Income-shifting arrangements of US multinational corporations and accounting reporting design

Abstract

Using a sample of 7,097 firm-year observations over the 2011-2017 period, we investigate the association between income-shifting arrangements and accounting reporting design using eXtensible Business Reporting Language (XBRL) tags. XBRL tags provide the IRS and auditors significant control over extracts of information derived from financial reports. Our findings reveal a negative and statistically significant association between income-shifting and accounting reporting design as measured by the number of XBRL tags. This relationship holds true even when employing alternative measures for both income-shifting and accounting reporting design, and when addressing endogeneity concerns. Further, cross-sectional analyses demonstrate that the negative association between income-shifting and XBRL-derived accounting reporting design is amplified for U.S. MNCs that utilize tax haven subsidiaries, possess a high number of offshore subsidiaries, and exhibit a low Environment, Social and Governance (ESG) score, which serves as a proxy for firms' sustainability and ethical performance.

Keywords: Income-shifting, eXtensible Business Reporting Language (XBRL), IRS monitoring

JEL classification: H25, F23, M41

1.1 Introduction

Income-shifting refers to strategies that result in a disproportionate allocation of profits to low-tax jurisdictions, deviating from what would be expected based on the global distribution of a MNC's assets (Gravelle, 2022). MNCs achieve this through various methods, including the transfer of assets or services at non-market prices to subsidiaries in low-tax countries, the strategic allocation of tax-deductible expenses to high-tax jurisdictions (e.g., interest payments, R&D expenditures) (Klassen & Laplante, 2012a, 2012b; De Simone et al., 2019; Cheng et al., 2020), and the manipulation of intercompany transactions involving shares, dividends, and royalties. Prior literature underscores the significant economic impact of MNC income-shifting (Klassen & Laplante, 2012a, 2012b; De Simone et al., 2019). Prior research suggests that income-shifting is a key contributor to the decline in reported profits by U.S. MNCs over the past decade, potentially impacting economic growth, employment levels, and government budget deficits (Klassen & Laplante, 2012a). De Simone et al. (2019), utilizing confidential Internal Revenue Service (IRS) data, estimate that U.S. MNCs engaged in substantial outbound and inbound payments exceeding US$830 billion and US$1 trillion, respectively, between 2005 and 2014. This large-scale income-shifting has resulted in the accumulation of over US$2 trillion in retained earnings offshore by U.S. MNCs over the past two decades (Rubin, 2015). Despite the prevalence of income-shifting arrangements, the effectiveness of XBRL tagging, a specific accounting reporting design measure, in mitigating this behavior remains unexplored. Hence, this study aims to address this gap by examining the potential association between income-shifting arrangements employed by U.S. MNCs and accounting reporting design using XBRL tagging.

The U.S. Securities and Exchange Commission (SEC) mandated the use of XBRL[1] for filing financial reports (10-K and 10-Q) in an interactive format starting June 15, 2011 (SEC, 2009). This adoption of XBRL offers several advantages. Financial statements become machine-readable, reducing information processing costs for external users (Dong et al., 2016; Kim et al., 2019). They can access, extract, compare, and analyse financial data with greater accuracy and efficiency. This study takes advantage of the compulsory adoption of XBRL as a rare opportunity to assess how information processing costs, which were previously unobservable, affect external monitoring, specifically by the IRS, while keeping the content of financial reporting consistent. The research explores whether the reduction in information processing costs induced by XBRL adoption influences managerial decisions regarding aggressive income-shifting practices. Managers often aim to reduce corporate tax liabilities through various strategies designed to enhance shareholder

[1] See (Figure 1) for further details of the key timeline for XBRL adoption in the U.S. (SEC, 2023)

value (Mills et al., 1998; Rego & Wilson, 2012). However, excessive tax avoidance strategies can lead to significant non-tax-related costs, such as higher information processing costs, agency expenses, reputational harm, and possible penalties (Graham et al., 2014; Hasan et al., 2014). Research indicates that these costs may outweigh the tax benefits, especially for firms with high levels of information opacity (McGuire et al., 2012). Regarding reputational concerns, Graham et al. (2014) find that nearly 70% of tax executives view reputation as a key factor in discouraging firms from engaging in aggressive tax avoidance. We hypothesize that mandatory XBRL adoption reduces the information processing costs tied to financial statements, thereby increasing the likelihood that the IRS will detect aggressive income-shifting strategies. As a result, the costs of income-shifting for U.S. multinational corporations (MNCs) are anticipated to rise.

A significant aspect of XBRL reports is the direct relationship between the contained figures and text and the values of the XBRL facts that can be extracted from these reports. This connection is extremely effective, enabling users to switch between various views of the reported data and to comprehend the sources of the values in derived analytic reports. XBRL facilitates automation and standardization of financial and tax data, thereby assisting taxing authorities and a firm's auditor to extract information and data and to undertake verification and integrity checks of that information. For instance, XBRL tags encompass a range of tax-related information within financial statements. This includes tax accruals, complex tax notes, reconciliations between effective and statutory tax rates, deferred tax assets (DTAs) and liabilities, valuation allowances for DTAs, and tax benefits from share-based compensation. XBRL reporting facilitates easier access for the IRS to such information, enabling efficient comparisons between a firm's reported tax liabilities and relevant benchmarks. Compared to traditional formats, XBRL allows the IRS to identify abnormal deviations in a firm's reported performance (e.g., book income or taxable income) from benchmarks (e.g., industry averages or historical trends) with greater accuracy, timeliness, and cost-efficiency. As a result, XBRL reporting enhances the IRS's ability to detect aggressive income-shifting and to penalize tax evaders. The increased risk of detection and associated penalties disincentivizes managers from engaging in income-shifting activities.

This study employs a sample encompassing 7,097 firm-year observations spanning the 2011-2017 period. We analyse the association between income-shifting arrangements and accounting reporting design using XBRL tags. The adoption of XBRL tags has streamlined information processing for the IRS, enabling them to more effectively detect aggressive income-shifting arrangements undertaken by U.S. MNCs. We leverage this enhanced efficiency to examine the influence of accounting reporting design, as measured by XBRL tags, on the income-shifting behaviour of U.S. MNCs. The analysis yields a negative and statistically significant association

between income-shifting arrangements and the extent of use of XBRL tags with XBRL reports. This relationship remains robust when employing alternative measures for both income-shifting and accounting reporting design, and when addressing endogeneity concerns. Furthermore, cross-sectional analyses reveal that the negative association between income-shifting and XBRL-derived accounting reporting design is amplified for U.S. MNCs characterized by: (a) the utilization of tax haven subsidiaries, (b) a high number of offshore subsidiaries, and (c) a low ESG score, serving as a proxy for corporate governance. Overall, the findings suggest that XBRL reporting alleviates the information processing burden on the IRS, ultimately curbing managerial incentives to engage in aggressive income-shifting arrangements.

This study offers several contributions to the financial report and tax compliance research domain. For the first time, we assess the association between income shifting and the extent of XBRL reporting. In doing so, we examine the role that XBRL reports facilitate monitoring and assessment of tax compliance by the IRS and auditors. We are thus able to assess the role that XBRL reports facilitate compliance around this aggressive financial and tax arbitrage technique. XBRL highlights the extent to which firms use arm's length transfer prices in intercompany service, and distribution transactions, as well as the relationship between an affiliate's accounting income and taxable income. This will facilitate compliance benchmarking of a particular firm against industry averages and can thus effectively isolate firms for further tax audits. Additionally, XBRL reports facilitate monitoring and analytical assessment of information and data by an auditor's client that could include compliance around income shifting protocols. We therefore add to the literature on key factors that predict income shifting. We shed light on the real effects that quality of reported information and data can have on managements' propensity to engage in income shifting. Additionally, this study enhances the understanding of how corporate disclosure design through an assessment of how XBRL reporting procedure significantly improves the information environment and its flow-on impacts in terms of tax compliance.

This paper is structured as follows. Section 2 reviews existing literature on income-shifting and accounting reporting design measured by XBRL tagging. We then develop the research hypothesis based on this review. Section 3 details the research design employed in this study. Section 4 presents the empirical findings from the analysis. Finally, Section 5 concludes the paper.

1.2 Literature review and hypothesis development

1.2.1 Income-shifting

Previous studies indicate that multinational corporations (MNCs) gain substantial tax advantages through income-shifting strategies (Harris, 1993; Jacob, 1996; Collins et al., 1998). For example, Collins et al. (1998), in their analysis of MNCs between 1984 and 1992, show that MNCs with average foreign tax rates exceeding the U.S. tax rate are more likely to engage in income-shifting for tax purposes compared to other MNCs. Their estimates suggest that each MNC shifts approximately $25–30 million of income annually, which, when aggregated, results in the transfer of around $34–40 billion to the U.S. In subsequent research, Klassen and Laplante (2012a) find that during the 2005–2009 period, MNCs with lower average foreign tax rates shifted about $10 billion in income out of the U.S., compared to the 1998–2002 period. Income-shifting enables firms to exploit financial, regulatory, and tax arbitrage opportunities, which can have a considerable impact on a firm's cost of capital, valuation, and cash flows (Klassen and Laplante, 2012a, 2012b). Additionally, using data from 4,266 tax return years matched with Compustat, De Simone et al. (2019) estimate that MNCs made approximately $2 trillion in intercompany payments during the 2005–2014 period.

1.2.2 Accounting reporting design

Regulatory bodies and standard-setting organizations, such as the Securities and Exchange Commission (SEC) and the Financial Accounting Standards Board (FASB), have focused on reducing the complexity of financial reporting (Baudot et al., 2018; FASB, 2012; Murphy, 2015; SEC, 2016). The Advisory Committee on Improvements to Financial Reporting (ACIFR) describes accounting reporting design as the challenges faced by preparers in applying U.S. Generally Accepted Accounting Principles (US-GAAP) and in accurately conveying the economic substance of transactions and events, along with a company's overall financial performance and position. The committee identifies two main sources of complexity in accounting-related reporting design: (1) the inherent difficulty in understanding and applying certain standards, and (2) the extensive volume and variety of existing accounting standards and their associated reporting requirements.

XBRL's flexible format allows filers to create custom tags for unique or non-standard financial data (SEC, 2009). A financial report can be provided with a number of XBRL tags designed to facilitate the human readable presentation of information as well as machine readable and structured XBRL data. This enables managers to communicate specific financial concepts not captured by existing definitions (Boritz & No, 2005), potentially enhancing both disclosure detail

and relevance (SEC, 2004). Prior research suggests, however, that accounting reporting design can arise from various factors including business operations, accounting standards, and information communication intent (e.g., Bloomfield, 2008; Dyer et al., 2017). Some studies posit that managers may exploit design to obfuscate information (e.g., Li, 2008; Lo et al., 2017), while others emphasize the influence of business activity and regulations (e.g., Guay et al., 2016). Additionally, XBRL tag proliferation can create challenges for preparers, potentially leading to errors (Hoitash & Hoitash, 2018). Overall, a XBR financial report allows management, as a preparer, to have fine-grained control over the layout and format of content, and for users (e.g. IRS, auditors, analysts and investors) to rapidly derive key information from these reports that could assist them in their assessment and investigations.

1.2.3 Potential association between income-shifting and accounting reporting design

Public financial disclosures complement private information obtained from tax filings, aiding IRS enforcement (Bozanic & Thevenot, 2015). However, cost constraints influence the IRS's use of public data for corroboration purposes. Research suggests that search-facilitating technologies like XBRL can enhance the ability to process financial information (Hirst & Hopkins, 1998; Hodge et al., 2004). By promoting data consistency across firms, XBRL reporting improves comparability, timeliness, and public detection of abnormal deviations from benchmarks (e.g., industry averages, historical trends). Consequently, we predict that XBRL facilitates more efficient monitoring of tax-related activities and identification of potential audit issues by IRS examiners.

Annual reports filed by publicly traded companies under the Securities Exchange Act of 1934, known as Form 10-Ks, provide essential information to stakeholders. These reports contain quantitative accounting data prepared in accordance with accounting standards, as well as unstructured textual narratives that describe a company's business activities, past and current performance, future plans, risks, opportunities, and governance (Li, 2008). We argue that XBRL can assist the IRS, auditors, and other stakeholders in interpreting and analyzing the unstructured textual content within these annual reports. The XBRL requirement is designed to establish a user-friendly, search-optimized environment without adding entirely new information (SEC, 2009). By tagging quantitative financial statement disclosures with standardized taxonomies, XBRL enables the IRS to more effectively access and analyze publicly disclosed tax data. Moreover, it improves the IRS's ability to compare and assess firms' tax strategies against relevant benchmarks. The IRS uses specific guidelines to identify potential tax concerns in companies with significant book-tax differences (Cloyd et al., 1996). Mills and Sansing (2000) further confirm that firms with larger book-tax discrepancies are at a higher risk of audit based on proprietary tax return data. XBRL

reporting likely strengthens this phenomenon, particularly for smaller firms with greater information asymmetry. Similarly, Humpherys et al., (2011) find that data mining and artificial intelligence tools can assist auditors and regulators to detect deceptive and obfuscation within the notes to financial reports.

Income-shifting arrangements involve strategically moving profits to lower-tax jurisdictions. The IRS views aggressive income-shifting practices as potentially noncompliant with tax regulations, particularly when achieved through transfer pricing manipulation that violates the arm's length principle relating to commerciality of transactions. The OECD/G20 BEPS project aimed to address these practices by establishing stricter transfer pricing guidelines and measures to combat treaty shopping (OECD, 2015)[2]. If the IRS deems income-shifting arrangements noncompliant, they may be disallowed, leading to stricter future scrutiny for the firm. Further, IRS challenges can impose significant back taxes, fines, penalties, and interest, posing a substantial cash flow risk. XBRL can help detect aggressive use of income shifting in the textual narratives of 10-K reports, leading to more transparent disclosures of accounting income to taxable income differences and a reduced propensity to aggressively avoid taxes through income shifting. Information not in XBL format potentially can be more difficult to interpret by the IRS and auditors because it requires that they devote more time and cognitive effort to identifying and extracting income shifting information, leaving them with more complex interpretations and uncertain information. Further, the mandatory adoption of XBRL reduces the IRS's information processing costs and enhances tax monitoring capabilities. Specifically, XBR report design facilitates information and data extraction by the IRS thereby effecting analysis of reported tax and financial data in reports and a comparison with that in firms' tax filings. If large discrepancies in accounting income to taxable income are detected owing to aggressive income shifting (or transfer mispricing) arrangements, this can then be investigated by the IRS. The presentation and availability of data in XBRL reports can facilitate the accuracy and completeness of tax and supporting financial data thereby effecting tax compliance. The reason for this is that XBRL report presentation and supporting data can assist the IRS in tracing the flow of transactions from the original financial data values to the taxable income data and to determine how income shifting arrangements have played a role in differences. As an example, XBRL can assist the IRS in deriving differences in accounting income to taxable income in firms; reconciliation statements and adjustments to accounting income derived as a consequence of the shifting or reallocation of funds to lower taxed jurisdictions or how transfer prices have impacted the final taxable income of a corporate group.

[2] The explanatory statement by OECD in 2015 can be found here: https://www.oecd.org/ctp/beps-explanatory-statement-2015.pdf

This will aid the IRS in determining potential areas of income shifting non-compliance. Consequently, facing a potentially higher tax audit risk, managers may be incentivized to curtail income-shifting behaviour following the XBRL mandate.

Prior research provides evidence that the quality and nature of the auditor, auditor-client relationship and audit itself can impact the propensity of firms to engage in income shifting arrangements. Auditors could potentially use XBRL tags to reconcile financial accounting and taxable numbers thereby ensuring accuracy, completeness and consistency of accounting and tax filings. Specifically, auditors could rely on the XBRL design to undertake detailed analytical procedures that could include tracing transaction effects through accounting to taxable income adjustments, financial ratios, trend analysis and determination of the tax effect of transactions. Auditors could also cross-reference tagged financial and tax data with tax rules that apply to different jurisdictions. This could ensure entities are compliant with OECD BEPS income shifting and tax law regulations.

Based on the discussion, we predict a negative association between accounting reporting design using XBRL tags and income-shifting arrangements. To provide evidence on this unexplored issue, we test the following hypothesis, stated in alternative form:

Hypothesis 1: All else being equal, there is a negative association between U.S. MNCs' income-shifting and the extent of XBRL reporting design.

1.3 Research design

1.3.1 Sample and data

We begin the initial sample with the income-shifting scores of De Simone et al. (2019) that span from 2005 to 2017[3]. De Simone et al. (2019) provide scores for a U.S. MNC sample of 13,878 corporation-year observations that satisfy the following criteria: (1) incorporated in the US, (2) total assets greater than $10m, (3) non-financial or non-utilities industries, (4) non-missing, non-zero pre-tax foreign income, and (5) FTR (i.e. U.S. statutory tax rate of 35% less the corporation's foreign tax rate) within the range of $-1 \leq FTR \leq 1$. We then merge the income-shifting scores with annual financial statement data from Compustat. We exclude corporation-year observations with missing data to compute the variables. After computing the variables, we then merge income-shifting scores and financial statement data from Compustat with ARC data provided by Hoitash

[3] Data on income-shifting scores are available at: https://sites.google.com/view/lisa-desimone/outbound-scores

and Hoitash (2018)[4]. We then set the sample to start from 2011 as this was the first year that corporations were required to tag their 10-K using XBRL. The main sample consists of 7,097 corporation-year observations (1,514 unique corporations). Finally, all continuous variables are winsorized at the 1st and 99th percentiles to mitigate the undesirable influence of outliers.

1.3.1.1 Dependent variable

The primary analysis utilizes the income-shifting proxy measure (INCS) developed by De Simone et al. (2019). Using confidential IRS data, they create a unique corporation-year measure of income-shifting that reflects the extent of MNCs' net intercompany payments made from the U.S. to Controlled Foreign Corporations (CFCs) for goods, services, intangibles, and capital. De Simone et al. (2019) employ an ordered logistic regression to estimate the decile of net outbound payment intensity, considering factors that previous studies have identified as determinants of income-shifting. These include intangible intensity (Morck and Yeung, 1991, 1992; Griffith et al., 2014), unique product and service offerings (Nakamura, 2001; Tomohara, 2004, 2011), global presence (Hines and Rice, 1994), tax incentives (Klassen et al., 1993; Collins et al., 1998), debt (Huizinga et al., 2008), and tax planning activities (Armstrong et al., 2012). To create a more streamlined measure of income-shifting, De Simone et al. (2019) apply the parameter estimates from their ordered logistic regression model to corporate characteristics, generating a score that increases with the relative level of net outbound intercompany payments.

The De Simone et al. (2019) income shifting measure offers many advantages over earlier income-shifting measures that involve assumptions about the location of income or profitability. Collins et al. (1998) measure MNCs' ability to shift income as foreign tax expense scaled by foreign pre-tax income less the statutory tax rate of 35% (i.e. annual average foreign tax rate [FTR]). Klassen and Laplante (2012a, 2012b) modify the Collins et al. (1998) measure of annualized FTR by calculating FTR over five years to overcome annual fluctuations. However, a possible drawback of the De Simone et al. (2019) proxy measure of income shifting is its broad nature, capturing facets of tax-motivated and non-tax-motivated income-shifting[5].

1.3.1.2 Independent variable

Hoitash and Hoitash (2018) contend that within the XBRL U.S. GAAP taxonomy, each accounting concept is represented by a tag. Each tag within the taxonomy is assigned a name and

[4] Data of accounting reporting design (ARC) is available at: http://www.xbrlresearch.com/

[5] As a robustness check, we use the alternative income-shifting measures of Collins et al. (1998), Klassen and Laplante (2012a, 2012b) and tax reconciliation adjustments (hand collected data from 10-K) and obtain qualitatively similar results (see Table 6).

label, with certain features such as data type (monetary or string) and balance type (credit/debit) being inherent to these identifiers. The overarching objective of the taxonomy is to provide definitions for tags that facilitate the transparent and complete reporting of various accounting items and outcomes in XBRL format. Despite the extensive inclusion of over 16,000 tags in the taxonomy, there may arise circumstances where firms find it necessary to develop new tags. The fundamental aim of XBRL design is to continually improve the taxonomy and accommodate the creation of specialized tags, known as extended tags, to fulfill the evolving needs of reporting entities. These tags facilitate the rapid and efficient review of various reporting items that may include, for instance, tax arrangements or strategy.

Consistent with previous research (Hoitash and Hoitash, 2018), we measure accounting reporting design (ARC) as the natural logarithm of the total number of distinct monetary annual tags reported in item 8 of the 10-K filings. The ARC measure captures the discrete accounting information found in companies' financial statements and notes, with each XBRL tag representing a specific accounting standard and its related regulations.

1.3.1.3 Control variables

Consistent with prior literature on income-shifting and tax avoidance, we include several control variables in the regression model. To control for economies of scale and firm design, we include firm size (Firm Size), leverage (Leverage), book-to-market ratio (BTM), R&D investment (R&D), and non-current assets (PPE), sales growth (Sales Growth), financial distress (Z-score), intangible assets (Intangible) and tobin's q ratio (Tobin's Q) (Chen et al., 2010; McGuire et al., 2012; Hasan et al., 2014; Richardson et al., 2020). Firms with negative pre-tax income and/or significant net operating loss carryforwards have less motivation to shift income offshore or engage in tax avoidance. Therefore, we include controls for firm profitability (ROA), net operating loss carryforwards (NOL), and changes in net operating loss carryforwards (Change NOL) in the regression model (Chen et al., 2010; McGuire et al., 2012; Chyz et al., 2013). Additionally, we control for the level of firms' cash holdings (Cash Size) to account for the cash needs that may drive certain income-shifting and tax avoidance behaviors (McGuire et al., 2012).

Previous studies indicate that tax rates are determined endogenously in response to macroeconomic conditions (Hanlon and Heitzman, 2010). To address this issue, we incorporate year dummies to account for the effects of changing business cycles and macroeconomic factors on income-shifting behavior. Additionally, existing research demonstrates that industry characteristics and trends influence firms' tax strategies (McGuire et al., 2012; Cen et al., 2017; Kubick et al., 2017). Therefore, we include industry dummies to control for the impact of industry-

specific factors on a firm's income-shifting behavior. The definitions of the variables can be found in **Error! Reference source not found.**.

1.3.2 Regression model

To examine the potential association between income-shifting (INCS) and accounting reporting design (ARC) using XBRL tags, we estimate the following regression model:

$$\begin{aligned} INCS_t = {} & \beta_0 + \beta_1 ARC_t + \beta_2 Firm\ Size_t + \beta_3 Leverage_t + \beta_4 R\&D_t + \beta_5 BTM_t \\ & + \beta_6 Cash\ Size_t \\ & + \beta_7 NOL_t + \beta_8 Change\ NOL_t + \beta_9 ROA_t + \beta_{10} PPE_t + \beta_{11} Intangible_t \\ & + \beta_{12} Sales\ Growth_t + \beta_{13} Z\text{-}score_t + \beta_{14} Tobin's\ Q_t \\ & + \beta_m INDDUMMIES + \beta_n YEARDUMMIES + \varepsilon_{it} \end{aligned} \quad (1)$$

where the dependent variable is income-shifting (INCS). The variable of interest is accounting reporting design (ARC), Hypothesis 1 predicts that β_1 should be negative.

1.4 Empirical results

1.4.1 Summary statistics and correlation matrix

Table 1 presents the descriptive statistics for the variables used in this analysis. The mean (-2.035) and median (-2.072) values of outbound income-shifting (INCS) scores are close to the values reported by De Simone et al. (2019). Similarly, the mean (5.196) and median (5.236) values for accounting reporting design using XBRL tags are consistent with those found by Hoitash and Hoitash (2018). The sample firms exhibit characteristics typical of large corporations (average firm size = 7.584) with low leverage (mean = 0.226). They also display moderate future growth opportunities (Tobin's Q = 1.916) and profitability (ROA = 0.062), while research intensity (R&D = 0.053) is low. Further, cash holdings (mean = 0.189) and sales growth (mean = 0.085) are also moderate. The financial health of the sample, as indicated by Altman's Z-score (mean = 2.071), is positive.

Table 1

Descriptive statistics

Panel A: Variables used in the main analyses

	Mean	SD	P25	P50	P75
INCS	-2.035	0.546	-2.397	-2.072	-1.693
ARC	5.196	0.447	4.942	5.236	5.505
Firm Size	7.584	1.759	6.435	7.611	8.658
Leverage	0.226	0.192	0.083	0.199	0.321
R&D	0.053	0.067	0.011	0.028	0.072
BTM	0.010	0.025	0.001	0.003	0.008
Cash Size	0.189	0.179	0.062	0.137	0.251
NOL	0.770	0.421	1.000	1.000	1.000
Change NOL	0.000	0.000	0.000	0.000	0.000
ROA	0.062	0.106	0.024	0.071	0.118
PPE	0.448	0.319	0.217	0.356	0.600
Intangible	0.299	0.250	0.098	0.249	0.441
Sales Growth	0.085	0.190	-0.011	0.055	0.145
Z-score	2.071	1.426	1.285	1.758	2.412
Tobin's Q	1.916	1.678	0.995	1.483	2.250

Panel B: Variables used in robustness tests and additional analyses

	Mean	SD	P25	P50	P75
ARC ALL FACTS	6.356	0.600	5.981	6.368	6.766
ARC ALL NUMS	6.256	0.615	5.869	6.261	6.683
INCS Collins	0.813	0.390	1.000	1.000	1.000
INCS Klassen	0.650	0.477	0.000	1.000	1.000

Table 2 presents the distribution of the sample firms across the Fama-French (12) industry classification. Business equipment (32.55%) and manufacturing (17.94%) firms represent the largest industry segments within the sample. Conversely, the telecommunications (1.82%) and petroleum extraction and products (2.83%) industries have the lowest representation.

Table 2

Industry distribution

FF-12	N	% N	INCS	ARC
Consumer nondurables	438	6.17	-2.00	5.23
Consumer durables	354	11.16	-1.72	5.12
Manufacturing	1273	29.10	-2.16	5.16
Petroleum extraction and products	201	31.93	-2.27	5.12

FF-12	N	% N	INCS	ARC
Chemical	377	37.24	-2.77	5.22
Business equipment	2310	69.79	-1.72	5.08
Telecommunications	129	71.61	-2.11	5.16
Services	594	79.98	-2.12	5.18
Healthcare	594	88.35	-1.88	5.08
Diversified	827	100.00	-1.85	5.12
Total	**7097**	**100.00**		

Table 3 reports the Pearson pairwise correlation results for the variables used in the analysis. There is a statistically significant negative correlation between income-shifting arrangements (INCS) and accounting reporting design (ARC) ($r = -0.12$, $p < 0.01$). This suggests that as the design of accounting reports increases, the level of income-shifting decreases. This negative correlation could indicate that more complex financial reporting may impose constraints or enhance transparency, thus limiting income-shifting arrangements. Firm size shows a moderate negative correlation with INCS ($r = -0.34$, $p < 0.01$) and a moderate positive correlation with ARC ($r = 0.43$, $p < 0.01$). Several control variables (R&D, BTM and cash size) exhibit statistically significant positive (negative) correlation with INCS (ARC).

Table 3 *Pearson pairwise correlations*

Variables	INCS	ARC	Firm Size	Leverage	R&D	BTM	Cash Size	NOL	Change NOL	ROA	PPE	Intangible	Sales Growth	Z-score	Tobin's Q
INCS	1.00														
ARC	-0.12***	1.00													
Firm Size	-0.34***	0.43***	1.00												
Leverage	-0.12***	0.21***	0.23***	1.00											
R&D	0.20***	-0.11***	-0.24***	-0.12***	1.00										
BTM	0.21***	-0.26***	-0.54***	-0.19***	0.06***	1.00									
Cash Size	0.08***	-0.08***	-0.16***	-0.13***	0.53***	-0.03*	1.00								
NOL	0.03*	0.03*	-0.07***	0.02	0.16***	-0.02	0.08***	1.00							
Change NOL	0.07***	-0.10***	-0.13***	-0.02	0.07***	0.09***	0.04**	0.10***	1.00						
ROA	-0.37***	0.03*	0.31***	-0.02	-0.29***	-0.33***	-0.02	-0.13***	-0.06***	1.00					
PPE	-0.05***	-0.04**	-0.01	0.08***	-0.17***	0.04**	-0.20***	-0.01	-0.01	0.06***	1.00				
Intangible	-0.02	0.11***	0.15***	0.46***	-0.04**	-0.18***	-0.22***	0.05***	0.02	-0.01	-0.39***	1.00			
Sales Growth	0.11***	-0.15***	-0.08***	-0.01	0.17***	-0.05***	0.21***	0.06***	0.04***	0.02	-0.14***	0.07***	1.00		
Z-score	0.07***	-0.20***	-0.26***	-0.43***	0.26***	0.00	0.42***	0.01	0.04**	0.11***	-0.11***	-0.18***	0.14***	1.00	
Tobin's Q	-0.02	-0.03*	-0.05***	0.12***	0.42***	-0.18***	0.51***	0.06***	0.01	0.16***	-0.11***	0.11***	0.24***	0.32***	1.00

1.4.2 Regression results

Table 4 presents the main regression results of this study. We find a negative association between accounting reporting design (ARC) and income-shifting arrangements (INCS) by U.S. MNCs, as hypothesized. In the first specification, which includes a limited set of control variables, the coefficient for ARC is -0.021 with a t-value of -2.80, statistically significant at the 1% level ($p<0.01$). This suggests that as the design of accounting reports increases, there is a corresponding decrease in income-shifting arrangements. The statistical significance and negative coefficient support the idea that more complex reporting, facilitated by XBRL tags, potentially deters firms from engaging in aggressive income-shifting behaviour. This deterrence may arise due to the enhanced scrutiny and reduced information processing costs for the IRS, which increases the risk of detection and penalties for noncompliant income-shifting behavior. In the second specification, which includes a more comprehensive set of control variables, the coefficient for ARC remains negative at -0.017 with a t-value of -1.89, significant at the 10% level ($p<0.1$). Despite the inclusion of additional control variables, the negative association between ARC and INCS persists, albeit with slightly reduced statistical significance compared to the first model. When assessing the economic significance of the results for first (second) specification, we find that a one-standard-deviation increase in ARC (=0.447) is associated with approximately a 1.72% (1.39%) decrease in INCS.

Table 4

The association between income-shifting and ARC

Variables	**Dependent variable INCS**	
ARC	**-0.021*** **	**-0.017***
	(-2.80)	**(-1.89)**
Firm Size	-0.056***	-0.036***
	(-5.23)	(-2.71)
Leverage	-0.155***	-0.239***
	(-7.71)	(-7.74)
BTM	-0.147	0.146
	(-0.64)	(0.43)
Cash Size	-0.104***	-0.128***
	(-3.93)	(-3.38)
ROA	-0.690***	-0.484***
	(-19.75)	(-9.65)
PPE	0.021	0.001
	(0.73)	(0.04)
R&D		0.819***
		(4.97)
NOL		-0.024*
		(-1.71)
Change NOL		2.796
		(0.48)
Intangible		0.124***
		(4.37)
Sales Growth		0.096***
		(5.91)
Z-score		-0.007*
		(-1.91)
Tobin's Q		0.004
		(1.18)
Constant	-1.367***	-1.634***
	(-16.06)	(-15.14)
Observations	6,708	3,818
Adjusted R-squared	0.156	0.192
YEAR FE	YES	YES
INDUSTRY FE	YES	YES
F-stat	7.83***	3.58***

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

1.5 Robustness checks

1.5.1 Alternative measures of accounting reporting design

To examine the robustness of the findings, we adopt the approach of Hoitash and Hoitash (2018) by employing two alternative measures of accounting reporting design (ARC) derived from XBRL tags. The first measure, ARC_ALL_FACTS, encompasses all reported facts within the filings, including repetitions within a single disclosure and those arising from comparable financial statement presentations. The second alternative, ARC_ALL_NUMS, captures all numerical data points in the filings, encompassing both monetary and non-monetary values such as percentages and share counts. The regression analyses utilizing these alternative ARC measures (ARC_ALL_FACTS and ARC_ALL_NUMS) are presented in Table 5. Consistent with the primary results (Table 4), the coefficients for ARC_ALL_FACTS (-0.019) and ARC_ALL_NUMS (-0.019) are statistically significant at the 1% level ($p < 0.01$), with corresponding t-values of -2.69 and -2.75, respectively. These findings suggest that the specific choice of ARC measure constructed from XBRL tags does not materially influence the conclusions.

Table 5
Alternative measures of ARC

Variables	**Dependent variable INCS**	
ARC_ALL_FACTS	**-0.019*****	
	(-2.69)	
ARC_ALL_NUMS		**-0.019*****
		(-2.75)
Control Variables	YES	YES
Constant	-1.624***	-1.631***
	(-15.09)	(-15.19)
Observations	3,818	3,818
Adjusted R-squared	0.190	0.190
YEAR FE	YES	YES
INDUSTRY FE	YES	YES
F-stat	7.21***	7.54***

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.5.2 Alternative measures of income-shifting

As a further robustness check, we employ alternative income-shifting measures from prior research (Collins et al., 1998; Klassen & Laplante, 2012a, 2012b) and our own hand-collected data. Consistent with Collins et al. (1998), we operationalize MNCs' incentive to shift income (annualized average foreign tax rate [FTR]) as foreign tax expense divided by foreign pre-tax income minus the U.S. statutory tax rate of 35%. Table 6 presents the regression results for this measure. The INCS_Collins coefficient is negative and statistically significant for accounting reporting design (ARC) at the 1% level ($p < 0.01$).

Acknowledging a potential limitation of the Collins et al. (1998) measure (i.e., annual fluctuations in foreign tax expense), Klassen and Laplante (2012a, 2012b) proposed a five-year average FTR. We adopt this approach and calculate a five-year FTR estimate (INCS_Klassen). Table 6 reports the regression results using this alternative measure. The INCS_Klassen coefficient remains negative and statistically significant for ARC, albeit at the 10% level ($p < 0.10$).

The Tax Reconciliation model (INCS_10-K) offers a number of advantages over the Collin's et al. (1998) and Klassen and Laplante (2012a) models. The hand-collected reconciliation adjustments provide us with a weighted average, generally negative adjustment to income tax expense on accounting profit owing to the aggregate effect of lower tax rates applied to income earned or allocated to offshore affiliates. This is a direct measure of income shifting incentives as it measures the actual tax effect of differential tax rates between that applied to offshore affiliates and the U.S. statutory tax rates. Table 6 reports the regression results using this hand-collected measure of income-shifting. The INCS_10-K coefficient is also negative and statistically significant for ARC at the 10% level ($p < 0.10$).

Overall, the consistency of the findings across these alternative income-shifting measures (see Table 4) reinforces the notion that the results are not dependent upon a specific measure of income-shifting.

Table 6
Alternative measures of income-shifting

Variables	INCS-Collins (1)	INCS-Klassen (2)	INCS-10-K (3)
ARC	**-0.075*** **	**-0.031***	**-0.022***
	(-3.37)	**(-1.77)**	**(-1.71)**
Control Variables	YES	YES	YES
Constant	0.952***	0.577***	0.180*
	(3.59)	(2.71)	(1.89)
Observations	3,818	3,818	1,109
Adjusted R-squared	0.304	0.279	0.198
YEAR FE	YES	YES	YES
INDUSTRY FE	YES	YES	YES
F-stat	11.36***	2.93***	2.92***

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.5.3 Potential endogeneity concerns

The findings thus far suggest a negative association between accounting reporting design (ARC) derived from XBRL tags and income-shifting practices of MNCs. However, potential endogeneity issues, such as reverse causality, could influence these results. To mitigate these concerns, we employ the two-step generalized method of moments (GMM) approach (Blundell & Bond, 1998). This approach by Blundell and Bond (1998) incorporates the dynamic relationship between ARC and income-shifting (INCS) while addressing other sources of endogeneity. It utilizes lagged firm characteristics as instruments. Specifically, the first difference of firm characteristics at the previous period serves as an instrument for the level equations, and the second difference serves as an instrument for the differenced equation (Blundell & Bond, 1998). The regression results are presented in Table 7.

The two-step GMM estimation confirms the robustness of the negative association between ARC and INCS, even after controlling for potential endogeneity. Table 7 also includes diagnostic tests for serial correlation and the Hansen test of overidentifying restrictions. The results indicate a statistically significant AR (1) ($p < 0.01$), suggesting the presence of first-order autocorrelation, but an insignificant AR (2), implying the absence of second-order autocorrelation. Finally, the statistically insignificant Hansen test of overidentifying restrictions supports the validity of the instruments used in the two-step GMM estimation.

Table 7
Two-stage regression analysis results (GMM)

Variables	**INCS**
ARC	-0.076***
	(-2.89)
Control Variables	YES
Constant	-0.307**
	(-2.20)
Observations	5,146
YEAR FE	YES
INDUSTRY FE	YES
F-stat	8.33***
Post-estimation test statistics	
Overidentification test	
Hansen J statistic	33.43
P-value	0.398
AR (1)	-6.36***
P-value	0.000
AR (2)	0.18
P-value	0.857

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.5.4 Cross-sectional analyses – moderating effects

We conducted additional cross-sectional analyses to explore whether the association between accounting reporting design (ARC) derived from XBRL tags and income-shifting arrangements (INCS) of U.S. MNCs is influenced by three factors: (a) use of tax haven subsidiaries, (b) number of offshore subsidiaries, and (c) corporate governance measured by ESG score. We predict that the negative association between ARC and INCS should be stronger for MNCs with: (1) greater reliance on subsidiaries located in tax havens, which are jurisdictions with low tax rates and potentially weaker regulatory environments, (2) a larger presence in offshore jurisdictions, potentially facilitating income-shifting activities and (3) weaker corporate governance structures, as indicated by a lower ESG score, which might create a less stringent oversight environment for income-shifting behavior. Data on tax haven subsidiaries and the number of offshore subsidiaries is hand-collected from firms' 10-K reports. ESG scores were obtained from the Refinitiv database.

Columns (1) and (2) of Table 8 (Panel A) present the results of the cross-sectional analyses on tax haven use. We initially divide the sample based on whether MNCs utilized tax haven

subsidiaries. The negative association between ARC and INCS is statistically significant and stronger for the subsample of MNCs that leverage tax havens (column 2). We further divide the sample in columns (3) and (4) based on the median number of subsidiaries in tax havens. Consistent with our predictions, the negative association remains significant and more pronounced for MNCs with a higher number of tax haven subsidiaries (column 4).

Like the analysis of tax havens, we investigate the moderating effect of the total number of offshore subsidiaries (Table 8, Panel B). Columns (1) and (2) present the results after splitting the sample by the median number of offshore subsidiaries. The negative association between ARC and INCS is again significant and stronger for MNCs with a greater number of offshore subsidiaries (column 2). Finally, columns (3) and (4) of Table 8 (Panel B) explore the moderating effect of corporate governance, measured by ESG score. The sample was divided based on the median ESG score. As expected, the negative association between ARC and INCS is significant and more pronounced for MNCs with a lower ESG score, indicating weaker corporate governance structures (column 3).

Table 8

Regression results of the cross-sectional analyses

Panel A: Income-shifting and accounting reporting design – the effect of tax haven

Variables	Tax haven=No (1)	Tax haven=Yes (2)	Less tax haven (3)	More tax haven (4)
ARC	0.025	**-0.064*** **	-0.033	**-0.064***
	(0.48)	**(-2.99)**	(-1.29)	**(-1.83)**
Control Variables	YES	YES	YES	YES
Constant	-0.821	-1.644***	-2.119***	-0.040
	(-1.20)	(-5.03)	(-5.89)	(-0.08)
Observations	188	955	615	528
Adjusted R-squared	0.014	0.117	0.115	0.135
YEAR FE	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES
F-stat	0.23	8.93***	1.68	3.36***

Panel B: Income-shifting and accounting reporting design – the effect of offshore subsidiaries and ESG

Variables	Less offshore subsidiaries (1)	More offshore subsidiaries (2)	Low ESG score (3)	High ESG score (4)
ARC	-0.002	**-0.104*** **	**-0.044** **	-0.011
	(-0.09)	**(-3.28)**	**(-2.24)**	(-0.52)
Control Variables	YES	YES	YES	YES
Constant	-0.691*	-1.518***	-0.692***	-1.485***
	(-1.76)	(-3.32)	(-3.23)	(-5.38)
Observations	564	575	1,412	1,430
Adjusted R-squared	0.093	0.149	0.394	0.223
YEAR FE	YES	YES	YES	YES
INDUSTRY FE	YES	YES	YES	YES
F-stat	0.01	10.73***	5.01***	0.27

t-statistics in parentheses

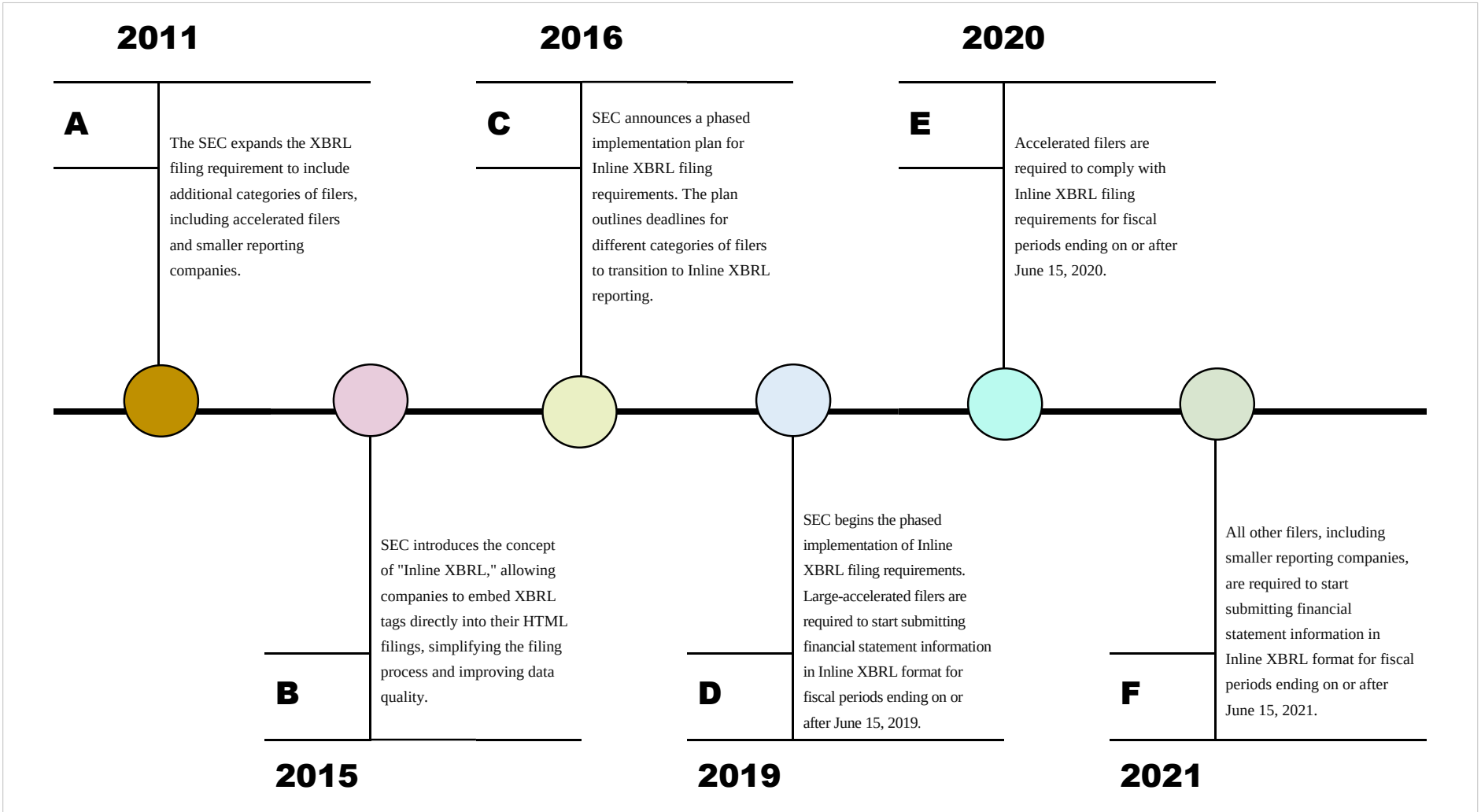
*** p<0.01, ** p<0.05, * p<0.1

1.6 Conclusion

This study explores the association between income-shifting arrangements of U.S. MNCs, and accounting reporting design derived from XBRL tags. Utilizing a sample of 7,097 firm-year observations spanning the 2011-2017 period, we find a negative and statistically significant association. This finding indicates that as accounting reporting design, measured by XBRL tags, increases, income-shifting arrangements decrease. The robustness of this relationship is confirmed through the application of alternative measures for both income-shifting and accounting reporting design, as well as by addressing potential endogeneity concerns. Further analyses strengthen the core findings. We observe a magnified negative association between income-shifting and XBRL-derived design for U.S. MNCs that (a) utilize tax haven subsidiaries, (b) have a high number of offshore subsidiaries and (c) exhibit a low ESG score (serving as a proxy for weak corporate governance). These results suggest that XBRL reporting enhances the efficiency of information processing by the Internal Revenue Service (IRS), potentially reducing the incentive for aggressive income-shifting arrangements by U.S. MNCs. By facilitating easier detection of such behaviors, XBRL may ultimately contribute to more transparent financial reporting and a fairer tax environment.

Figure 1

Key timeline for XBRL adoption in the U.S.



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Appendix: **Variable definition and measurement**

Variable	Definition
Variables used in the main regression analyses	
INCS	Income-shifting score of a corporation in year t (De Simone et al., 2019)
ARC	The natural logarithm of one plus the total number of monetary tags reported in Item 8 of 10-K filings, which includes the financial statements and notes (SEC filings) (Hoitash & Hoitash, 2018)
Firm Size	The natural logarithm of total assets (at) at the beginning of year t-1
Leverage	Total long-term debt divided by lagged total assets
BTM	The natural logarithm of the book value of common equity (ceq) divided by the market value of common equity (csho * prcc_f)
Cash Size	Cash and short-term investments (che) divided by lagged total assets
ROA	Income before extraordinary items (pi - xi) divided by the average total assets
PPE	Property, plant, and equipment (ppegt) divided by lagged total assets
R&D	Research and development expense divided by lagged total assets
NOL	An indicator variable that equals one if the firm reports a tax-loss carryforward, and zero otherwise
Change NOL	The change in tax-loss carryforwards from year t-1 to year t scaled by lagged total assets
Intangible	Intangible assets (INTAN) divided by lagged total assets
Sales Growth	The difference between current-year sales (SALE) and prior-year sales, divided by prior-year sales
Z-score	Altman's Z-score as a measure of financial distress in year t-1, Z-score = 1.4 (retained earnings scaled by total assets) + 1.2 (working capital scaled by total assets) + 3.3 (earnings before interest and taxes scaled by total assets) + 0.999 (sales scaled by total assets)
Tobin's Q	Market value of the firm divided by the book value of the firm

Variable	Definition
Variables used in the robustness tests and additional analyses	
ARC ALL FACTS	These include all facts reported in the filings which are facts that repeated within a disclosure and facts that repeated due to comparable financial statement disclosure. This approach assumes that design is a combination of the number of tags used and their frequency of use
ARC ALL NUMS	The count of all numerical facts in the filings and it includes non-monetary facts such as percent, shares
INCS Collins	Income-shifting score estimated following Collins et al. (1998)
INCS Klassen	Income-shifting score estimated following Klassen and Laplante (2012a, 2012b)
INCS 10-K	Hand-collected data from firms' 10-K reports, we obtain adjustment data on income tax expense on prima facie accounting profit within firms' accounting to taxable income reconciliation statements within 10-K reports. Negative adjustments relate to income earned offshore at tax rates less than the U.S. statutory tax rate while positive adjustments relate to income earned offshore at tax rates greater than the U.S. statutory tax rate.
Tax haven	Hand-collected data from firms' 10-K reports, we then utilize the following: (1) tax haven use (i.e., coded 1 if a firm has at least one subsidiary firm incorporated in a tax haven in year t-1, and 0 otherwise) and (2) less or more tax haven (i.e., based on the median of tax haven data, we partition the sample into high vs. low tax havens)
Offshore subsidiaries	Hand-collected data from firms' 10-K reports, we then utilize the following: less or a greater number of offshore subsidiaries (i.e., based on the median of number of offshore subsidiaries data, we partition the sample into high vs. low number of offshore subsidiaries)
ESG score	Overall ESG score as reported by Refinitiv database