmful tax practices. According to the guidelines, four criteria were used to determine whether a country is a tax haven: (1) low tax rate, (2) no exchange of information, (3) lack of transparency, and (4) policies that facilitate the establishment of foreign entities without the need for a local substantive presence.

To increase the transparency of tax havens and offshore financial centers, the OECD developed the EOIR standard in its Article 26. The standard was endorsed by G20 finance ministers at their Berlin meeting in 2004 and by the UN Committee of Experts on International Cooperation in Tax Matters at its October 2008 meeting. The standard applies to the execution of TIEAs signed by different countries.<sup>10</sup> The EOIR standard contains three main principles: (1) the availability of information, (2) access to information, and (3) the exchange of information.<sup>11</sup> Specifically, the country should ensure the availability of reliable ownership, identity, accounting, and other information of all relevant entities. The country's tax authority should also have the power to obtain such information. Also, the standard requires a country to fully cooperate with competent tax authorities from another country with a TIEA in all tax matters for the administration and enforcement of the partner country's domestic tax law.

Under the EOIR standard, a country's competent authority may request tax-related information from another country's competent authority if these two countries have a TIEA. OECD (2006) provides a nonexhaustive list of information that could be requested under the EOIR standard. Examples include ownership information for relevant entities, accounting and banking records, and prices used in similar transactions. The request is usually in written form and should be as specific and detailed as possible. As long as the requested information is

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<sup>10</sup> TIEAs are bilateral agreements that allow two countries to request an exchange of information about entities that potentially violated the tax laws in those two countries. A standard TIEA can be found at <http://www.oecd.org/tax/exchange-of-tax-information/taxinformationexchangeagreementstieas.htm>.

<sup>11</sup> For more details about the standard, see <http://www.oecd.org/tax/transparency/about-the-global-forum/publications/terms-of-reference.pdf>.

relevant for the administration and enforcement of the requesting country's domestic tax laws, the tax authority that received the request must provide the information regardless of whether the investigation in the requesting country is related to a criminal matter.

In 2009, the OECD increased its efforts in implementing the EOIR standard. Specifically, the Global Forum on Transparency and Exchange of Information for Tax Purposes (hereafter, the Global Forum) was assigned by the OECD as the organization responsible for ensuring the implementation of the EOIR standard.<sup>12</sup> The Global Forum started reviewing the implementation of the EOIR standard in its member countries in 2009. The review consists of two phases. Phase one reviews whether the country has legal and administrative rules to comply with the standard. Phase two further reviews whether the EOIR standard is effectively followed in exchanges of information with partner countries with TIEAs on the implementation level.

The Global Forum periodically issues progress reports that update the results of reviews. The progress reports classify countries into three groups: (1) a white list of jurisdictions that have substantially implemented the EOIR standard, (2) a gray list of jurisdictions that have committed to the EOIR standard but have not yet substantially implemented it, and (3) a black list of jurisdictions that have not committed to the EOIR standard. A country is put on the black list if it does not commit to implementing the EOIR standard. After making the commitment and receiving a satisfactory first-phase review, the country is moved to the gray list. The country is further moved from the gray list onto the white list if it has substantively implemented the EOIR standard and successfully completed the second-phase review. To be whitelisted, the country should also have signed qualifying TIEAs with at least 12 countries that meet the requirements

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<sup>12</sup> The Global Forum was originally created in the early 2000s by 32 members with the goal of improving transparency and information exchange on tax matters. Over the years, the Global Forum introduced the EOIR standard. However, historically, the Global Forum has been an ad hoc group and less effective. The Global Forum was significantly restructured in the 2009 Mexico Meeting to answer the call for a strengthened implementation of the EOIR standard.

of the EOIR standard.<sup>13</sup> By the end of 2012, most countries are removed from the black and gray lists. Thus, the EOIR standard was effectively implemented in most countries around the world from 2009 to 2012. The implementation of the EOIR standard can help countries enforce their domestic tax laws and crack down on multinational firms' use of tax havens and financial centers in tax avoidance.

However, there are also criticisms over the effectiveness of the EOIR standard (e.g., Sheppard 2009; Tax Justice Network 2012). Most notably, a country shares information only when the partner country initiates requests for specific information. However, placing a request requires the partner country's tax authority to know exactly what information to look for before the information is requested (Tax Justice Network 2012). This increases the difficulty of requesting the correct information, which could significantly reduce the effectiveness of the EOIR standard.

### **Hypothesis Development**

Prior research suggests that U.S. multinational firms use tax havens and offshore financial centers for tax avoidance. For example, O'Donovan et al. (2019) study the Panama Papers and find that U.S. public firms use secret offshore vehicles in tax havens to aggressively avoid taxes. These secret offshore vehicles are usually set up by U.S. firms' foreign subsidiaries, and the ownership and other information of these secret vehicles are usually not publicly observable.

We are interested in examining whether the implementation of the EOIR standard in tax havens and other financial centers reduces U.S. multinational firms' tax avoidance. The EOIR standard aims to increase the transparency of the corporate tax environment and plays a different

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<sup>13</sup> Not all the TIEAs signed between countries meet the requirements of the EOIR standard. Simply signing 12 qualifying TIEAs is not sufficient for a country to be removed from the gray or black list. In addition to signing the TIEAs, a country needs to effectively follow the requirements and implement the EOIR standard. Therefore, we did not use the signing of TIEAs as our experimental events.

and complementary role from that of other international tax initiatives. But, as discussed earlier, a geographic breakdown of income does not inform tax authorities whether the transfer price is appropriate (Hanlon 2018). Instead, “documents and other information required for a transfer pricing audit will ... be located outside the country whose tax administration is conducting the audit. It is therefore important that the tax administration is able to obtain directly or through information sharing, such as exchange of information mechanisms, information that extends beyond the country’s borders” (OECD 2015, 14). Requestable information under the EOIR standard includes ownership and identity information for relevant entities, accounting and banking records, and prices used in similar transactions. In its *Manual on the Implementation of Exchange of Information Provisions for Tax Purposes* (OECD 2006), the OECD provides examples of requests for information that can help tax authorities better assess whether a firm’s transactions are with a related party and whether the firm uses the arm’s-length price and complies with tax laws and the OECD guidelines.<sup>14</sup> For example, the exchange of information could help tax authorities obtain information about the ownership relationship between two parties in a transaction. Also, when tax authorities suspect that the transaction price or loan terms (e.g., interest rates) between intrafirm companies are abnormal, they could request the financial records and even the price used in a similar transaction between two independent parties in the foreign country.

The EOIR standard is supposed to increase the transparency of tax havens and financial centers and facilitate information exchanges among countries on tax matters. After the implementation of the EOIR standard, firms could still use operations in tax havens to lower their taxes if they fully comply with the tax rules. However, the improved transparency should

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<sup>14</sup> The examples in the OECD report are related to four typical tax avoidance strategies: (1) inbound loan, (2) outbound loan, (3) services re invoicing, and (4) import and export transaction using conduit companies.

assist tax authorities in the United States and other high-tax countries in detecting tax underpayments and noncompliance by multinational firms and better enforcing tax laws. The higher probability of detection increases firms' expected costs of tax avoidance (e.g., Hoopes, Mescall, and Pittman 2012). Therefore, firms will likely more closely follow the arm's-length principle and shift less taxable income to low-tax countries through aggressive transfer pricing transactions. Taking these together, we expect the EOIR standard to reduce tax avoidance. Therefore, we formally state our hypothesis as follows:

**Hypothesis 1:** The implementation of the OECD's standard of exchange of information on request lowers U.S. multinational firms' aggressive tax avoidance.

It is also possible that we may not observe such results as predicted by the hypothesis. For example, the difficulty to place requests limits the information shared between tax authorities. Therefore, the EOIR standard may not be an effective threat to U.S. multinational firms.

## **DATA AND METHODOLOGY**

### **OECD Listed Countries and Progress Updates**

We collect eight "progress reports" that were issued by the OECD in implementing the internationally agreed tax standard from 2009 to 2012. The progress reports evaluate countries' efforts to implement the EOIR standard and classify countries into three different categories. The OECD issued the initial progress report on April 2, 2009. In this report, 40 countries have substantially implemented the internationally agreed tax standard (the white list). Thirty-eight countries have committed to the internationally agreed tax standard but have not yet substantially implemented it (the gray list). The OECD refers to 30 out of these 38 countries as tax havens and the other eight countries as "other financial centers." Four countries have not committed to the internationally agreed tax standard (the black list). In this paper, we collectively refer to the 42

countries on the gray list and the black list as *listed* countries. The subsequent seven progress reports were issued from September 21, 2009 to December 5, 2012. In these reports, the OECD reclassified countries in the initial gray and black lists to white and gray lists depending on their progress and commitment to implementing the internationally agreed tax standard on the exchange of tax information on request.

In Appendix A, we list the 42 countries that belong to the gray and black lists in the initial progress report and the timing when these countries are reclassified into the white or gray list. In the first two columns, we list the country's name and original classification in the April 2, 2009 OECD progress update report. In the middle two columns, we show the time when the listed countries are removed from the black or gray list and are reclassified onto the gray or white list. If an "n/a" shows in a cell, it means the respective listed country has never been reclassified into the column heading category. The last two columns show the distribution of firm-year observations with at least one subsidiary in the respective listed country and whether the listed country has signed a TIEA with the United States.<sup>15</sup> The multinational firms in our sample operate most commonly in Singapore, Switzerland, and Belgium, followed by Malaysia, Luxembourg, Cayman Islands, and Austria among the listed countries. The OECD evaluates the signing and the detailed terms of TIEAs to assess whether a country has made a sufficient commitment to the EOIR standard. Among these listed countries, 22 countries have TIEAs with the United States (hereafter, TIEA-listed countries). These countries allow us to identify treated firms.

We compare the listed countries with the tax havens used in Dharmapala and Hines (2009) and Dyreng and Lindsey (2009). The two studies identify 57 tax havens in total. As discussed

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<sup>15</sup> A treated firm may have multiple subsidiaries in multiple listed countries. Control firms have no subsidiaries in any listed country.

above, the OECD refers to 30 out of the 38 countries on the gray list as tax havens and the other eight countries as other financial centers. All 30 countries identified as tax havens by the OECD are included as tax havens in at least one of the two studies. Six out of the eight other financial centers are not included as tax havens in either study: Austria, Belgium, Chile, Guatemala, Malaysia, and the Philippines. In addition, 20 countries are identified as tax havens in the two studies but not included in the OECD black or gray list (hereafter, nonlisted tax havens). These 20 nonlisted tax havens are Barbados, Botswana, Cape Verde, Cyprus, Guernsey and Alderney, Hong Kong, Ireland, Isle of Man, Jersey, Jordan, Latvia, Lebanon, Macau, Maldives, Malta, Mauritius, Palau, Seychelles, Tonga, and U.S. Virgin Islands. The nonlisted tax havens allow us to identify valid control firms. In Appendix B, we provide the distribution of our control sample observations with subsidiaries in these countries.<sup>16</sup>

## **Sample and Data**

Our sample selection starts with all U.S. incorporated multinational firms in *Compustat* during 2007–2015, a sample period surrounding the OECD’s effort to implement the EOIR standard which lasted from 2009 to 2012. Our sample period starts in 2007 because data on UTBs used to construct our primary tax avoidance measure were not available before 2007. Due to different regulatory and financial reporting environments, we do not include utilities (SIC: 4800–4999) and financial (SIC: 6000–6999) firms. We follow Rego (2003) to classify a firm as a multinational firm if it has positive foreign pretax income or positive foreign assets in the *Compustat* Geographic Segments file or at least one foreign subsidiary.<sup>17</sup> To mitigate concerns

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<sup>16</sup> Both treated firms and control firms may operate in nonlisted tax havens. Furthermore, we require our control firms to have at least one subsidiary in the nonlisted tax havens in at least one year during our sample period.

<sup>17</sup> Following Dyreng and Lindsey (2009), we gather foreign operation information from Exhibit 21 of companies’ SEC filings. Firms are required to disclose material subsidiaries unless the unnamed subsidiaries, considered in the aggregate as a single subsidiary, would not constitute a significant subsidiary (Dyreng, Hoopes, Langetieg, and Wilde 2020).

about the impact of the 2008 financial crisis on firm performance, we exclude firms that reported losses in 2007 or 2008. Further, since our research question is whether the OECD-listed countries' classification changes have effects on multinational firms' tax outcomes, we require our sample firms to exist in *Compustat* before 2009 and continue to exist afterward. Doing so provides a pre-period and a post-period to observe any changes in tax outcomes due to the OECD's classification changes.

Our sample of treated firms includes those that have material subsidiaries in at least one of the 22 TIEA-listed countries in both the pre-period and the post-period.<sup>18,19</sup> Further, we include a firm in the control sample if it meets two criteria: first, the firm has at least one subsidiary in at least one of 20 nonlisted tax havens during our sample period; second, the firm has no operation in any of the 22 TIEA-listed countries throughout the sample period.<sup>20</sup>

As explained below, we use both a generalized DiD test and a standard DiD test to evaluate our hypothesis. The final sample for the generalized DiD test consists of 4,097 firm-year observations from 2007 to 2015, including 2,762 observations of treated firms. Further, we remove observations from 2009 to 2012 from the sample used to estimate the standard DiD test. Therefore, the main sample for the standard DiD test consists of 2,045 firm-year observations. We list the detailed sample selection process step-by-step in Table 1.

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<sup>18</sup> Bennedsen and Zeume (2018) document a “haven-hopping” behavior; that is, some firms move foreign subsidiaries in TIEA-affected countries to nonaffected countries. We require treated firms to have such operation in both the pre- and post-periods to ensure that treated firms in our sample have subsidiaries in the original listed countries (in the April 2, 2009 report) both before and after classification changes. If a firm has subsidiaries in the 22 listed countries in only the pre-period or only the post-period, we exclude that firm from our sample.

<sup>19</sup> In untabulated tests, we continue to observe similar results after requiring that both treated firms and control firms exist in all the years during our sample period. Also, we find similar results if we do not require TIEAs with the United States in the definition of treated firms.

<sup>20</sup> We use an alternative control sample using the following two criteria: first, the firm has at least one subsidiary in at least one of 20 nonlisted tax havens or one of the listed countries that do not have a TIEA with the United States during our sample period; second, the firm has no operation in any of the 22 TIEA-listed countries throughout the sample period. Untabulated tests show similar results.



## Tax Avoidance Measure

Because we study the effects of EOIR on curbing aggressive tax avoidance, we choose a measure capturing tax-reporting behavior at the more aggressive end of the tax avoidance continuum (e.g., Hanlon and Heitzman 2010; Lisowsky, Robinson, and Schmidt 2013). Specifically, our aggressive tax avoidance measure is *Increase\_UTB*, which is calculated as the increase in UTBs related to current-year tax positions times 100 deflated by lagged total assets. Following FASB Interpretation No. 48, *Accounting for Uncertainty in Income Taxes* (FIN 48), companies need to assess the likelihood of sustaining their tax position upon the tax authority's audit, assuming the relevant tax authority has full knowledge. Specifically, firms need to follow a two-step approach. In the first step, a firm needs to identify all the possible tax benefits and assess whether the tax positions have a more-likely-than-not probability to sustain tax audits. In the second step, the firm recognizes the amount of tax benefits that the taxpayer more likely than not can realize. The remaining unrecognized amount constitutes the unrecognized tax benefits. A higher value in *Increase\_UTB* indicates more aggressive tax avoidance.<sup>21</sup>

Prior literature suggests that firms may want to underreport UTB to avoid attracting attention from the Internal Revenue Service (IRS) (Towery 2017). The increase in UTB related to current-year tax positions is likely less affected by such financial reporting incentives relative to the level of UTB, because a large portion of financial reporting incentives are relatively stable over a two-year period. Furthermore, many large multinational firms are audited every year. Thus, the variation in IRS attention has both a time-sensitive portion and a time-insensitive

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<sup>21</sup> In untabulated analyses, we find that increases in UTBs are significantly associated with foreign income and the number of listed countries where the firm has subsidiaries. These findings support the idea that increases in UTBs capture U.S. multinational firms' foreign tax avoidance activities. Also, our main results remain similar if we alternatively define tax avoidance based on the ending balance of UTBs scaled by lagged total assets.

portion. Using the increase in UTB related to current-year tax positions mitigates concerns about the time-invariant portion due to financial reporting incentives.

## Regression Models

We employ the following regression models to test the effect of the EOIR standard implementation on tax avoidance.

$$\begin{aligned} \text{Increase\_UTB} = & \alpha + \beta_1 \text{Treated Firm} + \beta_2 \text{Treated Firm} \times \text{Post}_g + \text{Controls} \\ & + \text{Year fixed effects} + \text{Industry fixed effects} + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} \text{Increase\_UTB} = & \alpha + \gamma_1 \text{Treated Firm} + \gamma_2 \text{Treated Firm} \times \text{Post}_s + \gamma_3 \text{Post}_s + \text{Controls} \\ & + \text{Industry fixed effects} + \varepsilon \end{aligned} \quad (2)$$

The dependent variable in both models is the increase in unrecognized tax benefits related to current-year tax positions (*Increase\_UTB*). Because *Increase\_UTB* is left-censored and takes the value of zero for approximately a quarter of our sample,<sup>22</sup> we use a Tobit model to estimate the regression (e.g., Tobin 1958; Wooldridge 2010).

To provide a generalized DiD test of our hypothesis, Model (1) includes *Treated Firm*, an indicator for the group of treated firms, and year fixed effects.<sup>23</sup> *Treated Firm* captures the differences in tax avoidance between the treated firms and the control firms before the implementation of the EOIR standard. Relative to nonlisted tax havens, the listed countries have fewer information exchange agreements before the EOIR standard. Such opacity may be exploited by U.S. multinational firms to avoid taxes aggressively. Therefore, we expect the coefficient on *Treated Firm* to be positive. To test our hypothesis, Model (1) interacts *Treated Firm* with *Post<sub>g</sub>*, an indicator variable for the post-treatment period. *Post<sub>g</sub>* is set to one for a treated firm in years after at least one of the TIEA-listed countries where the firm has foreign

<sup>22</sup> Under FIN 48, firms report UTBs only if they have uncertain tax positions over certain thresholds (i.e., the more-likely-than-not probability to sustain tax audits).

<sup>23</sup> To estimate a generalized DiD regression, the model needs to include indicators for group-fixed effects and time-fixed effects (e.g., Wing, Simon, and Bello-Gomez 2018). Tobit models do not allow the inclusion of firm fixed effects. Therefore, we include a group indicator instead.

subsidiaries is removed from either the black or gray list (in accordance with the OECD progress update reports).<sup>24,25</sup>  $Treated Firm \times Post_g$  compares observations of treated firms after the implementation of the EOIR standard with observations of treated firms before the implementation and observations of control firms. If the OECD's effort to implement the EOIR standard effectively reduces treated firms' tax avoidance, we expect the coefficient on  $Treated Firm \times Post_g$  ( $\beta_2$ ) to be negative.

Model (2) further provides a standard DiD test by including an indicator for the group of treated firms ( $Treated Firm$ ) and an indicator for the post-period ( $Post_s$ ). To estimate this model, we exclude observations in the transition period from 2009 to 2012. Thus,  $Post_s$  is set to one for both treated and control firms after 2012 and zero otherwise.<sup>26</sup>  $Treated Firm$  still captures the difference in tax avoidance between treated and control firms before the implementation of the EOIR standard.  $Treated Firm \times Post_s$  tests how the difference in tax avoidance between treated and control firms changes in the post-period (after 2012) relative to the pre-period (before 2009). Our hypothesis expects the coefficient on  $Treated Firm \times Post_s$  ( $\gamma_2$ ) to be negative.

Both models control for a comprehensive list of firm-level determinants of tax avoidance that are studied in prior tax literature (e.g., Zimmerman 1983; Porcano 1986; Gupta and Newberry 1997; Graham and Tucker 2006; Frank, Lynch, and Rego 2009; Chen, Chen, Cheng, and Shevlin 2010; Jiang, Kubick, Miletkov, and Wintoki 2018), including overall profitability ( $ROA$ ); the level of accruals ( $Total Accrual$ ); company size ( $Size$ ); the ratio of foreign income ( $Foreign Income$ ); the unremitted earnings from an unconsolidated subsidiary ( $Equity Income$ );

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<sup>24</sup> The post-treatment period is based on the first time when a firm is potentially affected by the implementation of the EOIR standard. For example, for a firm with subsidiaries in six TIEA-listed countries,  $Post_g$  is set to one as long as at least one of the six countries is removed from the black or gray list. In untabulated analysis, we use several alternative definitions of  $Post$ . For example,  $Post$  is alternatively set to one after all the countries where the firm has foreign subsidiaries are moved to the white list. Results remain robust.

<sup>25</sup>  $Post_g$  equals zero for all observations of control firms.

<sup>26</sup> In untabulated tests, we find similar results when we keep observations in years 2011 and 2012 and drop firms that become treated in these two years.

intangible assets (*Intangible Intensity*); property, plant, and equipment (*Capital Intensity*); market-to-book ratio (*MTB*); capital structure (*Leverage*); free operating cash flow (*Free Cash Flow*); research and development expenses (*R&D*); and institutional ownership (*IO*). In addition, we control for industry fixed effects in both models. We include a detailed definition of all variables in Appendix C. Following the recommendation in Petersen (2009), we use standard errors clustered at the firm level.

## MAIN RESULTS

### Univariate Analyses

We start our empirical analyses with univariate analyses. Our hypothesis is about the effect of the EOIR standard on U.S. multinational firms' tax avoidance. In Figure 1, we show the average *Increase\_UTB* for the treated firms and control firms by year. The solid line represents the treated firms. The dashed line shows the control firms. While both groups experience decreases in the average *Increase\_UTB*, the differences between the treated firms and control firms decline after 2009.<sup>27</sup> This finding is consistent with our hypothesis that the EOIR standard reduces U.S. multinational firms' tax avoidance. Further, prior to 2009, we find that the two groups exhibit similar behavior, which supports the parallel trend assumption for DiD tests.<sup>28</sup>

### Summary Statistics

Table 2, Panels A and B present the summary statistics of our samples for the generalized DiD test and the standard DiD test, respectively. According to Panel A, the mean (median) level of *Increase\_UTB* is about 0.177 (0.076) percent of total assets, and about 67.4 percent of firm-year observations belong to *Treated Firm*. These statistics are similar in Panel B. Panel C reports

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<sup>27</sup> The numbers of firms that become treated are 408, 100, and 2 firms in 2009, 2010, and 2012, respectively.

<sup>28</sup> In an untabulated test, we interact *Treated Firm* with a time trend variable after excluding observations of treated firms in the post-treatment period. We do not find different time trends for treated firms and control firms in the pre-treatment period, which is also consistent with the parallel assumption.

the comparatives of mean statistics between the treated and control samples before and after entropy balancing in the larger sample for generalized DiD tests. Before entropy balancing, treated firms have larger size, more intangible assets, higher capital intensity, higher market-to-book ratio, and higher leverage but report lower *ROA* and lower free cash flows and invest less in R&D. To better control for these differences in control variables between the treated firms and control firms, we use entropy balancing to reweight the control sample.<sup>29</sup> Specifically, we set the balancing constraints to the first moment. Hainmueller (2012) suggests that balance checking in the conventional sense is not needed for entropy balancing. After entropy balancing, we do not observe significant mean differences in control variables between the treated and control samples in Panel C, suggesting that the entropy balancing effectively balances the covariates in our sample.

## Regression Results

In Table 3, we test the deterrence effects of the EOIR standard on tax avoidance. Column (1) reports results of estimating regression Model (1). The coefficient on *Treated Firm* is significant and positive (0.058,  $p$ -value = 0.013), suggesting that treated firms have higher tax avoidance before the implementation of the EOIR standard. Further, the variable of interest  $Treated Firm \times Post_t$  has a significant negative coefficient (-0.043,  $p$ -value = 0.048). Thus, after the implementation of the EOIR standard, the association between *Increase\_UTB* and treated firms is mitigated. In dollar terms, the EOIR standard reduces an average firm's annual increase

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<sup>29</sup> Entropy balancing is a multivariate reweighting method to achieve covariate balance by assigning a scalar weight to each sample unit. Thus, the reweighted sample could satisfy a set of balance constraints. This reweighting scheme effectively adjusts for inequalities in representation. Entropy balancing has several advantages over propensity score matching and other preprocessing methods (Hainmueller 2012). For example, entropy balancing retains all the useful information in the sample rather than dropping unmatched observations as in propensity score matching. Also, propensity score matching requires finding the correct model specification and often a fairly large sample to accurately estimate propensity scores. However, it is often difficult to find the correct model specification or find a large enough sample. As a result, misspecified propensity scores often fail to balance the covariates. In contrast, entropy balancing directly reweights the sample to achieve covariate balance and thereby obviates the need for searching over the correct propensity score model.

in uncertain tax benefits by nearly \$0.8 million.<sup>30</sup> In Column (2), we further estimate the regression model (2). The coefficient on *Treated Firm* is still significant and positive (0.094,  $p$ -value = 0.000). The coefficient on the variable of interest *Treated Firm*  $\times$  *Post<sub>s</sub>* also continues to be significant and negative (-0.080,  $p$ -value = 0.000). These findings are consistent with our hypothesis that the compliance of the listed countries with the EOIR standard reduces the U.S. multinational firms' tax avoidance. Collectively, these findings suggest that U.S. multinational firms use tax havens and offshore financial centers to aggressively avoid taxes before the implementation of the EOIR standard, but such tax avoidance behavior is significantly lower after the implementation of the EOIR standard.

In an untabulated test, we find both the sum of coefficients on *Treated Firm* and *Treated Firm*  $\times$  *Post<sub>g</sub>* in Column (1) and the sum of coefficients on *Treated Firm* and *Treated Firm*  $\times$  *Post<sub>s</sub>* in Column (2) are not statistically different from zero ( $p$ -values = 0.483 and 0.323, respectively). Therefore, after these listed countries comply with the EOIR standard, treated firms that operate in these countries no longer have more aggressive tax avoidance than control firms with operations in nonlisted tax havens. As discussed earlier, nonlisted tax havens have more information exchange agreements than listed countries prior to the EOIR standard. These results suggest that after the EOIR standard, the transparency of listed countries becomes similar to that of nonlisted tax havens.

The coefficients on control variables are generally consistent with prior studies that use similar tax aggressiveness measures (e.g., Rego and Wilson 2012). For example, we find that U.S. multinational firms' tax avoidance is positively correlated with financial performance, firm

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<sup>30</sup> When the dependent variable is censored, coefficients in Tobit regression models are interpreted in the way as in a linear regression model. The average total assets are \$1.9 billion in our sample. Thus, the reduction approximately translates to \$0.8 million (= 1.9 billion  $\times$  0.043 percent).

size, foreign income, and R&D activities. Further, *Increase\_UTB* is negatively correlated with capital intensity and institutional ownership.

## ADDITIONAL TESTS

### Cross-Sectional Analyses

To better understand how and why treated firms change their tax avoidance, we provide several cross-sectional results in Table 4. As discussed above, under the EOIR standard, tax authorities could request related information to better detect tax noncompliance by multinational firms and better enforce tax rules. The higher probability of detection increases firms' expected costs of tax avoidance. After the EOIR standard, firms would more closely follow the arm's-length principle and reduce their aggressive income-shifting activities through intrafirm transactions. Therefore, we expect the effect of the EOIR standard to be more pronounced for firms with stronger incentives or more opportunities for income shifting. Also, the effect is likely stronger when existing enforcement is stronger and thus the probability of detection is also higher. We explore these cross-sectional variations in the effect of the EOIR standard by interacting *Treated Firm* and *Treated Firm*  $\times$  *Post* with several cross-sectional variables of interest.

We first examine the cross-sectional variations due to income-shifting incentives. Specifically, prior literature (e.g., Klassen and Laplante 2012) suggests that firms have stronger income-shifting incentives when their foreign tax rates are lower than the domestic tax rate. Thus, we measure a firm's income-shifting incentives (*Rate Diff*) as the U.S. statutory rate (35%) minus the firm's foreign effective tax rate. In Column (1), we interact *Treated Firm*  $\times$  *Post<sub>g</sub>* and *Treated Firm* with *Rate Diff*. In Column (2), we interact *Treated Firm*  $\times$  *Post<sub>s</sub>*, *Treated Firm*, and *Post<sub>s</sub>* with *Rate Diff*. We find positive and significant coefficients on *Treated Firm*  $\times$  *Rate*

*Diff*, suggesting that treated firms with higher income-shifting incentives have more aggressive tax avoidance before the EOIR standard. Coefficients on the interaction of *Treated Firm* and *Post<sub>g</sub>* and the interaction of *Treated Firm* and *Post<sub>s</sub>* are negative and significant. Therefore, even when *Rate Diff* equals zero, treated firms experience a decrease in tax avoidance. We further find significant and negative coefficients on the interaction of *Treated Firm*, *Post<sub>g</sub>*, and *Rate Diff* and the interaction of *Treated Firm*, *Post<sub>s</sub>*, and *Rate Diff*. Consistent with our expectations, these results suggest that the effect of the EOIR standard is stronger for firms with stronger income-shifting incentives. This moderating effect of income-shifting incentives is also economically significant. Based on results in Column (2), when *Rate Diff* increases by one standard deviation (0.219), the reduction in *Increase\_UTB* is approximately 131 percent larger ( $= 0.175 \times 0.219 \div 0.029$ ).

Second, we provide a cross-sectional analysis based on a measure that reflects firms' income-shifting tendency comprehensively. In particular, De Simone, Mills, and Stomberg (2019) construct an outbound income-shifting score based on a number of firm-level financial measures, including R&D, advertising, intangible assets, investment, profitability, foreign and domestic sales, tax rates, leverage, size, auditor, and industries. Firms with a high outbound score have more outbound income-shifting behavior measured based on confidential data from the IRS. In Panel B, *Outbound Score* is the demeaned values of the outbound income-shifting score. The sample size becomes smaller due to missing values of *Outbound Score*. We find that *Treated Firm*  $\times$  *Outbound Score* loads positively in Column (2), suggesting that treated firms with high outbound scores have more aggressive tax avoidance before the EOIR standard. Consistent with our expectation, coefficients on the interaction of *Treated Firm* and *Post<sub>g</sub>* and the interaction of *Treated Firm* and *Post<sub>s</sub>* are both negative and significant. Further, we find significant and



negative coefficients on the interaction of *Treated Firm*,  $Post_g$ , and *Outbound Score* and the interaction of *Treated Firm*,  $Post_s$ , and *Outbound Score*. Based on the results in Column (1), when *Outbound Score* increases by one standard deviation (0.544), the reduction in *Increase\_UTB* is approximately 39 percent larger for treated firms ( $= -0.035 \times 0.544 \div -0.049$ ). Therefore, the effect of the EOIR standard is significantly greater for firms with high income-shifting tendency.

Our third cross-sectional analysis in Panel C examines whether strong tax enforcement enhances the deterrence effect of the EOIR standard. Stronger enforcement is expected to increase the probability that tax avoidance is detected through requests under the EOIR standard. We use a measure of strong tax enforcement based on the probability of a tax audit by the IRS (*IRS Audit Risk*). Specifically, *IRS Audit Risk* is the demeaned values of the IRS audit probability extracted from SOI Tax Stats - IRS Data Book.<sup>31</sup> In Column (1), we interact *Treated Firm*  $\times$   $Post_g$  and *Treated Firm* with *IRS Audit Risk*. In Column (2), we interact *Treated Firm*  $\times$   $Post_s$ , *Treated Firm*, and  $Post_s$  with *IRS Audit Risk*. In addition, to mitigate concerns about the correlation between IRS audit risk and firm size, we also interact these variables with *Size*. Coefficients on the interaction of *Treated Firm* and  $Post_g$  and the interaction of *Treated Firm* and  $Post_s$  are both negative. Thus, even firms facing an average IRS audit risk reduce their tax avoidance after the implementation of the EOIR standard. We also find significant and negative coefficients on the interaction of *Treated Firm*,  $Post_g$ , and *IRS Audit Risk* and the interaction of *Treated Firm*,  $Post_s$ , and *IRS Audit Risk*. Thus, the effect of the EOIR standard is indeed enhanced by strong tax enforcement. Results in Column (2) suggest that when IRS audit probability increases by one standard deviation (0.218), the reduction in *Increase\_UTB* is approximately 4.6 percent larger for those with operations in TIEA-listed countries ( $= -0.222 \times$

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<sup>31</sup> Available at <https://www.irs.gov/statistics/soi-tax-stats-irs-data-book>.

0.218 ÷ -0.486). In comparison, when *Size* decreases by one standard deviation (1.669), the reduction in *Increase\_UTB* is approximately 10 percent ( $= -0.054 \times 1.669 \div -0.410$ ).

Overall, we find that the effect of the EOIR standard on tax avoidance is more pronounced when firms have more income-shifting incentives and opportunities or when tax enforcement is stronger. These cross-sectional analyses lend further support to the argument that the EOIR standard lowers corporate tax avoidance.

### **Timing of Effects**

To mitigate possible concerns about a pre-existing time-trend, we next analyze when the deterrence effect of the EOIR standard on tax avoidance arises in Figure 2. Panel A uses the sample for estimating model (1). We identify the first year when a treated firm receives treatment as year  $t$ . Then, we set up indicators for years  $t-3$  and before, year  $t-2$ , year  $t$ , year  $t+1$ , year  $t+2$ , and years  $t+3$  and after. Thus, the benchmark period is year  $t-1$ . In Panel B, we use the sample for the standard DiD test and interact the *Treated Firm* variable with indicators for each fiscal year except 2008, which serves as the benchmark year. Then, we plot the coefficients on these interaction terms and their 95 percent confidence intervals. Both panels show that there are no significant differences between treated firms and control firms in the pre-period. But the effect of the EOIR standard arises right after the implementation of the EOIR standard and exists throughout the post-period.<sup>32</sup>

### **Income Shifting**

To further understand the mechanism of our main results, we provide an additional analysis of income shifting in Table 5, Panel A. In particular, we adopt a regression model from

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<sup>32</sup> We also provide untabulated falsification tests based on pseudo-events. Specifically, for each treated firm, we identify the event when the firm became affected by the EOIR standard. The pseudo-events are set to be three years after the actual event year. We do not find significant results using the pseudo-events.

prior literature (e.g., Hope, Ma, and Thomas 2013; Li, Ma, and Shevlin 2021).<sup>33</sup> The dependent variable is the ratio of foreign income to total income (*Foreign Income*). After controlling for the ratio of foreign sales to total sales, more income shifting will result in a higher ratio of foreign income to total income. We include all the independent variables from Models (1) and (2) in the two columns, respectively, except for *Foreign Income*. Coefficients on *Treated Firm* × *Post<sub>g</sub>* and *Treated Firm* × *Post<sub>s</sub>* are significant and negative. Thus, the ratio of foreign income to total income decreases for treated firms after they are affected by the EOIR standard. These results are consistent with our expectation that the EOIR standard reduces treated firms' shifting of taxable income to foreign countries.

### **Tax Settlements**

We next provide another additional analysis to verify the assumption that the EOIR standard enables tax authorities to better detect tax avoidance. If so, we expect higher tax settlements between treated firms and tax authorities after the implementation of the EOIR standard. FIN 48 requires firms to disclose “settlement with tax authorities” in annual report footnotes. In Table 5, Panel B, we reestimate Models (1) and (2) after replacing the dependent variable with *Tax Settlement*, which is calculated as the amount of decreases to UTBs relating to settlements with taxing authorities times 100 scaled by the ending balance of UTBs. Consistent with our expectations, we find positive and significant coefficients on our variables of interest, *Treated Firm* × *Post<sub>g</sub>* and *Treated Firm* × *Post<sub>s</sub>*. These findings are consistent with the argument that the requests for information are associated with a higher detection rate of tax avoidance.

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<sup>33</sup> An alternative way to test income-shifting behavior in Klassen and Laplante (2012) requires the computation of foreign tax rates. To have a meaningful value of foreign tax rates, all firms with negative foreign pretax income need to be further dropped. Therefore, we use the approach in Hope et al. (2013) and Li et al. (2021) for a larger sample size.

## Operation Intensity in Listed Countries

In Table 5, Panel C, we test whether the EOIR standard also has a real effect on treated firms' operations in the listed countries. Our main results suggest that treated firms gain lower tax benefits from operations in listed countries after the implementation of the EOIR standard. As a result, they may also reduce the intensity of operations in those countries (e.g., Braun and Weichenrieder 2015). The dependent variable is *Operation in Listed Countries*, the number of subsidiaries in all the 22 TIEA-listed countries for a firm in year  $t$ . All the control variables from Models (1) and (2) are included in the regressions. Additionally, we control for *Subs in Prior Three Years*, which is the average number of subsidiaries in all the 22 TIEA-listed countries for the firm during the prior three years.<sup>34</sup>

We observe significant and negative coefficients on  $Treated Firm \times Post_g$  and  $Treated Firm \times Post_s$ . These findings lend further support to our argument that the implementation of the EOIR standard reduces treated firms' use of TIEA-listed countries. Based on results in Column (1), the coefficient estimate on  $Treated Firm$  suggests that treated firms have five more subsidiaries in listed countries during the pre-period than control firms. The coefficient estimate on  $Treated Firm \times Post_g$  suggests that the number of subsidiaries in listed countries decreases by one for treated firms after the treatment, which is 20 percent of the difference between control firms and treated firms before the treatment. Therefore, the effect is also economically significant.

## CONCLUSION

The last several decades have witnessed a remarkable increase in multinational firms' use of tax havens and offshore financial centers for aggressive tax avoidance. As an effort to crack

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<sup>34</sup> In untabulated tests, we re-estimated a linear model using the natural logarithm of one plus the number of subsidiaries in all the 22 TIEA-listed countries as the dependent variable. Results remain similar.

down on such behaviors, the OECD's Global Forum has promoted the implementation of the EOIR standard in its member countries. The EOIR standard requires a country to cooperate with competent tax authorities from another country in all tax matters for the administration and enforcement of the latter country's domestic tax law. Between 2009 and 2012, most listed countries have implemented or committed to the EOIR standard. The implementation of the EOIR standard can help countries enforce their domestic tax laws and crack down on multinational firms' use of tax havens. However, EOIR has also been criticized because a country shares information only when another country requests specific information. Thus, information exchange is limited by the difficulty for the other country's tax authority to know what information to request before the exact problem is identified. This study attempts to shed light on the effectiveness of the EOIR standard.

Using a sample of U.S. multinational firms from 2007 to 2015, we employ difference-in-differences tests based on staggered changes created by the implementation of the EOIR standard by different countries at different times. We find that the implementation of the EOIR standard significantly reduces U.S. multinational firms' aggressive tax avoidance. As the OECD is currently conducting a new peer-review of its member countries' efforts in tax information exchange, this study should be of interest to policymakers who are interested in understanding the benefits of the internationally agreed standard on tax information exchange on request.

The OECD is also promoting another standard of automatic exchange of financial account information (AEOI), which further requires financial institutions to automatically report information of financial accounts owned by foreign persons to competent foreign authorities. Tax authorities around the world are considering the implementation of the AEOI standard. The OECD expects the AEOI and EOIR standards to complement each other and work together to

enhance the effectiveness of tax administrations' efforts in addressing international tax evasion. Thus, the EOIR and AEOI standards are not expected to substitute for each other. For example, the AEOI requires an automatic exchange of only financial account information. But under the EOIR standard, a country's tax authorities could request more types of information from a partner country (see OECD 2006 for a nonexhaustive list of information that could be requested). Also, regimes introduced under the AEOI standard, such as the Foreign Account Tax Compliance Act (FATCA) and Common Reporting Standard (CRS), are mainly targeted toward individual taxpayers rather than publicly traded firms. Individual taxpayers can aggressively avoid taxes by underreporting income earned abroad or setting up shell corporations to channel funds into foreign jurisdictions (e.g., Gravelle 2015). To the extent that information sharing is also important for tax authorities to monitor individual tax avoidance activities, our findings imply that the AEOI standard might also help deter aggressive individual tax avoidance. But, given the differences between the AEOI and the EOIR standards, future research to empirically evaluate the effectiveness of the AEOI standard is warranted.

Finally, we need to add several caveats. First, although our difference-in-differences research design is based on staggered changes, we cannot totally exclude the possibility of confounding effects. Second, our empirical analyses are based on a sample of U.S. multinational firms. The generalization of our findings to other countries is not clear. Third, we find that treated firms that operate in listed countries no longer have more aggressive tax avoidance than control firms with operations in nonlisted tax havens. However, our tests do not answer whether treated firms have more tax avoidance than other U.S. multinational firms without operations in any tax haven after implementing the EOIR standard. We encourage future studies to examine these issues.

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**APPENDIX A**  
**OECD Listed Countries and Sample Distribution**

<u>OECD Listed Countries in the Apr. 2, 2009 report</u>	<u>Original Category</u>	<u>Move to Gray List</u>	<u>Move to White List</u>	<u>Observations</u>	<u>TIEA with the U.S.</u>
Andorra	GRAY	n/a	Oct. 11, 2010	0	No
Anguilla	GRAY	n/a	Oct. 11, 2010	2	No
Antigua and Barbuda	GRAY	n/a	Jan. 15, 2010	12	Yes
Aruba	GRAY	n/a	Sep. 21, 2009	35	Yes
Bahamas	GRAY	n/a	Oct. 11, 2010	109	Yes
Bahrain	GRAY	n/a	Sep. 21, 2009	76	No
Belize	GRAY	n/a	Mar. 1, 2011	5	No
Bermuda	GRAY	n/a	Sep. 21, 2009	601	Yes
British Virgin Islands	GRAY	n/a	Sep. 21, 2009	252	Yes
Cayman Islands	GRAY	n/a	Sep. 21, 2009	697	Yes
Cook Islands	GRAY	n/a	Oct. 11, 2010	0	No
Dominica	GRAY	n/a	Oct. 11, 2010	0	Yes
Gibraltar	GRAY	n/a	Jan. 15, 2010	121	Yes
Grenada	GRAY	n/a	Oct. 11, 2010	5	Yes
Liberia	GRAY	n/a	Mar. 1, 2011	30	No
Liechtenstein	GRAY	n/a	Jan. 15, 2010	19	Yes
Marshall Islands	GRAY	n/a	Oct. 11, 2010	30	Yes
Monaco	GRAY	n/a	Jan. 15, 2010	16	Yes
Montserrat	GRAY	n/a	May. 18, 2012	0	No
Nauru	GRAY	n/a	n/a	0	No
Netherlands Antilles	GRAY	n/a	Sep. 21, 2009	80	Yes
Niue	GRAY	n/a	n/a	0	No
Panama	GRAY	n/a	May. 18, 2012	260	Yes
St Kitts and Nevis	GRAY	n/a	Oct. 11, 2010	12	No
St Lucia	GRAY	n/a	Oct. 11, 2010	32	Yes
St Vincent and Grenadines	GRAY	n/a	Oct. 11, 2010	6	No
Samoa	GRAY	n/a	Jan. 15, 2010	9	No
San Marino	GRAY	n/a	Jan. 15, 2010	0	No
Turks and Caicos Islands	GRAY	n/a	Jan. 15, 2010	4	No
Vanuatu	GRAY	n/a	May. 18, 2012	8	No
Austria	GRAY	n/a	Sep. 21, 2009	684	Yes
Belgium	GRAY	n/a	Sep. 21, 2009	977	Yes
Brunei	GRAY	n/a	Oct. 11, 2010	28	No
Chile	GRAY	n/a	Jan. 15, 2010	548	Yes
Guatemala	GRAY	n/a	Dec. 5, 2012	171	No
Luxembourg	GRAY	n/a	Sep. 21, 2009	818	Yes
Singapore	GRAY	n/a	Jan. 15, 2010	1,533	No
Switzerland	GRAY	n/a	Jan. 15, 2010	1,002	Yes
Costa Rica	BLACK	Sep. 21, 2009	May. 18, 2012	274	Yes
Malaysia	BLACK	Sep. 21, 2009	Oct. 11, 2010	848	No
Philippines	BLACK	Sep. 21, 2009	Oct. 11, 2010	476	Yes
Uruguay	BLACK	Sep. 21, 2009	May. 18, 2012	198	No

This appendix shows the tax havens and offshore financial centers included in the April 2, 2009, OECD report. The first and second columns show the country names and the initial classifications. The next two columns show the time when the listed countries are removed from the black or gray list and are reclassified onto the gray or white list.

If an “n/a” shows in a cell, it means the respective listed country has never been reclassified into the column heading category. The last two columns show the number of firm-year observations with subsidiaries in the respective listed country and whether the listed country has signed TIEAs with the United States as of 2017.

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**APPENDIX B**  
**Nonlisted Tax Havens and Sample Distribution**

<u>Nonlisted Tax Havens</u>	<u>Source</u>	<u>Observations</u>
Barbados	DH;DL	39
Botswana	DL	0
Brunei Darussalam	DL	0
Cape Verde	DL	0
Cyprus	DH;DL	22
Guernsey and Alderney	DH;DL	4
Hong Kong	DH	293
Ireland	DH;DL	137
Isle of Man	DH;DL	3
Jersey	DH;DL	11
Jordan	DH	2
Latvia	DL	0
Lebanon	DH;DL	14
Macau	DH;DL	1
Maldives	DH;DL	0
Malta	DH;DL	4
Mauritius	DH;DL	64
Palau	DL	0
Seychelles	DH;DL	6
Tonga	DH	0
<u>U.S. Virgin Islands</u>	DH;DL	3

This appendix shows the distribution of control firm observations in tax havens that are not included in the April 2, 2009, OECD report. The first two columns show the country names and sources we use to identify tax havens. We rely on two prior studies to identify tax havens: DH refers to Dharmapala and Hines (2009) and DL refers to Dyreng and Lindsey (2009). The last column shows the number of firm-year observations with subsidiaries in the respective nonlisted tax haven for the control sample. A control firm is required to have at least one subsidiary in a nonlisted tax haven during our sample period.

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**APPENDIX C**  
**Variable Definition**

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<b>Variable</b>	<b>Definition</b>
<i>Increase_UTB</i>	Increases in unrecognized tax benefits related to current-year tax positions. Calculated using the amount of increases in UTBs for current-year's tax position (TXTUBPOSINC) times 100 deflated by lagged total assets (AT). Source: <i>Compustat</i>
<i>Treated Firm</i>	Indicator for treated firms with foreign operations in at least one of the 22 listed countries with TIEAs with the United States (see Appendix A for the list). Source: <i>OECD</i> and Exhibit 21
<i>Post<sub>g</sub></i>	Indicator for the period after a firm is affected by the EOIR standard. Specifically, among the listed countries where the firm has foreign subsidiaries, we first identify those countries that have TIEAs with the United States. Then, <i>Post<sub>g</sub></i> is set to one for observations of the treated firm in years after at least one of the listed countries with TIEAs with the United States is removed from either the black list or the gray list and zero otherwise. Source: <i>OECD</i> and Exhibit 21
<i>Post<sub>s</sub></i>	Indicator for the post-period of the EOIR standard. Specifically, it is set to one for observations from 2013 to 2015 and zero for observations from 2007 to 2008. Source: <i>Compustat</i>
<i>ROA</i>	Pretax book income (PI) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>Total Accrual</i>	Pretax total accruals (IBC + TXT – OANCF – TXPD + XIDOC) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>Size</i>	Natural logarithm of total assets (AT). Source: <i>Compustat</i>
<i>Foreign Income</i>	The ratio of foreign pretax income (PIFO) as of total pretax income (PI), following the adjustments in Hope, Ma, and Thomas (2013). For firms with positive PI and negative PIFO, the ratio is set to zero. For firms with negative PI and positive PIFO, the ratio is set to one. If both PI and PIFO are negative, the ratio is set to missing. Source: <i>Compustat</i>
<i>Equity Income</i>	Unconsolidated earnings (ESUB) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>Intangible Intensity</i>	Intangible assets (INTAN) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>Capital Intensity</i>	Net property, plant, and equipment (PPENT) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>MTB</i>	Market-to-book value of equity (PRCC_F × CSHO / CEQ) in natural logarithm form. Source: <i>Compustat</i>
<i>Leverage</i>	Long-term debt (DLTT) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>Free Cash Flow</i>	Operating cash flow (OANCF) minus capital expenditures (CAPX), scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>R&amp;D</i>	Research and development expense (XRD) scaled by lagged total assets (AT). Source: <i>Compustat</i>
<i>IO</i>	Institutional ownership, measured as the percent of shares outstanding owned by institutional investors (INSTOWN_PERC). Source: WRDS Thomson Reuters Institutional (13f) Holdings

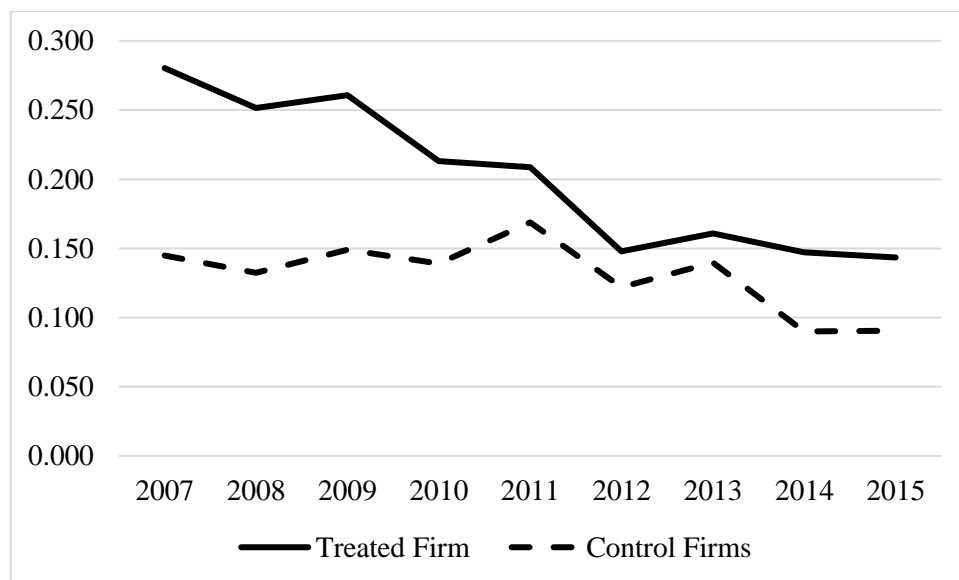
### APPENDIX C (Continued)

<i>Rate Diff</i>	Income-shifting incentives, calculated as the U.S. statutory rate (35%) minus the firm's foreign effective tax rate. Source: <i>Compustat</i>
<i>Outbound Score</i>	The demeaned values of a firm-level measure of income-shifting tendency to foreign affiliates. Source: De Simone, Mills, and Stomberg (2019)
<i>IRS Audit Risk</i>	IRS tax audit probability, measured as the demeaned values of the percentage of Form 1120 examined by the IRS. Source: SOI Tax Stats - IRS Data Book
<i>Tax Settlement</i>	The amount of decreases to UTBs relating to settlements with taxing authorities (TXTUBSETTLE) scaled by the ending balance of UTBs (TXTUBEND) Source: <i>Compustat</i>
<i>Listed Countries Operation</i>	The number of subsidiaries in the TIEA-listed countries. Source: <i>OECD</i> and Exhibit 21
<i>Subs in Prior Three Years</i>	The average number of subsidiaries in the TIEA-listed countries from year $t-1$ to year $t-3$ . Source: <i>OECD</i> and Exhibit 21

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**Figure 1**  
**US Multinational Firms' Aggressive Tax Avoidance**



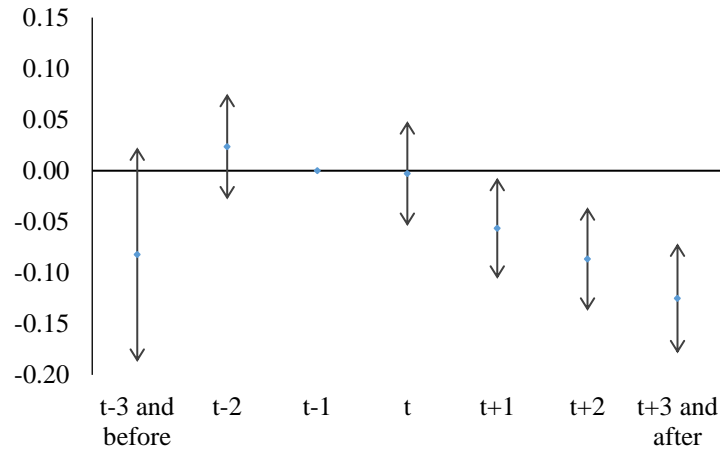
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This figure depicts the average increase in unrecognized tax benefits related to current-year tax positions (i.e., *Increase\_UTB*) of the treated firms and control firms. The solid line is the average *Increase\_UTB* of the treated firms. The dashed line is the average *Increase\_UTB* of the control firms.

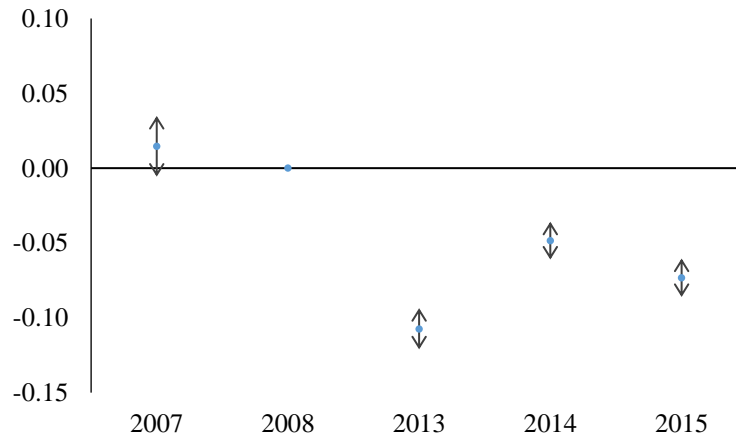
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**Figure 2**  
**Timing of Treatment Effects**

**Panel A: Generalized DiD Sample**



**Panel B: Standard DiD Sample**




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The figure maps out the timing of the treatment effects of EOIR standards on U.S. multinational firms. Panels A and B use the specification in Table 3, Columns 1 and 2, respectively. In Panel A, we identify the first year when a firm became treated as year  $t$ . Then, we replace the  $Post_g$  indicator in Table 3, Column 1 with separate indicators for years  $t-3$  and before, year  $t-2$ , year  $t$ , year  $t+1$ , year  $t+2$ , and years  $t+3$  and after. Year  $t-1$  is the benchmark year. In Panel B, we replace the  $Post_s$  indicator with separate indicators for 2007, 2013, 2014, and 2015. The year 2008 serves as the benchmark year. The figure displays coefficient estimates on the interaction terms of these indicators with *Treated Firm* and their 95 percent confidence intervals.

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**Table 1**  
**Sample Selection**

	<b>Observations</b>
U.S. multinational firms in nonfinancial and nonutility industries from 2007 to 2015	24,961
<i>Less:</i> Firms with a loss in 2007 and 2008	(12,221)
<i>Less:</i> Firms that do not exist prior to the initial OECD report in 2009 or firms that cease to exist after the initial OECD report in 2009	(1,621)
<i>Less:</i> Observations with missing values of <i>Increase_UTB</i>	(2,803)
<i>Less:</i> Observations with missing values to construct control variables, as well as observations with lower than \$10 million in total assets	(1,761)
<i>Less:</i> Firms that have subsidiaries in the 22 listed countries with TIEAs with the United States in only the pre-period or only the post-period	(233)
<i>Less:</i> Firms without subsidiaries in any of the 22 listed countries with TIEAs with the United States and any of the 57 tax havens identified in prior studies during the sample period	(2,225)
 Final sample for the generalized difference-in-differences test of Model (1)	 4,097
 <i>Less:</i> Observations in fiscal years 2009, 2010, 2011, and 2012	 (2,052)
 Final sample for the standard difference-in-differences test of Model (2)	 2,045

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This table shows the sample selection process. Unrecognized Tax Benefits (UTBs) become publicly available in financial reports after the implementation of FASB Interpretation No. 48, *Accounting for Uncertainty in Income Taxes* (FIN 48). FASB issued FIN 48 in June of 2006. For public companies, FIN 48 becomes effective for the fiscal years beginning after December 15, 2006. Due to the calendar year classification in *Compustat*, our main test on *Increase\_UTB* starts from *Compustat* fiscal year 2007.

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**TABLE 2**  
**Descriptive Statistics**

**Panel A: Summary Statistics (Generalized DiD Sample, N = 4,097)**

Variables	Mean	Std. Dev.	Bottom Quartile	Median	Top Quartile
<i>Increase_UTB</i>	0.177	0.271	0.010	0.076	0.216
<i>Treated Firm</i>	0.674	0.469	0.000	1.000	1.000
<i>Post<sub>g</sub></i>	0.459	0.498	0.000	0.000	1.000
<i>ROA</i>	0.108	0.089	0.056	0.097	0.149
<i>Total Accrual</i>	-0.047	0.058	-0.073	-0.043	-0.017
<i>Size</i>	7.549	1.669	6.437	7.446	8.628
<i>Foreign Income</i>	0.416	0.366	0.037	0.362	0.744
<i>Equity Income</i>	0.001	0.003	0.000	0.000	0.000
<i>Intangible Intensity</i>	0.269	0.229	0.085	0.216	0.407
<i>Capital Intensity</i>	0.220	0.195	0.083	0.159	0.279
<i>MTB</i>	1.316	0.532	0.949	1.231	1.578
<i>Leverage</i>	0.187	0.179	0.018	0.161	0.281
<i>Free Cash Flow</i>	0.079	0.077	0.036	0.075	0.118
<i>R&amp;D</i>	0.037	0.052	0.000	0.014	0.054
<i>IO</i>	0.727	0.210	0.627	0.764	0.872

**Panel B: Summary Statistics (Standard DiD Sample, N = 2,045)**

Variables	Mean	Std. Dev.	Bottom Quartile	Median	Top Quartile
<i>Increase_UTB</i>	0.169	0.260	0.010	0.074	0.206
<i>Treated Firm</i>	0.673	0.469	0.000	1.000	1.000
<i>Post<sub>s</sub></i>	0.623	0.485	0.000	1.000	1.000
<i>ROA</i>	0.107	0.085	0.057	0.094	0.146
<i>Total Accrual</i>	-0.046	0.056	-0.070	-0.042	-0.017
<i>Size</i>	7.636	1.687	6.507	7.537	8.740
<i>Foreign Income</i>	0.412	0.363	0.042	0.348	0.728
<i>Equity Income</i>	0.001	0.003	0.000	0.000	0.000
<i>Intangible Intensity</i>	0.276	0.234	0.088	0.219	0.413
<i>Capital Intensity</i>	0.222	0.198	0.084	0.160	0.279
<i>MTB</i>	1.365	0.565	0.971	1.285	1.639
<i>Leverage</i>	0.205	0.186	0.042	0.183	0.301
<i>Free Cash Flow</i>	0.074	0.075	0.033	0.072	0.113
<i>R&amp;D</i>	0.036	0.052	0.000	0.012	0.052
<i>IO</i>	0.701	0.204	0.607	0.733	0.829

**Panel C: Comparison of Means between Treated and Control Firms before and after Entropy Balancing (Generalized DiD Sample, N = 4,097)**

Variables	Before Entropy Balancing			After Entropy Balancing		
	Treated Firms N=2,762	Control Firms N=1,335	<i>p</i> -value	Treated Firms N = 2,762	Control Firms N = 1,335	<i>p</i> -value
<i>ROA</i>	0.105	0.110	0.099	0.105	0.105	1.000
<i>Total Accrual</i>	-0.042	-0.051	0.000	-0.042	-0.042	0.999
<i>Size</i>	8.084	7.095	0.000	8.084	8.084	0.999
<i>Foreign Income</i>	0.485	0.358	0.000	0.485	0.485	0.999
<i>Equity Income</i>	0.001	0.001	0.001	0.001	0.001	1.000
<i>Intang. Intensity</i>	0.276	0.264	0.095	0.276	0.276	1.000
<i>Capital Intensity</i>	0.226	0.214	0.041	0.226	0.226	1.000
<i>MTB</i>	1.380	1.262	0.000	1.380	1.380	1.000
<i>Leverage</i>	0.203	0.174	0.000	0.203	0.203	1.000
<i>Free Cash Flow</i>	0.075	0.083	0.001	0.075	0.075	1.000
<i>R&amp;D</i>	0.035	0.039	0.019	0.035	0.035	0.999
<i>IO</i>	0.728	0.725	0.612	0.728	0.728	1.000

This table shows the descriptive statistics of our test sample. Panel A shows the summary statistics for the sample for the generalized DiD test. Panel B shows the summary statistics for the sample for the standard DiD test. Panel C reports the comparatives of mean statistics between the treated and control samples before and after entropy balancing in the larger sample for generalized DiD tests. We also report the *p*-values of t-tests of the differences between these two groups before and after entropy balancing. All variables are defined in Appendix C. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

**TABLE 3**  
**The Effect of EOIR on U.S. Multinational Firms' Tax Avoidance**

	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-0.043** (0.048)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-0.080*** (0.000)
<i>Treated Firm</i>	0.058** (0.013)	0.094*** (0.000)
<i>Post<sub>s</sub></i>		-0.071*** (0.000)
<i>ROA</i>	0.417** (0.047)	0.449*** (0.000)
<i>Total Accrual</i>	0.431 (0.128)	0.157** (0.017)
<i>Size</i>	0.030*** (0.000)	0.030*** (0.000)
<i>Foreign Income</i>	0.144*** (0.000)	0.120*** (0.000)
<i>Equity Income</i>	2.468 (0.380)	4.106*** (0.000)
<i>Intangible Intensity</i>	-0.028 (0.607)	-0.061*** (0.000)
<i>Capital Intensity</i>	-0.065 (0.409)	-0.210*** (0.000)
<i>MTB</i>	0.028 (0.151)	0.034*** (0.000)
<i>Leverage</i>	0.073 (0.268)	0.106*** (0.000)
<i>Free Cash Flow</i>	0.584** (0.036)	0.300*** (0.000)
<i>R&amp;D</i>	1.748*** (0.000)	1.714*** (0.000)
<i>IO</i>	-0.035 (0.503)	-0.087*** (0.000)
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	4,097	2,045

This table examines the effects of the OECD's Standard of Exchange of Information on Request on aggressive tax avoidance. The dependent variable is *Increase\_UTB*, which is calculated as the increase in UTBs related to current-year tax positions times 100 scaled by lagged total assets. *Treated Firm* × *Post<sub>g</sub>* and *Treated Firm* × *Post<sub>s</sub>* are our variables of interest. All variables are defined in Appendix C. Industry and year fixed effects and an intercept are included but untabulated. *p*-values are reported in parentheses and calculated using clustered standard errors at the firm level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

**TABLE 4**  
**Cross-sectional Effects of the EOIR Standard on U.S. Multinational Firms**

**Panel A: Tax Rate Differences**

	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i> × <i>Rate Diff</i>	-0.175*** (0.000)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i> × <i>Rate Diff</i>		-0.248*** (0.000)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-0.029*** (0.000)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-0.066*** (0.000)
<i>Treated Firm</i> × <i>Rate Diff</i>	0.064*** (0.009)	0.167*** (0.000)
<i>Post<sub>s</sub></i> × <i>Rate Diff</i>		0.004 (0.858)
<i>Treated Firm</i>	0.057*** (0.000)	0.086*** (0.000)
<i>Post<sub>s</sub></i>		-0.067*** (0.000)
<i>Rate Diff</i>	0.106*** (0.000)	0.083*** (0.000)
Control Variables	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	3,482	1,744

**TABLE 4 (Continued)**

**Panel B: Outbound Income Shifting**

	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i> × <i>Outbound Score</i>	-0.035*** (0.000)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i> × <i>Outbound Score</i>		-0.258*** (0.000)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-0.049*** (0.000)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-0.023*** (0.002)
<i>Treated Firm</i> × <i>Outbound Score</i>	-0.001 (0.879)	0.219*** (0.000)
<i>Post<sub>s</sub></i> × <i>Outbound Score</i>		0.230*** (0.000)
<i>Treated Firm</i>	0.067*** (0.000)	0.037*** (0.000)
<i>Post<sub>s</sub></i>		-0.126*** (0.000)
<i>Outbound Score</i>	0.071*** (0.000)	-0.152*** (0.000)
Control Variable	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	2,878	1,443

**TABLE 4 (Continued)**

**Panel C: IRS Audit Risk**

	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i> × <i>IRS Audit Risk</i>	-0.283** (0.015)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i> × <i>IRS Audit Risk</i>		-0.222*** (0.000)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i> × <i>Size</i>	0.036* (0.099)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i> × <i>Size</i>		0.054*** (0.000)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-0.314* (0.065)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-0.486*** (0.000)
<i>Treated Firm</i> × <i>IRS Audit Risk</i>	0.200 (0.190)	0.261*** (0.000)
<i>Treated Firm</i> × <i>Size</i>	-0.024 (0.333)	-0.041*** (0.000)
<i>Post<sub>s</sub></i> × <i>IRS Audit Risk</i>		0.027 (0.197)
<i>Post<sub>s</sub></i> × <i>Size</i>		-0.018*** (0.000)
<i>Treated Firm</i>	0.233 (0.217)	0.399*** (0.000)
<i>Post<sub>s</sub></i>		0.065*** (0.000)
<i>IRS Audit Risk</i>	-0.067 (0.520)	-0.071*** (0.001)
Control Variables	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	4,097	2,045

This table shows cross-sectional variations in the effects of the OECD's Standard of Exchange of Information on Request on aggressive tax avoidance. The dependent variable is *Increase\_UTB*, which is calculated as the increase in UTBs related to current-year tax positions times 100 scaled by lagged total assets. *Rate Diff* is calculated as the U.S. statutory rate (35%) minus the firm's foreign effective tax rate. *Outbound Scores* is the demeaned value of a firm-level measure of income-shifting tendency to foreign affiliates developed by De Simone, Mills, and Stomberg (2019). *IRS Audit Risk* is the demeaned value of IRS audit risk. The triple interaction terms of *Treated Firm*, *Post<sub>g</sub>* (*Post<sub>s</sub>*), and the interaction variables are the variables of interest. All variables are defined in Appendix C. Industry and year fixed effects and an intercept are included but untabulated. *p*-values are reported in parentheses and calculated using clustered standard errors at the firm level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

**TABLE 5**  
**Additional Analyses**

<b>Panel A: Income Shifting</b>	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-0.125*** (0.001)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-0.141*** (0.000)
<i>Treated Firm</i>	0.127*** (0.004)	0.162*** (0.000)
<i>Post<sub>s</sub></i>		0.072*** (0.000)
Control Variables	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	4,097	2,045
<b>Panel B: Tax Settlements</b>	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	0.115*** (0.000)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		0.051*** (0.008)
<i>Treated Firm</i>	-0.088*** (0.000)	-0.014 (0.454)
<i>Post<sub>s</sub></i>		-0.003 (0.877)
Control Variables	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	3,905	1,946
<b>Panel C: Operation in Listed Countries</b>	(1)	(2)
<i>Treated Firm</i> × <i>Post<sub>g</sub></i>	-1.082** (0.049)	
<i>Treated Firm</i> × <i>Post<sub>s</sub></i>		-4.597*** (0.000)
<i>Treated Firm</i>	4.760*** (0.000)	6.789*** (0.000)
<i>Post<sub>s</sub></i>		2.333*** (0.002)
<i>Subs in Prior Three Years</i>	1.000*** (0.000)	1.012*** (0.000)
Control Variables	Included	Included
Year Fixed Effects	Included	Not Included
Industry Fixed Effects	Included	Included
Observations	4,097	2,045



This table provides additional tests. Panel A examines the effects of the OECD's Standard of Exchange of Information on Request on income shifting. The dependent variable is *Foreign Income*, which is calculated as the ratio of foreign pretax earnings scaled by total pretax earnings. Panel B examines the effects of the OECD's Standard of Exchange of Information on Request on tax settlement. The dependent variable is *Tax Settlement*, which is calculated as the amount of tax settlement scaled by year-end UTBs balance. Panel C examines the effects of the OECD's Standard of Exchange of Information on Request on operation intensity in listed countries. The dependent variable is *Listed Countries Operation*, which is calculated as the number of subsidiaries in all the 22 TIEA-listed countries in year  $t$ . In all panels,  $Treated Firm \times Post_g$  and  $Treated Firm \times Post_s$  are our variables of interest. All variables are defined in Appendix C. Industry and year fixed effects and an intercept are included but untabulated.  $p$ -values are reported in parentheses and calculated using clustered standard errors at the firm level. \*\*\*, \*\*, and \* denote statistical significance at the 1%, 5%, and 10% levels, respectively, using two-tailed tests.

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