Can Public SEC Filings Enable Tax-Motivated Income Shifting?

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Abstract: Multinational entities (MNE) are well-known to strategically set intercompany transfer prices to shift income out of the U.S. to lower-tax jurisdictions. U.S. Treasury regulations allow MNEs to benchmark transfer prices against comparable transactions between unrelated parties. U.S. MNEs and their advisors commonly use publicly available licensing agreements between third parties that are disclosed in SEC material definitive agreements filings as a source of comparable transactions related to intellectual property. In this study, we examine whether the count and range of royalty rates in these publicly available agreements are associated with outbound income shifting. Although a greater count or range could allow U.S. MNEs to select more favorable transfer prices, a broader, publicly available set also provides tax authorities with more information to challenge transfer prices. We find evidence that U.S. MNEs engage in more outbound income shifting when in an industry with a broader set of publicly disclosed royalty rates. However, we also find some evidence of larger future settlements with tax authorities for income shifters in these industries. Lastly, we provide evidence consistent with income shifters in these industries allocating more risk to foreign affiliates to substantiate their profit shifting. Overall, these findings suggest that U.S. MNEs' efforts to strategically use publicly available benchmarks to shift income impose real costs.

JEL Classification: H25, H26, M41, O34

1. Introduction

One way that multinational entities (MNE) shift taxable income out of the U.S. to lower-tax jurisdictions is by pricing intercompany transactions between global affiliates — particularly for the use of intellectual property (IP) — to maximize the amount of taxable income reported in lower-tax jurisdictions. The U.S. attempts to curb the use of tax-motivated intercompany transfer prices by enforcing an "arm's length standard," whereby a company must demonstrate that the results of an intercompany transaction are consistent with the results that would have been realized in a similar transaction with an unrelated third party. Data based on transactions between unrelated parties are considered the most objective for determining whether the results of an intercompany transaction are at arm's length. U.S. Treasury Regulations suggest taxpayers *should* consider third-party licensing agreements, which taxpayers can do only to the extent that these licenses are publicly available. We examine whether information from third-party IP-related material agreements disclosed in SEC filings facilitates outbound income shifting. In doing so, we speak to how public financial disclosures are associated with corporate tax planning. We further explore how these benchmarks impact IRS enforcement efforts. We use the same data that companies and the IRS often use as a transfer pricing resource to explore how the benchmarking opportunity set for IP-related transactions is associated with income shifting.

When determining the appropriate transfer price for intercompany royalty transactions, MNEs and their advisors use royalty rate data from industry peers' publicly available third-party licensing agreements, hereafter "third-party licensing agreements," as an input. Our study uses these data to further our understanding of how the count and range of publicly available third-party royalty rates affect MNEs' tax-motivated income shifting. All else equal, a greater count and range of publicly available royalty rates for third-party IP transactions affords MNEs greater flexibility

to select and defend transfer prices that allow them to shift more income out of the U.S to lower-tax jurisdictions. Consistent with this prediction, De Simone (2016) finds an increase in tax-motivated income shifting among MNEs in the European Union after IFRS adoption increased the availability of profit-based benchmarks. Her results are consistent with the adoption of a common set of accounting standards increasing MNEs' opportunity set of benchmark firms and allowing them to "cherry-pick" among that broader set to substantiate their transfer prices. The results in De Simone (2016) apply to *profit*-based transfer pricing methods, which capture a wide range of intercompany transactions beyond those related to IP. Similarly, we expect greater availability of publicly available *transaction*-specific royalty rates to increase opportunities for cherry picking of IP-related transfer prices using transaction-based transfer pricing methods.

However, the results from De Simone (2016) might not hold in our setting. We could find a negative association between the count and range of publicly available royalty rates and IP-related income shifting for U.S. MNEs. The IRS has stated a focus on challenging companies' allocation of intercompany profits specifically for the use of IP. The IRS has successfully argued that foreign affiliates of U.S. MNEs earn substantially higher royalty income than is appropriate when benchmarked against unaffiliated companies in the same industry that perform similar functions and face similar economic risks (*The Coca-Cola Company v. Commissioner of the Internal Revenue*, 2020). Several large MNEs, including 3M, Amazon, Medtronic, and Microsoft, have found themselves at the center of billion-dollar court cases related to these issues. For example, in November 2020, the U.S. Tax Court found in favor of the IRS in a transfer pricing dispute with Coca-Cola and imposed $3.3 billion in tax deficiencies (Avi-Yonah and Mazzoni 2020). Bozanic, Hoopes, Thornock, and Williams (2017) show that the Internal Revenue Service (IRS) downloads SEC filings that contain third-part licensing agreements and the IRS can obtain

these data from service providers.[1] Knowing that the IRS is focused on these transactions and that they have a wider information set available to challenge the use of favorable royalty rates, a firm could select benchmarks that result in less income shifting as compared to when a lower count and range in royalty rates exist. We could also find no association between the count and range of publicly available royalty rates and IP-related income shifting because IP can be so firm-specific that no third-party agreement is sufficiently comparable to establish a reasonable transfer price.[2]

To test our research question, we use a database of third-party licensing agreements, from DataAIchemist, to create industry-level IP benchmarks.[3] We include data from all licensing agreements within a SIC two-digit industry that are related to IP and are between unrelated parties. We use 9,321 unique IP licensing agreements disclosed by U.S. MNEs between 1994 and 2022 to calculate the count and range of publicly available royalty rates within each industry. We compute the count and range using five-year rolling windows because firms often use prior years' third-party licensing agreements when selecting comparable transactions.

Using a sample of large U.S. MNEs, we examine the association between the count and range of publicly available royalty rates and income shifting. We find that firms in industries with a greater count and range of publicly available royalty rates engage in more tax-motivated outbound income shifting. In terms of economic magnitude, a one standard deviation increase in the count (range) translates to between $50.6 to $68.7 ($38.9 to $42.5) million of additional income

[1] DataAIchemist and RoyaltyRange, two providers of these agreements, list tax authorities among their clients.
[2] In this case, firms would rely on an alternative transfer pricing method allowed under U.S. Treasury Regulations.
[3] We use royalty rate data in third-party licensing agreements from DataAIchemist, previously known as IntangibleSpring. Per their website, they "help global businesses across a wide range of industries — from legal, *tax and accountancy firms* [emphasis added] to consultancies and universities — address complex and unique information and data requirements. As an integrated, full service firm, our portfolio of text-mining, AI models, manual processing and analytical tools combined with high-quality data, makes us the first port of call for all your information service requirements from *transfer pricing and intellectual property valuation* [emphasis added], to broader legal research assignments" (https://intangiblespring.com/home/). Per discussions with DataAIchemist, their client base includes large and mid-sized accounting firms and American and European tax authorities.

shifted annually per firm out of the U.S. We obtain larger magnitudes in a subsample of outbound income shifting firms relative to the full sample of firms. Our results suggest that broader information sets allow firms to strategically select third-party licensing agreements that increase tax-motivated income shifting for IP-related transactions.

We conduct additional tests to understand the potential costs associated with using a broad set of third-party licensing agreements to support transfer prices. First, we use data from firms' income tax footnotes to examine future settlements with tax authorities. We find some evidence that income-shifting firms report larger tax settlements with tax authorities when they are in industries with more publicly available benchmarks. These results suggest firms that engage in greater income shifting by strategically selecting from a broader set of publicly available royalty rates incur future costs as the tax authorities can challenge more aggressive transfer pricing positions when more publicly available information exists. However, the effect is modest.

Second, we test whether income-shifting firms allocate more risk to foreign affiliates when they are in industries with more publicly available benchmarks. All else equal, an MNE would prefer its high-tax affiliates to bear the risk of losses while its low-tax affiliates earn profits. However, as Becker, Johannesen, and Riedel (2020) explain, transfer pricing rules require risk borne by affiliates to be compensated with higher expected returns, as this corresponds with how many third-party agreements are structured. For example, third-party agreements generally require that the licensor bears the financial and operational risks related to the IP. As such, we expect MNEs that rely on such third-party agreements to support the relatively high royalty rates charged by their lower-tax affiliates (i.e., the licensors) by also bearing risk in those affiliates. We measure risk as the standard deviation of an MNE's foreign return (Becker et al. 2020) and find evidence that income-shifting firms allocate more risk to foreign affiliates when they are in

industries with more publicly available benchmarks. Collectively, the results of these two additional analyses reveal real economic costs of using third-party licensing agreements to facilitate cross-border income shifting.

Our study provides timely evidence on how mandatory public disclosure of material transactions is associated with corporate tax planning vis-à-vis income shifting. We provide new insights into MNEs' income shifting strategies by exploiting a data source that MNEs and their advisors use to support IP-related transfer prices. Rarely can researchers directly observe the inputs managers use in their tax planning decisions and the outcomes from using these inputs. Thus, we answer the call in Dyreng and Maydew (2018) to peer inside the "black box" of tax planning. Studies thus far have not distinguished to what extent IP-related income shifting is driven by accounting (i.e., the strategic, tax-motivated transfer price of an intercompany royalty) versus location (i.e., the strategic, tax-motivated location of IP) decisions. By exploiting the available set of publicly available, third-party royalty information and taking the location of IP as given, we can for the first time tease out the role of accounting versus location decisions.[4]

Our study also extends prior research that shows benchmarks affect income shifting (Amberger and Osswald 2021; De Simone 2016). Although De Simone (2016) examines a similar research question, our study is distinct along several dimensions. Whereas De Simone (2016) examines benchmarks of comparable *firms* with respect to profits, our study focuses on benchmarks of specific *transactions*. This distinction is important because tax authorities consider transaction-based methods a more reliable source of arm's length prices. Additionally, whereas De Simone (2016) examines MNE income-shifting after IFRS adoption, our study examines the relation between income-shifting and third-party agreements over 25 years. Given the importance

[4] Our analysis assumes that IP locations are relatively fixed in the short term.

of IP in income shifting, we narrow the focus on IP benchmarks to provide a more refined quantitative analysis of how benchmarks facilitate income shifting. We also provide a more comprehensive analysis by examining whether MNEs incur economic costs in connection with using IP-related benchmarks to shift income.

Third, we contribute to research on tax authority enforcement efforts (e.g., De Simone, Stomberg, and Williams 2024; Finley and Stekelberg 2022; Hoopes, Mescall, and Pittman 2012). Our findings suggest publicly available data are an important resource for tax authorities in their enforcement efforts. Thus, we compliment De Simone et al. (2024) by furthering researchers', tax authorities', practitioners', and MNEs' knowledge of inputs in the tax enforcement process. Finally, we contribute to the literature on the use of public disclosure. For example, prior research finds that public disclosure provides firms with information regarding investment decisions (Badertscher, Shroff, and White 2013), impacts import competition (Glaeser and Omartian 2022), affects that patent market (Kim and Valentine 2023) and informs investors of firm's IP (Kankanhalli, Kwan, and Merkley 2024). We contribute to this literature by demonstrating how public disclosure is utilized by both firms and the tax authorities within the economically significant tax-motivated income shifting setting.

2. Background Information, Related Literature, and Hypothesis Development

2.1 IP Transfer Pricing Rules

MNEs can shift income through real activities whereby the firm locates high value-adding assets to low-tax rate jurisdictions as well as through the strategic use of transfer prices for the use of goods, services, or IP (De Simone, Klassen, and Seidman 2022).[5] U.S. and global tax rules

[5] See De Simone, Huang, and Krull (2020) and De Simone and Sansing (2019) for details regarding strategies that firms use to engage in income shifting specifically through IP transfer prices.

require firms to use an arm's length price (i.e., the price that unrelated parties would use for a similar economic transaction) to value intercompany transactions. As such, when firms set their transfer prices for the use of IP — their intercompany royalty rates — they should first consider the royalty rates and terms within arm's length licensing agreements involving similar IP. Indeed, U.S. Treasury Regulation § 1.482-2(c)(2)(ii) states that if an intercompany transaction "involves the transfer of the same intangible under the same, or substantially the same, circumstances" as an arm's length transaction, the results derived from applying this method (known as comparable uncontrolled transaction or "CUT" method) will generally be the most direct and reliable measure of the arm's length result. The Regulations allow both internal CUTs, or agreements between the taxpayer and related parties, and external CUTs, or agreements between two unrelated parties as well as agreements between the taxpayer and an unrelated party.

However, the IRS (2013) acknowledges that arm's length transactions *identical* to a particular intercompany transaction are rare. Instead, the IRS has adopted the clear reflection of income principle to evaluate the arm's length standard under IRC § 482. Treasury Regulation § 1.482-4(a) lists four primary methods for determining an arm's length price for IP: (1) the CUT method described above, (2) the comparable profits method, (3) the profit split method, and (4) unspecified methods to be used when the other three methods do not apply. Firms should choose the method "that, under the facts and circumstances, provides the most reliable measure of an arm's length result" (IRC § 1.482-1(c)). The IRS (2013) states that when evaluating whether the results of an intercompany transaction are similar to those of unrelated parties (i.e., are arm's

length), two primary factors should be considered: the (1) degree of comparability and (2) the quality of the data and assumptions used in the analysis.[6]

2.2 Tax-Motivated Income Shifting Literature

Prior research finds evidence that MNEs engage in tax-motivated income shifting (e.g., Clausing 2003; Klassen and Laplante 2012). Although a large stream of research focuses on income shifting, we focus on briefly discussing two streams of literature within the broader income shifting literature given their importance to our research question: 1) IP-related income shifting and 2) income shifting and benchmarks. Prior research finds evidence consistent with the notion that IP provides MNEs with an opportunity to engage in income shifting. For example, Harris (1993) shows U.S. firms increased income shifting into the U.S. subsequent the Tax Reform Act of 1986's reduction in the U.S. corporate tax rate, with that result being concentrated in firms with greater research and development expenses, a common proxy for IP. Grubert (2003) shows that profits derived from research and development activities account for a substantial portion of income shifting. Using confidential IRS data, De Simone, Mills, and Stomberg (2019) show that firms with the greater intangible intensity are more likely to engage in income shifting.

Prior research also shows that tax incentives to shift income are associated with firms' IP-related investment decisions. For example, Dischinger and Riedel (2011) find that affiliates in lower-tax jurisdictions invest more in IP when compared to affiliates in higher-tax jurisdictions, suggesting firms engage in IP-related income shifting. Further, Griffith, Miller, and O'Connell (2014) examine firms' location decisions of patents, another common proxy for IP, and show firms' patent location decisions are related to tax incentives. Additionally, De Simone, Huang, and

[6] The IRS (2013) notes that "comparability does not require that controlled and uncontrolled transactions be identical. Rather, they must be sufficiently similar that differences either will not materially affect the condition being examined or permit a reasonably accurate adjustment for any material difference."

Krull (2020) provide evidence that firms engage in research and development activities in foreign countries, which enables the firm to engage in income shifting.

Although the literature that examines income shifting implicitly assumes that firms can strategically set transfer prices, fewer studies examine the characteristics of benchmarks that enable the income shifting. De Simone (2016) examines the change in European MNEs' income shifting that arises when the presence of publicly available financial statements for benchmarking affiliate-level profits increases.[7] She shows that after IFRS adoption, a broader count and range of book profits existed for firms to use for benchmarking purposes. Further, she finds an increase in income shifting for affiliates of MNEs following the adoption of IFRS when compared to the pre-adoption period and non-adopter affiliates. Amberger and Osswald (2021) examines European affiliate-level patent concentration and its association with income shifting. Using patent concentration, the authors capture the information advantage that the MNE or tax authority possess for benchmarking IP. Their results suggest that when an affiliate holds a greater patent concentration, the MNE can use this information advantage to set more favorable transfer prices that results in greater income shifting.

2.3 Hypothesis Development

In our study, we focus on the characteristics of the IP benchmarking opportunity set at the industry level and their association with income shifting. Specifically, we focus on the count and range of comparable uncontrolled transactions that are publicly available to both MNEs and the tax authorities through third-party licensing agreements.[8] A priori, it is unclear whether the count

[7] By focusing on profit-based benchmarks, De Simone (2016)'s analysis targets the comparable profits method under US transfer pricing regulations, or the transactional net margin method under the OECD Guidelines.

[8] As noted above, multiple transfer pricing methods exist. However, practitioner guidance during the sample period examined in this study indicates that "[t]he [2016 Medtronic] decision suggests that the [U.S. Tax Court] prefers to base its determinations upon direct pricing evidence from comparable transactions where available…" (PwC 2016). Further, the IRS' 2015 publication summarizing Advanced Pricing Agreements (APAs) indicates that 11 percent of agreements in 2015 used the CUT method for tangible and intangible property transfers. As firms are more likely to

and range of publicly available royalty rates is associated with an increase or decrease in income shifting. On the one hand, we could expect to find a positive association between the count and range of publicly available royalty rates and income shifting. As noted above, De Simone (2016) finds European MNEs increase income shifting after an increase in the count and range of publicly available financial statements that firms can use for benchmarking profit margins. Her results suggest MNEs "cherry-pick" benchmarks to engage in more income shifting. Similarly, greater count and range of publicly available royalty rates for MNEs could allow firms to increase profit shifting related to IP because the firm can select the comparable uncontrolled transaction(s) as a benchmark that allows the firm to shift more income to lower-tax jurisdictions.

On the other hand, we could expect to find a negative association between the count and range of publicly available royalty rates and income shifting. Although greater count and range of publicly available royalty rates could benefit a firm, a greater count and range of publicly available royalty rates also provides tax authorities with a broader opportunity set of comparable uncontrolled transactions to choose from when auditing the firm's transfer pricing. Research shows that the Internal Revenue Service and foreign tax authorities obtain SEC filings that contain these agreements (Bozanic, Hoopes, Thornock, and Williams 2017; Chi, Persson, Shevlin, and Urcan 2023) and that managers are aware that tax authorities obtain SEC filings (Richter, Seidman, Sinha, and Stomberg 2024). Therefore, knowing the tax authorities have a greater opportunity set of comparable uncontrolled transactions when greater count and range exists, a firm could expect

file APAs for more complex cases, we view 11 percent as the lower bound percentage of when the CUT method is used in practice. Finally, DataAIchemist and RoyaltyRange, another provider of publicly available royalty rates, lists large public accounting firms and tax authorities among their client list. Thus, although multiple transfer pricing methods exist, the facts noted above indicate the importance and validity in examining characteristics of these third-party licensing agreements that are used in the CUT method and firms' income shifting practices.

greater tax compliance costs and could therefore select benchmarks that result in less income shifting as compared to when lower count and range of publicly available royalty rates exists.

Finally, although third-party licensing agreements can be used as benchmarks, IP is inherently unique and can be idiosyncratic to a taxpayer such that no third-party licensing agreement is relevant for identifying economically comparable transactions. Under these circumstances, the firm would rely upon one of the other three methods allowed under U.S. transfer pricing regulations to set intercompany prices. As our tests are conducted using industry level-measures of IP benchmarks, if firm IP is too firm specific at the industry level, on average, we would observe no association between the count and range of publicly available royalty rates and income shifting. Given these competing predictions, we make no directional prediction between the count and range of benchmarks and income shifting and state our hypothesis in the null form:

H1: There is no association between the count and range of publicly available royalty rates and income shifting.

3. Research Design

3.1 3rd Party Licensing Agreements

The SEC requires firms to disclose the terms and conditions when entering into a material definitive agreement. These material agreements often involve the licensing of IP, and the terms and conditions of these third-party licensing agreements specify the royalty rates that the licensor receives in return for licensing the IP.[9] In practice, MNEs and practitioners use internally developed software or service providers, like DataAIchemist (previously known as Intangible Spring), to obtain normalized royalty rate data per these material agreements. DataAIchemist explains that "[f]or every [SEC] license agreement, we extract and normalize the pricing structure

[9] See Appendix B for an example of a third-party licensing agreement.

and licensing terms, then provide a summary description of the underlying intellectual property, so our clients can make reliable comparisons of license terms and royalty rates" (Intangible Spring 2024).[10] The database provides the royalty rate, the industry of the firm that files the licensing agreement with the SEC, and a general description of the type of IP (e.g., patent, trademark) that the licensing agreement pertains to. The database also identifies whether the licensing agreement is between unrelated parties.

We obtain a database of all U.S. MNE third-party licensing agreements from DataAIchemist for the years 1994 to 2022. From this database, we remove any agreement between related parties because related-party transactions should not be relied upon to benchmark the arm's length price of a comparable uncontrolled transaction. We also exclude IP-related agreements that contain provisions unrelated to the licensing of IP (e.g., asset purchases, joint ventures). Our final dataset of third-party licensing agreements that we use to calculate the count and range of royalty rates consists of 9,321 unique licensing agreements. With the dataset, we calculate the count and range of royalty rates by industry. *RoyaltyCount* equals the natural log of the count of all third-party licensing agreements within a two-digit SIC industry over a rolling five-year window. Further, *RoyaltyRange* equals the maximum value less the minimum value of all royalty rates within a two-digit SIC industry over a rolling five-year window. We select the rolling five-year window because firms should use contemporaneous or prior years' third-party licensing agreements when selecting comparable transactions to support their transfer pricing policies. Further, from a research design perspective, the five-year window aligns with the five-year averages used in the income shifting model as described below.[11]

[10] See https://intangiblespring.com/home/benchmark/ for additional detail.
[11] We follow prior studies that measure public disclosure at the industry-year (e.g., Badertscher, Shroff, and White 2013; Glaeser and Omartian 2022; Kim and Valentine 2023). In contrast to Glaeser and Omartian (2022) and Kim

3.2 Empirical Design

To examine our research question, we adopt the income shifting model from Collins, Kemsley, and Lang (1998) and further modified by Klassen and Laplante (2012).[12] This research design assumes that, in the absence of tax incentives, the rate of return on domestic or foreign sales will be a constant function of the rate of return on worldwide sales (Collins, Kemsley, and Lang 1998; Klassen, Lang, and Wolfson 1993). The model infers tax-motivated income shifting when unexpected foreign income is positively correlated with variables that capture the tax incentive to shift income. Accordingly, we first examine our research question using the model below that resembles the specification in McGuire, Rane, and Weaver (2023):[13]

$$FROS_{i,t} = \beta_1 ROS_{i,t} + \beta_2 FTR_{i,t} + \beta_3 Royalty_{k,t} + \beta_4 FTR_{i,t} \times Royalty_{k,t} + \Sigma\beta_5 Controls_{i,t} + \Sigma\beta_6 Industry_k + \Sigma\beta_7 Year_t + \varepsilon_{i,t} \quad (1)$$

In equation (1), the *i, k,* and *t* subscripts denote firm, industry, and time, respectively. We separately estimate equation (1) using $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$ in turn for $Royalty_{k,t}$. The dependent variable, $FROS_{i,t}$, is foreign return on sales, measured as firm *i*'s foreign profit (PIFO) scaled by foreign sales from years *t-4* though *t*. Consistent with Klassen and Laplante (2012), the primary control variable, $ROS_{i,t,}$ *is* measured as firm *i*'s total profits (PI) scaled by total sales from years *t-4* though *t*. $FTR_{i,t}$ captures the incentive to shift income outside of the U.S. and equals the U.S. statutory tax rate less firm *i*'s foreign effective tax rate, such that it is increasing in the firm's incentive to shift income out of the United States. Our variable of interest in equation (1) is the coefficient on the interaction of $FTR_{i,t} \times Royalty_{k,t}$. This coefficient captures whether

and Valentine (2023), who run their analyses at the industry-year level, we cannot measure income-shifting tax incentives at the industry-year level, and therefore our unit of analysis is the firm-year level.

[12] Researchers often use an income shifting model developed by Hines and Rice (1994) and expanded by Huizinga and Laeven (2008). However, this model requires the use of affiliate-level financial statement data. We study U.S. MNEs for which affiliate-level financial statement is not available, and therefore we are not able to use this model.

[13] McGuire, Rane, and Weaver (2023) limit their sample to firm-years where *LowFTR* equals one and then use *FTR* as the measure of tax incentive. We find consistent results when we apply this specification.

there is an association between the incentive to engage in outbound income shifting and the level of outbound income shifting as the count or range of publicly available royalty rates increases.

We next follow Klassen and Laplante (2012), which considers that firms with foreign tax rates below the U.S. statutory rate have incentives to shift profits *from* the U.S., whereas firms with foreign tax rates above the U.S. statutory rate have incentives to shift profits *into* the U.S. Accordingly, this model includes $HighFTR_{i,t}$ and $LowFTR_{i,t}$ to capture inbound and outbound tax-motivated income shifting incentives, where $HighFTR_{i,t}$ ($LowFTR_{i,t}$) equals one when the foreign effective tax rate is greater than (less than) the U.S. statutory tax rate.[14] The incentive to engage in inbound profit shifting exists when $HighFTR_{i,t}$ equals one, whereas the incentive to engage in outbound profit shifting exists when $LowFTR_{i,t}$ equals one.[15] We adapt the baseline model following Klassen and Laplante (2012) to examine whether the intensity of income shifting varies based on the count and range of publicly available royalty rates. Specifically, we modify the model by interacting the tax incentive variables with the count and range of publicly available royalty rates through the estimation of an OLS regression with the inclusion of additional controls per Chow, Hoopes, and Maydew (2023), Deng (2020), and Deng and Rane (2024) as follows:

$$\begin{aligned} FROS_{i,t} = {} & \beta_1 ROS_{i,t} + \beta_2 Royalty_{k,t} + \beta_3 LowFTR_{i,t} \times FTR_{i,t} \times Royalty_{k,t} + \beta_4 High\ FTR_{i,t} \\ & \times FTR_{i,t} \times Royalty_{k,t} + \beta_5 LowFTR_{i,t} + \beta_6 LowFTR_{i,t} \times Royalty_{k,t} + \beta_7 HighFTR_{i,t} \\ & \times FTR_{k,t} + \beta_8 LowFTR_{i,t} \times FTR_{i,t} + \Sigma\beta_9 Controls_{i,t} + \Sigma\beta_{10} Industry_k + \Sigma\beta_{11} \\ & Year_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

[14] Slightly more than one-third of sample firm-year observations (0.354) have $HighFTR_{i,t}$ equal to 1, indicating an incentive to shift income *into* the United States, and slightly less two-thirds of sample firm-year observations (0.646) have $LowFTR_{i,t}$ equal to one, indicating an incentive to shift income out of the United States.

[15] Klassen and Laplante (2012) predict and find negative coefficients on β_3 and β_4 because they calculate the tax rate incentive as the *foreign effective tax rate minus the U.S. statutory tax rate*. For ease of interpretation such that evidence of increases in income shifting results in positive coefficients on our variables of interest, we use the *U.S. statutory tax rate minus the foreign effective tax rate*.

We separately estimate equation (2) using $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$ in turn for $Royalty_{k,t}$. Our variables of interest in equation (2) are the triple interaction terms that include $Royalty_{k,t}$. The coefficient on β_3 (β_4) captures the association between the count or range of publicly available royalty rates and the level of *FROS* for firms with an incentive to engage in outbound (inbound) income shifting, as the firm's tax incentive to shift increases. A positive (negative) coefficient on β_3 or β_4 suggests MNEs' income shifting incrementally increases (decreases) as both the incentive to income shift and the count or range of observed royalty rates increase.

Following prior literature, we include several firm-year control variables that could be correlated with $FROS_{i,t}$ and $FTR_{i,t}$ (e.g., Chow, Hoopes, and Maydew 2023; Deng 2020; Deng and Rane 2024). We include firm size ($Size_{i,t}$), research and development expense ($RD_{i,t}$), advertising expense ($AD_{i,t}$), intangible intensity ($Intangibles_{i,t}$), cash holdings ($CASH_{i,t}$), and total debt ($DEBT_{i,t}$) measured at time *t*. Finally, when estimating equations (1) and (2), we winsorize all continuous variables at the 1st and 99th percentiles, include SIC two-digit industry and year fixed effects, and cluster standard errors at the firm level.

3.3 Sample

We begin with a sample of all U.S. incorporated firms in non-regulated industries between 1998 and 2022 per Compustat. We begin in 1998 because our research design calculates the *Royalty* variables over a five-year period and the sustained presence of third-party royalty agreements per DataAIchemist begins in 1994. We exclude firm-year observations missing data needed to calculate variables in equation (1) and exclude observations in which *FTR* is less (greater) than negative (positive) one to avoid including outlier observations in the sample (Chow, Hoopes, and Maydew 2023). As our focus is on large U.S. MNEs, we further restrict the sample to firm-years with greater than one million dollars in foreign sales and negative five-year summed

pre-tax domestic and foreign income (Chow, Hoopes, and Maydew 2023; Klassen and Laplante 2012). Finally, we exclude firm-year observations with data missing to calculate *RoyaltyRange* variables (i.e., firm-year observations in industries with fewer than one publicly available licensing agreement over a five-year period). Our final sample includes 9,600 firm-year observations and 1,270 unique firms.

Because we are particularly interested in examining outbound income shifting, we also create a subsample of outbound income shifting firm-year observations following the methodology in Collins, Kemsley, and Lang (1998). We identify firm-year observations as outbound income shifting if *LowFTR* equals one and if the firm's foreign profit margin is higher than expected, which suggests the firm shifted income out of the U.S. A positive residual from estimating the following regression allows us to identify firms with foreign profit margins that are higher than expected:

$$FROS_{i,t} = \beta_1 ROS_{i,t} + \Sigma\beta_2 Industry_k + \Sigma\beta_3 Year_t + \varepsilon_{i,t} \quad (3)$$

We estimate equation (4) on the full sample of 9,600 firm-year observations. We then set *Outbound Income Shifter* equal to one if *LowETR* equals one and the residual from equation (3) is positive.[16] The *Outbound Income Shifter* sample is comprised of 3,365 firm-year observations and 690 unique firms. Table 1 details our sample selection process.

4. Empirical Results

4.1 3rd Party Royalty Rates Descriptive Data

Table 2 provides license-level descriptive data for the 9,321 licenses used to construct our *Royalty* measures, and Figure 1, Panel A plots the total $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$ of

[16] Collins, Kemsley, and Lang (1998) identify firm-year observations that shift income *into* the U.S. Therefore, the authors identify inbound income shifters as firms with *HighFTR* equal to one and a *negative* residual from equation (4). As we are interested in identifying outbound income shifters, we modify their methodology by using firms with *LowFTR* equal to one and a *positive* residual from equation (4).

each industry summed over our entire sample period 1994 to 2022.[17] The industry with the highest number of licensing agreements is SIC code 28, Chemicals & Allied Products, with 1,587 agreements. The industry with the second highest number of agreements is SIC code 58, Eating and Drinking Places, with 1,058 agreements from 1994 to 2022.[18] Over this sample period, U.S. MNCs in 24 different industries disclosed more than 100 publicly available licensing agreements.

Figure 1, Panel B plots the five-year rolling average of the raw count of licensing agreements over time for the five industries with the highest overall count of licensing agreements. This figure shows that the number of agreements disclosed by U.S. MNCs follows different trends across industries. These different trends are important as our research design exploits within-industry variation in the count (and range) of royalties over time. The number of publicly available licensing agreements decreases over time for three of the five industries. U.S. MNCs operating in industry SIC 28 (SIC 38, Instruments & Related) [SIC 73, Business Services] disclosed 350 (120) [220] licensing agreements between 1994 and 1998, but only 100 (30) [120] licensing agreements from 2018 to 2022. In contrast, the number of publicly available licensing agreements increased for firms operating in industry SIC 58 (SIC 79, Recreation Services), with U.S. MNCs disclosing 45 (40) licensing agreements from 1994 to 1998 and 400 (100) from 2018 to 2022.

Figure 1, Panel C plots the five-year rolling average of the royalty range for the five industries with the highest overall count. The range represents the maximum unwinsorized royalty rate charged in third-party agreements as a percentage of sales, which is between 11 and 99 percent over the sample period for these industries. The range of royalties included in licensing agreements

[17] Of these agreements, 5,364 relate to marketing IP (e.g., trademarks, tradenames), 3,469 relate to technology IP (e.g., patents), and 953 have both types of IP. We plan to explore this variation in future work.

[18] We continue to find results consistent with Tables 4 and 6 if we exclude firms from industry SIC 28 (Chemicals & Allied Products) from our sample, indicating our results are not driven by the industry with the highest number of licensing agreements alone.

generally follows the same trends as the count of publicly available contracts. For example, as the count of licensing agreements increases in industry SIC 58, the range increases to 11 percent in 1998 to 60 percent in 2022. As the count of licensing agreements decreases in industry SIC 74, the range decreases from 99 percent in 1998 to 50 percent in 2022. However, there is almost no change in the range of royalties charged in SIC 28, with a range of approximately 50 percent in 1998 and 2022. These different trends across industries are important as our research design exploits within-industry variation in the range and count of royalties over time.

4.2 Univariate Results

Table 3, Panel A provides descriptive statistics for the sample of firms used to estimate equations (1) and (3). On average, there are 93 third-party licensing agreements ($RoyaltyCount_{k,t}$ *(Raw)*) within a firm's SIC two-digit industry, with the maximum number of agreements equal to 495. The average $RoyaltyRange_{k,t}$ is 31.0 percent with the minimum (maximum) range being 0.000 (0.494), which suggests substantial variation in royalty rates included in third-party licensing agreements within industries. Slightly less than two-thirds of firm-year observations in the sample have an incentive to engage in outbound income shifting (mean $LowFTR_{i,t}$ = 0.646), whereas slightly more than one-third have an incentive to shift income into the United States ($HighFTR_{i,t}$ = 0.354). By construction, our sample consists of large U.S. MNEs, with the average firm-year observation having nearly $10B in assets.

Table 3, Panel B provides variable correlations. $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$ are highly correlated with a correlation coefficient of 0.762 (p-value <0.05), suggesting that as the count of third-party licensing agreements increases within an industry, the range of the royalty rates within these agreements also increases. Both $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$ exhibit a positive correlation with $FTR_{i,t}$, suggesting that as the incentive to engage in outbound income

shifting increases, firm-year observations have a greater count and range of publicly available royalty rates from which to choose. Consistent with prior literature, there is a positive correlation between the $FTR_{i,t}$ and $FROS_{i,t}$ (coefficient = 0.322, p-value<0.05), which suggests that firm-year observations with the incentive to engage in outbound income shifting have a higher foreign return on sales.

4.3 H1 Results

Table 4 presents the results of estimating equations (1) and (2). We begin by estimating equation (1), which interacts $FTR_{i,t}$ and $Royalty_{k,t}$, and we then build up to the fully interacted model with triple interactions per equation (2). Columns (1) and (2) provide results when interacting $FTR_{i,t}$ with $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$, respectively. We find positive and significant coefficients on both $FTR_{i,t} \times RoyaltyCount_{k,t}$ and $FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value < 0.01). This result suggests that as the incentive to engage in outbound income shifting increases, a greater count or range in publicly available royalty rates is associated with greater outbound income shifting.

We next estimate the fully interacted model with $LowFTR_{i,t}$ and $HighFTR_{i,t}$. In these fully interacted models, the coefficient of interest is $LowFTR_{i,t} \times FTR_{i,t} \times Royalty_{k,t}$ and $HighFTR_{i,t} \times FTR_{i,t} \times Royalty_{k,t}$. In columns (3) and (4), we estimate equation (2) with $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$, respectively. We observe a positive and significant coefficient on both $LowFTRi_{i,t} \times FTR_{i,t} \times RoyaltyCount_{k,t}$ (p-value < 0.01) and $LowFTR_{i,t} \times FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value<0.05). Therefore, we find significant increases in outbound income shifting as both the incentive to engage in income shifting and the count of publicly available royalty rates increase. We do not find a significant coefficient on $HighFTR_{i,t} \times FTR_{i,t} \times RoyaltyCount_{k,t}$, (p-value =1.24) or $HighFTR_{i,t} \times FTR_{i,t} \times RoyaltRanget_{k,t}$ (p-value = 0.78), suggesting that higher counts in publicly

available royalty rates are not associated with greater inbound income shifting at conventional levels of significance.

The results in columns (1) to (4) provide evidence that firms shift more income out of the U.S. as the count and range of publicly available royalty rates increase. To more precisely understand the relation between the count and range of publicly available royalty rates and income shifting for outbound income shifting firms, we next estimate equation (1) on the sample of firm-year observations where *Outbound Income Shifter* equals one. Columns (5) and (6) provide results when interacting $FTR_{i,t}$ with $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$, respectively. We find positive and significant coefficients on both $FTR_{i,t} \times RoyaltyCount_{k,t}$ (p-value < 0.05) and $FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value < 0.10). This result confirms our main findings in columns (1) to (4) in that income shifting increases as the count and range of publicly available royalty rates increases for firms with the incentive to engage in income shifting out of the U.S.

Overall, our analysis in Table 4 suggests a positive association between the count and range of publicly available royalty rates and outbound income shifting. Our results indicate that firms with an incentive to engage in outbound income shifting are more likely to benefit from a greater opportunity set of benchmarks. We estimate the economic magnitude of our results within the full sample of U.S. MNCs and *Outbound Income Shifter*s. In columns (1) to (2), the positive and significant coefficient on $FTR_{i,t} \times Royalty_{k,t}$ equals 0.030 and 0.194 for $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$, respectively. U.S. MNCs included in the full sample report an average of $3.67 billion in foreign sales. Accordingly, the economic magnitude suggests that a one standard deviation increase in the count (range) of royalty benchmarks translates into an additional $50.6 ($38.9) million of income shifted annually per firm out of the U.S. In columns (5) to (6), the positive and significant coefficient on $FTR_{i,t} \times Royalty_{k,t}$ equals 0.046 and 0.268 for

RoyaltyCount$_{k,t}$ and *RoyaltyRange*$_{k,t}$, respectively. *Outbound Income Shifter* firms report an average of $4.25 billion in foreign sales. Accordingly, for the sample of *Outbound Income Shifters,* the economic magnitude suggests that a one standard deviation increase in the count (range) of royalty benchmarks translates into an additional $68.7 ($42.5) million of income shifted annually per firm out of the U.S.[19] These results are largely consistent with De Simone (2016) and suggest that as the benchmarking opportunity set increases, firms strategically select third-party licensing agreements with more favorable royalty rates.

5. Additional Analysis – Costs of Income Shifting

5.1 Settlements with Tax Authorities

Our findings suggest that firms engage in greater income shifting by strategically selecting third-party licensing agreements with more favorable royalty rates. However, as noted above, a greater count and range of publicly available royalty rates also provide tax authorities with a broader opportunity set of comparable uncontrolled transactions to choose from when auditing the firm's transfer pricing. Thus, although firms could engage in greater income shifting ex-ante with a broader opportunity set, it remains an open question whether firms are able to sustain these more aggressive tax positions ex-post if challenged by tax authorities. Therefore, we next examine whether firms that engage in greater income shifting when a greater count and range of publicly available royalty rates exist result in greater tax avoidance costs from tax authorities' enforcement efforts.

[19] The calculation to estimate the economic significance of the standard deviation increase in count within the full sample of firms is as follows: 0.030 (the coefficient on $FTR_{i,t} \times Royalty_{k,t}$) * 0.282 (avg. foreign ETR of the full sample) * 1.63 (std. dev. in count) = 0.0138. Then 0.0138 * $3.67 billion (avg. foreign sales of the full sample) = $50.6 million shifted out of the U.S. per firm per year. Within the sample of *Outbound Income Shifter*s, the calculation is modified as follows: 0.046 (the coefficient on $FTR_{i,t} \times Royalty_{k,t}$) * 0.198 (avg. foreign ETR of *Outbound Income Shifter*s) * 1.63 (std. dev. in count) = 0.0148. Then 0.0148 * $4.25 billion (avg. foreign sales of *Outbound Income Shifter*s) = $62.9 million shifted out of the U.S. per firm per year.

To examine tax avoidance costs from tax authorities' enforcement efforts, we rely on financial statement data from firms' tax reserves as required under ASC 740-10, previously known as FIN 48. FIN 48 requires firms to establish reserves for uncertain tax positions in the year the tax position is taken. In subsequent years, firms release the reserves either due to lapses in statutes of limitation or due to settlements with tax authorities. We focus our analysis on settlements because settlements reflect tax positions that the tax authorities successfully challenged.[20]

To conduct this analysis, we examine the association between future settlements and increases in the incentive to shift income out of the U.S. and the count and range of publicly available royalty rates. We estimate the regression below on the subsample of firms in our main analysis with valid tax reserve data. Specifically, we include observations with non-missing tax reserve data and observations for which the beginning balance of tax reserves plus all current-year adjustments sums to the ending balance of tax reserves (Robinson, Stomberg, and Towery 2016). On this subsample of firm-year observations, we estimate the following OLS regression:

$$Settle_{i,t\ to\ t+2} = \beta_1\ FTR_{i,t} + \beta_2\ Royalty_{k,t} + \beta_3\ FTR_{i,t} \times Royalty_{k,t} + \Sigma\beta_4\ Controls_{i,t} + \Sigma\beta_5\ Industry_k + \Sigma\beta_6\ Year_t + \varepsilon_{i,t} \quad (4)$$

The dependent variable, $Settle_{i,t\ to\ t+2}$, equals the sum of settlements with tax authorities from year t through $t+2$ divided by the sum of the beginning tax reserve balance in year t plus additions to tax reserves during year t related to prior year tax positions. We separately estimate equation (4) with both $Royalty_{k,t}$ variables (i.e., $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$). Our main variable of interest is the interaction term, β_3. The interaction term captures whether an association

[20] A limitation of this analysis is that we cannot directly observe tax reserves that relate to transfer pricing tax positions. However, Towery (2017) finds evidence that the most common uncertain tax positions reported to the IRS on Form UTP relate to transfer pricing. As overlap exists between uncertain tax positions reported to the IRS and tax reserves reported in the financial statements and our sample of firms consists of large U.S. MNEs, it is likely that a portion of the tax reserves are for transfer pricing positions.

exists between firms with increases in the incentive to engage in outbound income shifting and future settlements with tax authorities as the count or range in publicly available royalty rates increases. We further control for other factors that could be associated with future settlements (e.g., research intensity and intangible intensity). Finally, when estimating equation (4), we winsorize all continuous variables at the 1st and 99th percentiles, include SIC two-digit industry and year fixed effects, and cluster standard errors at the firm level.

Before turning to the results from estimating equation (4), we first provide descriptive statistics on the sample of firm-year observations used in this analysis. Table 5, Panel A provides descriptive statistics. The average values of 80.700 and 0.288 for $RoyaltyCount_{k,t}$ (raw) and $RoyaltyRange_{k,t,}$ respectively, are largely similar to values in our main sample. The raw average (median) of $Settlements_{i,t\text{-}to\ t+2}$ equals $38.69 ($2.3) million (untabulated), suggesting a significant dollar value of reserves are released through settlements. Descriptives on other variables are similar to values in our main sample.

Table 5, Panel B provides variable correlations. We do not observe a significant correlation between our $Royalty_{k,t}$ variables and $Settle_{i,t\ to\ t+2}$, suggesting no univariate relation between the count or range in publicly available royalty rates and future settlements. Correlations between other variables are largely similar to correlations in our main sample, which provides some assurance that our subsample of firms used in this analysis are similar to our main sample of firms.

Table 6 presents the results of estimating equation (4). In columns (1) and (2), we estimate equation (4) on the full sample of firm-year observations with valid tax reserve data. In column (1), we observe a positive and significant coefficient on the $FTR_{i,t} \times RoyaltyCount_{k,t}$ interaction term (p-value < 0.10), indicating that as both the tax rate incentive to engage in greater income shifting and the count of publicly available royalty rates increases, there are greater future

settlements with tax authorities. In column (2), we observe a positive coefficient on the $FTR_{i,t} \times RoyaltyRange_{k,t}$ interaction term, but the coefficient is insignificant at conventional statistical levels (p-value = 0.16). In columns (3) and (4), we estimate equation (4) on the subsample of observations with *Outbound Income Shifter* equal to one. In column (3), we observe a positive coefficient on the $FTR_{i,t} \times RoyaltyCount_{k,t}$ interaction term (p-value < 0.10). In column (4), we observe a positive and significant coefficient on the $FTR_{i,t} \times RoyaltyRange_{k,t}$ interaction term (p-value < 0.10). Overall, the results from this analysis combined with our main analysis suggest that firms that likely took more aggressive income shifting positions by strategically using greater benchmarking information sets incur greater but modest tax avoidance costs as tax authorities also use the greater benchmarking information sets in their enforcement activities.

5.2 Foreign Risk Allocation

Our second cost of income shifting analysis examines the association between foreign risk allocation and the count and range of publicly available royalty rates for income-shifting firms. Specifically, we build off of Becker, Johannesen, and Riedel (2020) to test whether income-shifting firms allocate more risk to foreign affiliates when they are in industries with more publicly available benchmarks. Becker, Johannesen, and Riedel (2020) explain that transfer pricing rules require affiliates that bear greater risk be compensated with higher expected returns. Thus, transfer pricing requirements induce MNEs to shift risk to lower-tax affiliates to mirror third-party licensing agreements for royalties for the use of IP. Empirically, Becker, Johannesen, and Riedel (2020) provide evidence in support of their theory whereby their results show MNEs disproportionately allocate risk to affiliates located in low-tax countries. Despite the transfer pricing benefits of allocating risk to affiliates in low-tax countries, this strategy could be costly as greater losses in low-tax affiliates would be recognized during years in which the firm

underperforms as a whole. Therefore, evidence that income-shifting firms allocate more risk to foreign affiliates when they are in industries with more publicly available benchmarks could suggest real economic costs during periods of poor overall firm performance.

To conduct this analysis, we follow Becker, Johannesen, and Riedel (2020) and measure foreign risk allocation as the five-year standard deviation of foreign affiliates' return on sales (*Std Dev FROS*).[21] We then re-estimate equations (1) and (2) after replacing the dependent variable with *Std Dev FROS*. Further, we replace the worldwide return on sales (*ROS*) control variable with the worldwide standard deviation of return on sales (*Std Dev ROS*). When estimating equation (1), our variable of interest remains the coefficient on the interaction of $FTR_{i,t} \times Royalty_{k,t.}$. This coefficient captures whether there is an association between firms with an incentive to engage in outbound income shifting and foreign risk allocation as the count or range of publicly available royalty rates increases. When estimating equation (2), our variable of interest is the triple interaction term $LowFTR_{i,t} \times FTR_{i,t} \times Royalty_{k,t}$. A positive (negative) coefficient on this term suggests MNEs' foreign risk allocation incrementally increases (decreases) as both the incentive to income shift and the count or range of observed royalty rates increase.

Table 6 presents the results of estimating equations (1) and (2) after replacing the dependent variable with *Std Dev FROS*. Columns (1) and (2) provide results when estimating equation (1). Across both columns, we find a positive and significant coefficient on $FTR_{i,t} \times RoyaltyCount_{k,t}$ and $FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value < 0.01). Further, columns (3) and (4) provide results when estimating equation (2), the fully interacted model. In column (3), we find a positive

[21] We deviate from Becker, Johannesen, and Riedel (2020) who use the standard deviation of the return on assets whereas we use the standard deviation of the return on sales. As the income shifting models used in equations (1) and (2) measure returns using the return on sales, for consistency we measure returns using the return on sales. Further, Becker, Johannesen, and Riedel (2020) use individual foreign affiliate observations to measure risk allocation. Our analysis is restricted to measuring foreign risk allocation using aggregated foreign return on sales data because we our sample is comprised on U.S. MNEs for which affiliate level data is not available. The use of aggregated foreign return on sales data likely creates more noise in our measure of foreign risk allocation and biases against results.

and significant coefficient on $LowFTR_{i,t} \times FTR_{i,t} \times RoyaltyCount_{k,t}$ (p-value < 0.01). Although, the coefficient on $LowFTR_{i,t} \times FTR_{i,t} \times RoyaltyRange_{k,t}$ in column (4) is positive, it is not significant at conventional levels (p-value= 0.10). Overall, these results show that outbound income shifting firms allocate more risk to foreign affiliates as the count and range of publicly available royalty rates increases. Further, we find positive and significant coefficients on both $HighFTR_{i,t} \times FTR_{i,t} \times RoyaltyCount_{k,t}$ (p-value < 0.10) and $HighFTR_{i,t} \times FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value < 0.05) in columns (3) and (4), respectively. This finding suggests that firms with an incentive to shift income into the U.S. allocate *less* risk to their foreign affiliates, consistent with these firms substantiating their income shifting into the U.S. with more stable returns for foreign affiliates.[22]

Finally, we estimate equation (1) on the sample of firm-year observations where *Outbound Income Shifter* equals one to provide more robustness to our results in columns (1) to (4) for firms that engage in outbound income shifting. Columns (5) and (6) provide results when interacting $FTR_{i,t}$ with $RoyaltyCount_{k,t}$ and $RoyaltyRange_{k,t}$, respectively, on outbound income shifting firms. We find positive and significant coefficients on both $FTR_{i,t} \times RoyaltyCount_{k,t}$ (p-value < 0.01) and $FTR_{i,t} \times RoyaltyRange_{k,t}$ (p-value < 0.10). Overall, our results show that income-shifting firms allocate more risk to foreign affiliates when they are in industries with more publicly available benchmarks. This result suggests that firms allocate risk to foreign affiliates to a greater extent when in an industry with more publicly available benchmarks, which could result real in economic costs to the firm during periods of poor overall firm performance.

6. Conclusion

This study examines how the count and range of publicly available royalty rates in third-party licensing agreements are associated with outbound income shifting for U.S. MNEs. We find

[22] The *FTR* variable is *increasing* in the incentive to shift income outside of the U.S. Therefore, a positive coefficient on $HighFTR_{i,t} \times FTR_{i,t} \times Royalty_{k,t}$ indicates lower *Std Dev FROS*.

consistent evidence that U.S. MNEs with an incentive to shift income out of the U.S. engage in greater income shifting as the firm has a greater count or range of publicly available royalty rates to select from. We also find increases in income shifting as both the tax incentive to engage in outbound income shifting increases and the count of publicly available royalty rates increases. However, we also find evidence of real economic costs for firms with greater incentives to shift income and as the count of publicly available royalty rates increases as evidenced by larger future settlements with tax authorities and greater foreign risk allocation. Therefore, these findings suggest that U.S. MNEs' efforts to strategically use publicly available benchmarks to shift income imposes tax avoidance costs.

Our study makes several contributions to the literature. First, by using the same inputs that manager use in their tax planning decisions related to transfer pricing, one of the most common tax avoidance methods utilized by MNEs, we answer the call in Dyreng and Maydew (2018) to peer inside the "black box" of tax planning. In particular, we demonstrate that accounting decisions to strategically price intercompany IP transactions allow firms to shift income above and beyond the operational decisions of strategically locating IP in low-tax jurisdictions. Second, we extend prior research that examines the impact benchmarks have on income shifting (Amberger and Osswald 2021; De Simone 2016). Our study focuses on benchmarks of specific IP-related *transactions* that can be used as inputs in setting transfer prices whereas De Simone (2016) examines benchmarks of comparable *firms*. We compliment Amberger and Osswald (2021) by using different dimensions of IP-related transfer pricing information to examine their association with firms' income shifting. Additionally, we contribute to research on tax authority enforcement efforts (e.g., De Simone, Stomberg, and Williams 2023; De Simone, Stomberg, and Williams 2024; Finley and Stekelberg 2022; Hoopes, Mescall, and Pittman 2012). Our findings suggest

publicly available data is an important resource for tax authorities in their enforcement efforts to successfully challenge taxpayers' transfer pricing positions. Thus, we provide important evidence that further researchers, tax authorities, practitioners, and MNEs' knowledge of critical inputs in the tax enforcement process. Finally, we contribute to the literature of various stakeholders' use of public disclosure (e.g., Badertscher, Shroff, and White 2013; Glaeser and Omartian 2022; Kim and Valentine 2023; Kankanhalli, Kwan, and Merkley 2024). We contribute to this literature by demonstrating how public disclosure is utilized by both firms to engage in tax-motivated income shifting while simultaneously being used by tax authorities to challenge firms' transfer pricing positions.

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Appendix A: Variable Descriptions

Variable	Definitions
Royalty Benchmark Variables	
$RoyaltyCount_{k,t}$	The natural logarithm of the count of third-party licensing agreements, with royalty rates expressed as a percentage of sales, within each industry (SIC two-digit) from years t-4 to t.
$RoyaltyRange_{k,t}$	The range (maximum less minimum) of royalty rates expressed as a percentage of sales from third-party licensing agreements for each industry (SIC two-digit) from years t-4 to t.
Tax Incentive Variables	
$FTR_{i,t}$	The five-year average income shifting incentive by firm *i* from years *t*-4 to *t*, measured by the sum of foreign total tax expense (TXFO + TXDFO) divided by the sum of foreign pre-tax income (PIFO) less the U.S. statutory rate. We multiply this ratio by negative one so that *FTR* increases as a firm's tax incentive to shift income out of the U.S. increases.
$LowFTR_{i,t}$	An indicator variable equal to one if firm *i*'s five-year foreign effective tax rate is lower than the U.S. statutory rate (i.e., 35% for years before 2018 and 21% for subsequent years)
$HighFTR_{i,t}$	An indicator variable equal to one if firm *i*'s five-year foreign effective tax rate is higher than the U.S. statutory rate (i.e., 35% for years before 2018 and 21% for subsequent years).
Outcome Variables	
$FROS_{i,t}$	The five-year average of foreign pre-tax income over foreign sales for firm *i*, where foreign pre-tax income is the sum of PIFO for firm *i* from years *t-4* to *t*.
$Settle_{i,t\ to\ t+2}$	The sum of tax reserve settlements from years *t* to *t+2* (TXTUBSETTLE+ leadTXTUBSETTLE1 + leadTXTUBSETTLE2) divided by the sum of beginning balance of tax reserves in year *t* (TXTUBBEGIN) plus additions to tax reserves during year *t* related to prior year tax positions (TXTUBPOSPINC) for firm *i*.
Std Dev $FROS_{i,t}$	The standard deviation of $FROS_{i,t}$ for firm *i* from years *t-4* to *t*, where $FROS_{i,t}$ is calculated individually for each year *t-4* to *t*.
Firm-level Control Variables	
$ROS_{i,t}$	Worldwide pre-tax income over worldwide sales, where worldwide pre-tax income is the sum of PI for firm *i* from years t-4 to t.
Std Dev $ROS_{i,t}$	The standard deviation of $ROS_{i,t}$ for firm *i* from years *t-4* to *t*, where $ROS_{i,t}$ is calculated individually for each year *t-4* to *t*.
$Size_{i,t}$	The natural logarithm of total assets of firm *i* in year *t*.
$Rd_{i,t}$	Research and development expense (XRD) scaled by assets of firm *i* in year *t*, with missing values set to 0.
$Ad_{i,t}$	Advertising expense (XAD) scaled by assets of firm *i* in year *t*, with missing values set to 0.
$Intangibles_{i,t}$	Intangible assets (INTAN) scaled by assets of firm *i* in year *t*, with missing values set to 0.

$Cash_{i,t}$	Cash (CHE) scaled by assets of firm *i* in year *t*, with missing values set equal to 0.
$Debt_{i,t}$	Total debt (DLC + DLTT) scaled by assets of firm *i* in year *t*, with missing values set to 0.
Outbound Income Shifter	An indicator variable equal to one if $LowETR_{i,t}$ equals one and the residual from equation (4) is positive for firm *i* in year *t*, and zero otherwise.

Appendix B: Third-Party Licensing Agreement Example
This appendix provides an excerpt from Thermogenesis Holdings, Inc. Form 8-K filed on March 18, 2022, to highlight the intellectual property and royalty rate data contained within SEC material agreement filings. The licensor (Thermogenesis) and licensee (Boyalife Genomics) do not share common ownership.

Item 1.01. Entry into a Material Definitive Agreement.

License and Technology Access Agreement

… In furtherance of our planned [Contract Development and Manufacturing] business, on March 24, 2022, we entered into a License and Technology Access Agreement with Boyalife Genomics (the "Boyalife License Agreement")…

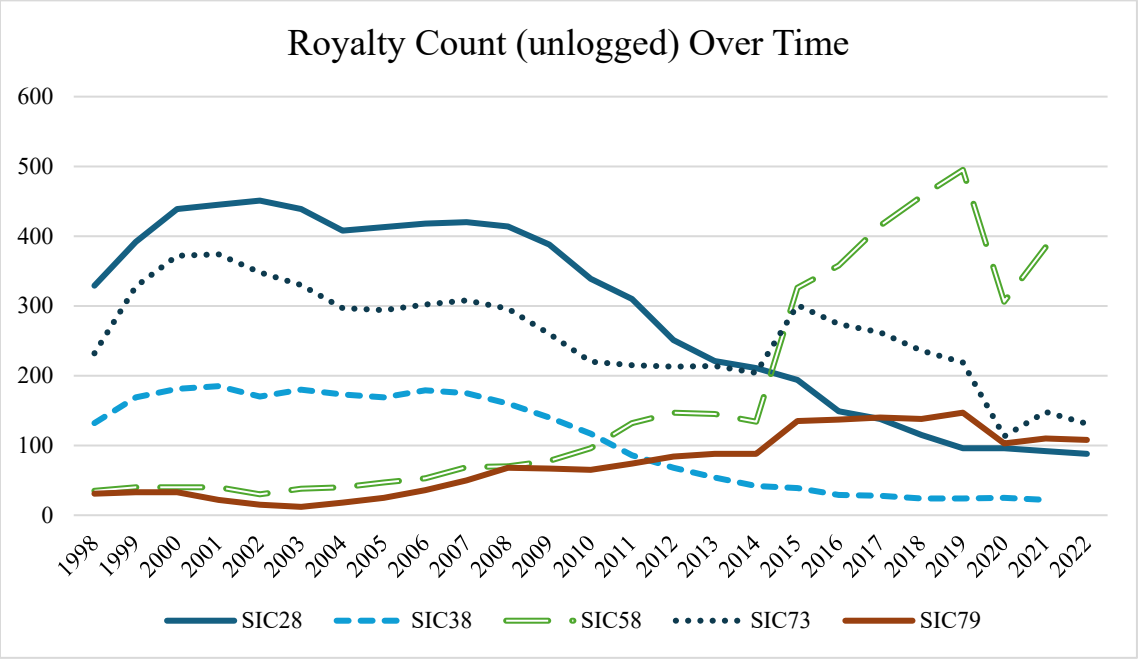
Under the terms of the Boyalife License Agreement, Boyalife Genomics granted the Company and its subsidiaries and affiliates a perpetual exclusive license in the United States to use Boyalife Genomics' existing and future know-how and U.S. patents rights (if any) relating to cell manufacturing and related processes. Notwithstanding the foregoing exclusivity, Boyalife Genomics retains the right to use (but not license) the licensed intellectual property in the U.S. for its internal use in connection with the provision of products and services to third parties. In consideration of this license, the Company will pay to Boyalife Genomics a running royalty of 7.5% of the Company's annual net sales of products and services that are covered by one of more Boyalife Genomics' granted U.S. patents and 5.0% of other products and services covered by the licensed intellectual property…

Figure 1: Count and Range of Licensing Agreements by Industry

Panel A: Total Royalty Count & Range by Industry

Figure 1: Count and Range of Licensing Agreements by Industry (continued)

Panel B: Royalty Count Over Time for Five Industries with Highest Count of Total Agreements



Panel C: Royalty Range Over Time for Five Industries with Highest Count of Total Agreements

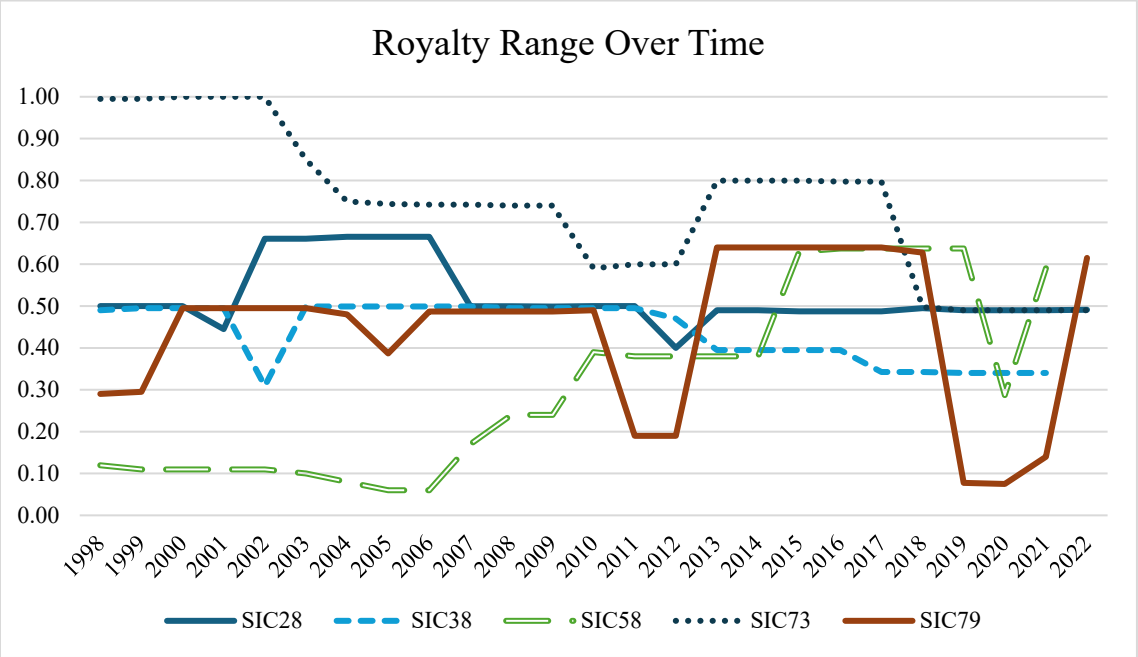


Figure 1, Panel A illustrates the total logged number of third-party licensing agreements disclosed by U.S. MNCs and range of royalties charged of all licenses within each industry (two-digit SIC) from 1994 to 2022. The horizontal axis on the left side of the graph measures the natural log of licensing agreements, whereas the horizontal axis on the right measures the range of royalty agreements before winsorizing. Panel B (C) illustrates the five-year unlogged number of licensing agreements (the range of royalties charged) from 1998 to 2022 for the five industries with the highest total number of publicly available third-party licensing agreements.

Table 1: Sample Selection

	Firm-Year Observations
U.S. incorporated, non-regulated firms (SIC 4000–4999, SIC 6000–6999) with total assets of at least $10 million between 1998 and 2022.	108,587
Less: Observations missing foreign sales from Compustat geographic segment disclosures	(73,553)
Less: Observations missing five years of data for computing firms' foreign return on sales (*FROS*) and foreign tax rate incentives (*FTR*)	(13,842)
Less: Observations with less than one million dollars in foreign sales or if foreign revenue scaled by total revenue exceeds 1.02	(4,932)
Less: Observations with negative five-year summed pre-tax domestic and foreign income from *t-4* to *t* and a foreign tax rate incentive below –1 or above 1.	(5,837)
Less: Observations in industries without any publicly-available licensing agreements over the five-year-window *t-4* to *t*	(823)
Total firm-year observations for equations (1) and (2):	9,600
Total firm-year observations for equations (1) and (2):	9,600
Less: Observations not engaging in outbound income shifting (*Outbound Income Shifter* equal to zero)	(6,235)
Total firm-year observations for equations (1) and (2) for *Outbound Income Shifter* equal to one:	3,365
Total firm-year observations for equations (1) and (2):	9,600
Less: Firm-years missing UTB data from Compustat from *t* to *t+3*, with a zero or negative UTB balance in year *t*, and negative summed settlements related to uncertain tax positions from year *t+1* to *t+3*	(3,929)
Total firm-year observations for equation (4):	**5,671**
Less: Observations not engaging in outbound income shifting (*Outbound Income Shifter* equal to zero)	(3,534)
Total firm-year observations for equation (4) for *Outbound Income Shifter* equal to one::	**2,137**

Table 1 describes the sample selection process. We define all variables in Appendix A.

Table 2: Descriptive Statistics – Licensing Agreements by Industry

SIC	Industry Description	N	Mean	SD	Min	Max	SIC	Industry Description	N	Mean	SD	Min	Max
1	Agricultural – Crops	7	0.14	0.12	0.02	0.30	44	Water Transport	2	0.07	0.00	0.07	0.07
2	Agricultural – Livestock	5	0.04	0.03	0.01	0.08	45	Air Transport	2	0.16	0.13	0.06	0.25
7	Agricultural Services	75	0.07	0.03	0.01	0.19	47	Transport. Services	44	0.11	0.13	0.00	0.65
8	Forestry	3	0.12	0.07	0.08	0.20	48	Communications	108	0.15	0.18	0.00	0.55
10	Metal Mining	60	0.07	0.09	0.00	0.45	50	Wholesale - Durable Goods	174	0.09	0.11	0.01	0.70
13	Field Crops	44	0.07	0.09	0.01	0.49	51	Wholesale - Nondurable Goods	104	0.07	0.05	0.01	0.50
14	Nonmetallic Minerals	15	0.11	0.09	0.02	0.25	52	Building Materials	22	0.05	0.02	0.02	0.08
15	Building Contractors	56	0.07	0.03	0.01	0.25	53	General Merch. Stores	7	0.07	0.02	0.04	0.10
16	Vegetables And Melons	12	0.05	0.03	0.02	0.10	54	Food Stores	146	0.05	0.01	0.01	0.09
17	Fruits And Tree Nuts	90	0.06	0.02	0.02	0.10	55	Automotive Dealers & Services	31	0.05	0.03	0.02	0.20
20	Food Products	107	0.05	0.03	0.01	0.20	56	Apparel & Accessory Stores	108	0.05	0.02	0.01	0.18
21	Livestock	7	0.03	0.01	0.02	0.05	57	Furniture & Home furnishing	76	0.06	0.08	0.01	0.60
22	Textile Mill Products	33	0.06	0.04	0.01	0.25	58	Eating And Drinking Places	1,058	0.06	0.04	0.00	0.65
23	Apparel Products	166	0.07	0.06	0.01	0.55	59	Misc. Retail	218	0.07	0.10	0.00	0.80
24	Dairy Farms	6	0.05	0.02	0.02	0.08	70	Hotels	113	0.05	0.02	0.01	0.13
25	Poultry And Eggs	26	0.06	0.04	0.02	0.20	72	Crop Services	254	0.07	0.06	0.00	0.60
26	Paper Products	30	0.11	0.11	0.00	0.50	73	Business Services	1,416	0.16	0.16	0.00	1.00
27	Animal Specialties	90	0.11	0.09	0.00	0.50	75	Animal Services	111	0.08	0.06	0.02	0.50
28	Chemicals & Allied Products	1,587	0.07	0.08	0.00	0.67	76	Farm Labor & Mgmt	61	0.07	0.02	0.02	0.15
29	General Farms	6	0.06	0.08	0.01	0.20	78	Landscape Services	115	0.14	0.14	0.01	0.85
30	Rubber & Plastic Products	23	0.06	0.05	0.02	0.25	79	Recreation Services	422	0.08	0.07	0.01	0.65
31	Leather & Leather Products	9	0.05	0.02	0.03	0.10	80	Health Services	203	0.08	0.10	0.01	0.80
32	Stone & Glass Products	19	0.08	0.13	0.00	0.50	81	Timber Tracts	5	0.10	0.04	0.07	0.18
33	Primary Metal Industries	16	0.05	0.04	0.01	0.20	82	Educational Services	232	0.09	0.07	0.00	0.60
34	Fabricated Metal Products	25	0.06	0.07	0.01	0.40	83	Forest Products	58	0.07	0.04	0.03	0.25
35	Industrial Equipment	151	0.07	0.09	0.01	0.60	84	Museums & Gardens	5	0.08	0.04	0.03	0.15
36	Electronic & Electric Equip.	333	0.07	0.10	0.00	0.85	85	Forestry Services	2	0.11	0.04	0.08	0.14
37	Transportation Equip.	100	0.07	0.06	0.01	0.33	86	Membership Organizations	4	0.10	0.07	0.06	0.20
38	Instruments & Related	562	0.07	0.07	0.00	0.50	87	Engineering & Mgmt Services	267	0.09	0.10	0.01	0.80
39	Misc. Manufac.	162	0.08	0.07	0.01	0.50	88	Private Households	3	0.03	0.02	0.02	0.06
40	Railroad Transportation	1	0.05	.	0.05	0.05	89	Services, Nec	30	0.09	0.08	0.02	0.40
41	Passenger Transit	10	0.16	0.10	0.03	0.25	91	Commercial Fishing	1	0.06	.	0.06	0.06
42	Trucking & Warehousing	23	0.07	0.02	0.03	0.12	95	Environ. Quality & Housing	6	0.06	0.04	0.01	0.10
43	U.S. Postal Service	1	0.02	.	0.02	0.02	99	Nonclassifiable	53	0.11	0.13	0.01	0.75

Table 2 provides descriptive statistics for unwinsorized license-level data from 1994 to 2022, including the number of licenses and the mean, standard deviation, minimum, and maximum of royalty rates charged between third parties.

Table 3: Descriptive Statistics & Correlations – Royalty Benchmarks and Income Shifting

Panel A. Firm-year observations

	N	Mean	SD	Min	P25	P50	P75	Max
RoyaltyCount	9,600	3.508	1.630	0.000	2.197	3.497	4.927	6.205
RoyaltyCount (no log)	9,600	93.000	118.800	1.000	9.000	33.000	138.000	495.000
RoyaltyRange	9,600	0.310	0.194	0.000	0.095	0.394	0.494	0.494
FROS	9,600	0.120	0.103	0.006	0.051	0.092	0.154	0.572
ROS	9,600	0.121	0.083	0.010	0.062	0.102	0.158	0.416
HighFTR	9,600	0.354	0.478	0.000	0.000	0.000	1.000	1.000
LowFTR	9,600	0.646	0.478	0.000	0.000	1.000	1.000	1.000
FTR	9,600	0.038	0.165	-0.592	-0.039	0.049	0.137	0.420
Size	9,600	7.994	1.383	5.367	6.996	7.858	8.858	11.716
Rd	9,600	0.045	0.065	0.000	0.000	0.017	0.059	0.292
Ad	9,600	0.013	0.029	0.000	0.000	0.000	0.009	0.164
Intangibles	9,600	0.360	0.426	0.000	0.068	0.222	0.495	2.359
Cash	9,600	0.112	0.096	0.000	0.039	0.085	0.158	0.469
Debt	9,600	0.248	0.193	0.000	0.108	0.231	0.347	2.439

Panel B. Pairwise Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13
(1) RoyaltyCount	1												
(2) RoyaltyRange	0.762*	1											
(3) FROS	0.109*	0.090*	1										
(4) ROS	0.162*	0.144*	0.634*	1									
(5) HighFTR	-0.024*	-0.02	-0.243*	-0.155*	1								
(6) LowFTR	0.024*	0.02	0.243*	0.155*	-1	1							
(7) FTR	0.039*	0.049*	0.332*	0.206*	-0.730*	0.730*	1						
(8) Size	-0.128*	-0.161*	0.146*	0.056*	-0.075*	0.075*	0.066*	1					
(9) Rd	0.245*	0.234*	0.211*	0.361*	-0.148*	0.148*	0.233*	-0.113*	1				
(10) Ad	0.040*	-0.016	0.126*	0.104*	-0.051*	0.051*	0.042*	0.091*	-0.041*	1			
(11) Intangibles	0.089*	0.074*	0.214*	0.179*	-0.063*	0.063*	0.065*	0.061*	0.149*	0.099*	1		
(12) Cash	0.118*	0.149*	0.157*	0.225*	-0.123*	0.123*	0.159*	-0.237*	0.340*	0.060*	-0.159*	1	
(13) Debt	-0.075*	-0.120*	0.034*	-0.054*	0.077*	-0.077*	-0.101*	0.198*	-0.241*	0.120*	0.198*	-0.344*	1

Table 3, Panel A (B) provides descriptive statistics (pairwise correlations) for the underlying variables used to test the relation between publicly available third-party licensing agreements and income shifting of U.S. MNCs. * shows significance of the correlations at $p < .05$.

Table 4: Royalty Benchmarks and Income Shifting

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample				*Outbound Income Shifting Sample Only*	
Dep Var =	*FROS*	*FROS*	*FROS*	*FROS*	*FROS*	*FROS*
Royalty =	*Count*	*Range*	*Count*	*Range*	*Count*	*Range*
ROS	0.636***	0.639***	0.634***	0.638***	0.960***	0.965***
	(15.56)	(15.54)	(15.59)	(15.58)	(21.30)	(21.14)
FTR	0.044*	0.089***			-0.017	0.056
	(1.94)	(5.60)			(-0.26)	(1.05)
Royalty	0.002	-0.013	-0.001	-0.039**	0.003	-0.030
	(0.83)	(-1.18)	(-0.51)	(-2.40)	(0.71)	(-1.24)
FTR x Royalty	0.030***	0.194***			0.046**	0.268*
	(4.52)	(3.95)			(2.25)	(1.81)
LowFTR × FTR × Royalty			**0.049*** **	**0.286** **		
			(2.82)	**(2.37)**		
HighFTR × FTR × Royalty			**0.009**	**0.045**		
			(1.22)	**(0.76)**		
LowFTR			-0.002	-0.002		
			(-0.28)	(-0.27)		
Royalty × LowFTR			0.002	0.017		
			(0.72)	(0.97)		
HighFTR × FTR			0.092***	0.110***		
			(3.11)	(5.33)		
LowFTR × FTR			-0.002	0.078**		
			(-0.04)	(1.99)		
Size	0.007***	0.008***	0.007***	0.007***	-0.000	-0.000
	(4.02)	(4.14)	(3.96)	(4.07)	(-0.16)	(-0.04)
Rd	-0.102*	-0.098*	-0.118**	-0.112**	-0.094	-0.086
	(-1.92)	(-1.84)	(-2.14)	(-2.03)	(-1.22)	(-1.12)
Ad	0.127	0.130	0.116	0.121	-0.034	-0.032
	(1.39)	(1.43)	(1.27)	(1.33)	(-0.33)	(-0.31)
Intangibles	0.020***	0.020***	0.019***	0.020***	0.013*	0.013*
	(3.00)	(2.99)	(2.96)	(2.99)	(1.92)	(1.94)
Cash	0.072***	0.072***	0.070***	0.071***	0.026	0.026
	(3.17)	(3.18)	(3.12)	(3.14)	(0.94)	(0.93)
Debt	0.031**	0.032***	0.031**	0.032***	0.016	0.018
	(2.52)	(2.62)	(2.53)	(2.61)	(1.02)	(1.17)
Fixed Effects	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.
Observations	9,600	9,600	9,600	9,600	3,365	3,365
Adjusted R^2	0.507	0.505	0.509	0.506	0.703	0.701

Table 4 reports the results on the relation between publicly available third-party licensing agreements and income shifting of U.S. MNCs. The dependent variable is a firm's five-year foreign return on sales (*FROS*). *RoyaltyCount* equals the log of the count of licensing agreements within each industry over the five years *t-4* to *t*. *RoyaltyRange* equals the range of royalty rates within each industry over the five years *t-4* to *t*. Columns (1) and (2) report results when estimating equation (1), which interacts a firm's tax incentive, *FTR*, with *RoyaltyCount* and *RoyaltyRange*, respectively. *FTR* equals the five-year foreign effective tax rate less the U.S. statutory rate multiplied by negative one. Columns (3) and (4) report results when estimating equation (2), a fully interacted model following Klassen and Laplante (2012). Columns (5) and (6) report results when estimating equation (1) on the sample of firm-year observations with *Outbound Income Shifter* equal to one. t-statistics, reported in parentheses, are calculated based on standard errors obtained by clustering at the firm. *** p<0.01, ** p<0.05, * p<0.10.

Table 5: Descriptive Statistics & Correlations – Royalty Benchmarks and UTB Settlements

Panel A. Firm-year observations

	N	Mean	SD	Min	P25	P50	P75	Max
RoyaltyCount	5,671	3.358	1.611	0.000	2.079	3.332	4.745	6.205
RoyaltyCount (no log)	5,671	80.700	104.500	1.000	8.000	28.000	115.000	495. 000
RoyaltyRange	5,671	0.288	0.197	0.000	0.080	0.340	0.490	0.494
Settlement	5,671	0.190	0.255	0.000	0.000	0.087	0.275	1.285
LowFTR	5,671	0.709	0.454	0.000	0.000	1.000	1.000	1.000
FTR	5,671	0.059	0.164	-0.592	-0.018	0.073	0.157	0.420
Size	5,671	8.160	1.374	5.367	7.199	8.023	9.001	11.716
Rd	5,671	0.045	0.065	0.000	0.000	0.016	0.059	0.292
Ad	5,671	0.013	0.029	0.000	0.000	0.000	0.010	0.164
Intangibles	5,671	0.417	0.460	0.000	0.089	0.271	0.581	2.359
Cash	5,671	0.121	0.096	0.000	0.049	0.098	0.168	0.469
Debt	5,671	0.253	0.196	0.000	0.117	0.234	0.352	2.439

Panel B. Pairwise Correlations

	1	2	3	4	5	6	7	8	9	10	11
(1) RoyaltyCount	1.000										
(2) RoyaltyRange	0.851*	1.000									
(3) Settlements	-0.010	-0.021	1.000								
(4) LowFTR	0.131*	0.126*	0.055*	1.000							
(5) FTR	0.125*	0.150*	0.015	0.740*	1.000						
(6) Size	-0.122*	-0.139*	0.098*	0.019	0.017	1.000					
(7) Rd	0.257*	0.262*	-0.049*	0.155*	0.257*	-0.101*	1.000				
(8) Ad	0.057*	0.020	-0.016	0.046*	0.046*	0.064*	-0.054*	1.000			
(9) Intangibles	0.158*	0.161*	-0.019	0.026	0.047*	-0.007	0.172*	0.111*	1.000		
(10) Cash	0.154*	0.131*	-0.043*	0.089*	0.128*	-0.247*	0.333*	0.083*	-0.211*	1.000	
(11) Debt	-0.048*	-0.062*	-0.002	-0.085*	-0.106*	0.179*	-0.210*	0.155*	0.211*	-0.293*	1.000

Table 5, Panel A (B) provides descriptive statistics (pairwise correlations) for the underlying variables used to test the relation between publicly available third-party licensing agreements and settlements with tax authorities of U.S. MNCs. * shows significance of the correlations at $p < .05$.

Table 6: Royalty Benchmarks and UTB Settlements

	(1)	(2)	(3)	(4)
	Full Sample		*Outbound Income Shifting Sample Only*	
Dep Var =	$Settle_{t\ to\ t+2}$	$Settle_{t\ to\ t+2}$	$Settle_{t\ to\ t+2}$	$Settle_{t\ to\ t+2}$
Royalty =	*Count*	*Range*	*Count*	*Range*
FTR	-0.007	0.001	0.000	-0.014
	(-0.60)	(0.01)	(0.00)	(-0.14)
Royalty	-0.131**	-0.089	-0.436**	-0.347**
	(-2.01)	(-1.63)	(-2.05)	(-2.04)
FTR × Royalty	**0.029***	**0.197**	**0.100***	**0.835***
	(1.82)	**(1.40)**	**(1.67)**	**(1.86)**
Size	0.022***	0.022***	0.024***	0.024***
	(4.43)	(4.52)	(3.29)	(3.42)
Rd	-0.113	-0.110	-0.265	-0.264*
	(-1.04)	(-1.01)	(-1.64)	(-1.68)
Ad	-0.015	-0.014	0.076	0.061
	(-0.08)	(-0.07)	(0.32)	(0.26)
Intangibles	0.018	0.018	0.019	0.021
	(1.45)	(1.45)	(1.00)	(1.08)
Cash	-0.007	-0.006	0.002	0.008
	(-0.11)	(-0.09)	(0.02)	(0.08)
Debt	0.016	0.016	0.031	0.033
	(0.52)	(0.51)	(0.72)	(0.79)
Fixed Effects	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.
Observations	5,671	5,671	2,137	2,137
Adjusted R^2	0.078	0.077	0.121	0.122

Table 6 reports the results on the relation between publicly available third-party licensing agreements and settlements with tax authorities of U.S. MNCs. The dependent variable, $Settle_{t\ to\ t+3}$, is the sum of tax reserve settlements from years *t* to *t+2* divided by the sum of the ending beginning balance of tax reserves in year *t* plus additions to tax reserves during year *t* related to prior year tax positions. *RoyaltyRange* equals the range of royalty rates within each industry over five years. Columns (1) and (2) report results when estimating equation (5), which interacts a firm's tax incentive, *FTR*, with *RoyaltyCount* and *RoyaltyRange*, respectively. *FTR* equals the five-year foreign effective tax rate less the U.S. statutory rate multiplied by negative one. Columns (3) and (4) report results when estimating equation (5) on the sample of firm-year observations with *Outbound Income Shifter* equal to one. t-statistics, reported in parentheses, are calculated based on standard errors obtained by clustering at the firm. *** p<0.01, ** p<0.05, * p<0.10.

Table 7: Royalty Benchmarks and Income Shifting

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample				*Outbound Income Shifting Sample Only*	
Dep Var =	*Std Dev FROS*	*Std Dev FROS*	*Std Dev FROS*	*Std Dev FROS*	*Std Dev FROS*	*Std Dev FROS*
Royalty =	*Count*	*Range*	*Count*	*Range*	*Count*	*Range*
Std Dev ROS	0.481***	0.480***	0.469***	0.468***	0.653***	0.655***
	(14.85)	(14.77)	(14.71)	(14.64)	(12.18)	(12.21)
FTR	-0.027**	-0.010			-0.012	0.045*
	(-2.35)	(-1.13)			(-0.34)	(1.72)
Royalty	-0.000	-0.001	-0.001	-0.003	-0.003	-0.017
	(-0.17)	(-0.12)	(-0.49)	(-0.40)	(-0.98)	(-1.09)
FTR x Royalty	0.013***	0.094***			0.031***	0.157*
	(4.38)	(3.91)			(2.80)	(1.95)
LowFTR × FTR × Royalty			**0.021*** **	**0.088**		
			(2.88)	**(1.64)**		
HighFTR × FTR × Royalty			**0.008***	**0.077****		
			(1.87)	**(2.07)**		
LowFTR			0.003	-0.000		
			(0.61)	(-0.01)		
Royalty × LowFTR			-0.001	0.001		
			(-0.64)	(0.07)		
HighFTR × FTR			-0.056***	-0.052***		
			(-3.17)	(-3.62)		
LowFTR × FTR			0.006	0.054***		
			(0.25)	(2.94)		
Size	0.001	0.001	0.000	0.001	-0.000	-0.000
	(0.77)	(0.92)	(0.49)	(0.65)	(-0.25)	(-0.09)
Rd	0.035	0.036*	0.010	0.014	-0.040	-0.034
	(1.65)	(1.71)	(0.48)	(0.65)	(-1.24)	(-1.04)
Ad	0.047	0.048	0.033	0.035	0.009	0.007
	(1.27)	(1.31)	(0.93)	(1.00)	(0.17)	(0.14)
Intangibles	0.007**	0.007**	0.007**	0.007***	0.009*	0.009**
	(2.46)	(2.49)	(2.56)	(2.63)	(1.96)	(2.03)
Cash	0.012	0.013	0.010	0.010	0.020	0.022
	(1.11)	(1.15)	(0.90)	(0.96)	(1.09)	(1.16)
Debt	0.009	0.009	0.009	0.009	-0.004	-0.004
	(1.50)	(1.51)	(1.43)	(1.43)	(-0.46)	(-0.45)
Fixed Effects	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.	Ind, Yr.
Observations	9,600	9,600	9,600	9,600	3,365	3,365
Adjusted R^2	0.348	0.347	0.361	0.359	0.410	0.407

Table 6 reports the results on the relation between publicly available third-party licensing agreements and foreign risk allocation of U.S. MNCs. The dependent variable is the standard deviation of a firm's foreign return on sales over the five years *t-4* to *t* (*Std Dev FROS*). *RoyaltyCount* equals the log of the count of licensing agreements within each industry over the five years *t-4* to *t*. *RoyaltyRange* equals the range of royalty rates within each industry over the five years *t-4* to *t*. Columns (1) and (2) report results when estimating equation (1) after replacing *Std Dev FROS* as the dependent variable. Equation (1) interacts a firm's tax incentive, *FTR*, with *RoyaltyCount* and *RoyaltyRange*, respectively. *FTR* equals the five-year foreign effective tax rate less the U.S. statutory rate multiplied by negative one. Columns (3) and (4) report results when estimating equation (3) after replacing the dependent variable with *Std Dev FROS*. Equation (2) is a fully interacted model following Klassen and Laplante (2012). Columns (5) and (6) report results when estimating equation (1) after replacing the dependent variable with *Std Dev FROS* on the sample of firm-year observations with *Outbound Income Shifter* equal to one. t-statistics, reported in parentheses, are calculated based on standard errors obtained by clustering at the firm. *** p<0.01, ** p<0.05, * p<0.10.