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Tax Efficient Supply Chains: Analysis of Multinational Corporations with Swiss Subsidiaries

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Abstract

I examine whether U.S. corporations can strategically organize global supply chains to achieve tax efficiency by creating or acquiring subsidiaries in Switzerland. In particular, I study if there is an association between a firm's use of Swiss subsidiaries and the firm's effective tax rate using a sample of firm years from 1998 to 2013. Under U.S. rules prior to the Tax Cuts and Jobs Act of 2017 (TCJA), firms with subsidiaries in low-tax-rate foreign countries (e.g., Switzerland) could generally avoid U.S. tax on foreign income by not repatriating income. The 2014 Caterpillar Inc. case study offers an example of how corporations may derive tax benefits from Swiss subsidiaries. Consistent with the implications of the case study and opportunities presented by pre-TCJA rules, I find that corporations with at least one Swiss subsidiary generally have lower effective tax rates than corporations without any subsidiaries in Switzerland. Furthermore, the degree of these effective tax rate effects vary by industry. I also analyze pre-tax supply chain costs (e.g., duties, tariffs, and transportation-type costs) and find that firms with at least one Swiss subsidiary have a lower average cost of goods sold divided by total assets ratio than the average ratio of firms without at least one Swiss subsidiary. This is consistent with the notion that analyzing supply chain tax efficiency must consider the net effects of pre-tax supply chain costs and tax liabilities. Broadly, my study contributes evidence of the value of studying corporations' tax planning and supply chain management practices in conjunction.

Introduction

While traditional supply chain management and tax planning are not typically evaluated in conjunction, taxes have a large effect on firms' net income and thus may relatedly be a key element for consideration in supply chain management. This paper examines whether firms can strategically organize supply chains to achieve tax efficiency by creating or acquiring subsidiaries in Switzerland. More specifically, this paper examines if there is an association between a firm's use of Swiss subsidiaries and the firm's tax rate. If creating or acquiring Swiss subsidiaries is tax efficient, firms with Swiss subsidiaries are expected to have lower tax costs.

Understanding the relation between taxes and supply chain costs is important for several reasons. First, following the rapid spread of COVID-19 in 2020, global supply chains were disrupted, leaving many companies with the difficult task of restructuring supply chains. Thus, it is beneficial to obtain a better understanding of how and why firms use certain multinational supply chains. Importantly, firms are unlikely to reveal explicit information on their supply chain strategy because it may be a source of competitive advantage or, alternatively, a source of risk. As such, this study aims to reveal potential consequences of one specific supply chain choice: the use of Swiss subsidiaries. Second, the world economy is continuing to grow and become increasingly interconnected. Consequently, more corporations will be able to leverage opportunities to optimize their business models through strategic tax and supply chain arrangements, underscoring the importance of understanding strategic supply chain management.

I expect firms' use of Swiss subsidiaries to reduce taxes for several reasons. Under U.S. rules prior to the Tax Cuts and Jobs Act of 2017 (TCJA), firms with subsidiaries in low-tax-rate foreign countries (e.g., Switzerland) could generally avoid U.S. tax on foreign income by not repatriating income. The Caterpillar Inc. case study, which I discuss later, offers an example of

how corporations can obtain tax benefits from Swiss subsidiaries. Therefore, I predict that U.S. corporations with at least one Swiss subsidiary will have a lower average effective tax rate (ETR) than U.S. corporations without any Swiss subsidiaries. Furthermore, the efficacy of tax efficient supply chains may vary by industry because some tax rules apply differently for certain industries such as manufacturing. Consequently, I will examine these dynamics separately for different industries. It is also important to consider pre-tax supply chain costs (e.g., duties, tariffs, and transportation-type costs) to assess the net effect of strategic supply chain decisions but due to a lack of transparency into potential pre-tax costs, I do not make predictions as to whether a Swiss subsidiary increases or decreases those costs.

In order to test the effect of Swiss subsidiary ownership on firm tax liabilities, I analyze a sample of firm years from 1998-2013. Specifically, I use several multivariable linear regression models to examine the association between several different variables, including Swiss subsidiary usage, and ETR. Generally, I find that U.S. corporations with at least one Swiss subsidiary have lower average effective tax rates than U.S. corporations without any. This result is consistent with the inferences drawn from the Caterpillar Inc. case study and the findings of Dyreng and Lindsey (2009), which describe how U.S. multinational entities (MNEs) can derive tax benefits from situating subsidiaries in jurisdictions with low corporate income tax rates (e.g., Switzerland). Moreover, after stratifying by several business industries, I find that corporations in the “Personal and Business Services” industry with at least one Swiss subsidiary also have lower average effective tax rates than same-industry corporations without any. For corporations in the manufacturing industry, I am unable to obtain statistically significant evidence of an association between Swiss subsidiaries and ETRs. I also find evidence that Swiss subsidiary usage is negatively associated with cost of goods sold (COGS) but positive associated with

selling, general, and administrative expense (SG&A). Overall, these results support the notion that corporations can strategically manage global supply chains to achieve tax efficiency. More broadly, my study provides evidence of the value of studying corporations' tax planning and supply chain management practices in conjunction.

Background and Research Question

Institutional Details – Overview of U.S. Corporate Tax System

In the United States, the corporate income tax applies to C corporations, which are treated as taxable entities separate from their owners, who are known as shareholders. Under this type of organization, corporate income is taxed twice: once at the corporate level and then again at the individual-shareholder level when shareholders receive dividends or realize capital gains. On the other hand, other business entities, such as S corporations and partnerships, pass their income through the entity to the owners, who then pay taxes. Thus, these "pass-through" businesses only pay taxes on business income once at individual income tax rates (Congressional Research Service [CRS], 2020, p. 11). The corporate income tax liability can be calculated with the following general equation:

$$Taxes = [(Total\ Income - Excluded\ or\ Deferred\ Income - Deductible\ Expenses) \times Tax\ Rate] - Tax\ Credits \quad (1)$$

Corporations may have a net operating loss (NOL), which occurs when expenses exceed total income in a given year. Losses arising after December 31, 2017 can be "carried forward" indefinitely and be used to offset future tax liability (IRC § 172(b)). The losses carried forward are generally limited to 80 percent of taxable income (CRS, 2020, p. 12; IRC § 172(a)).[1] For

[1] Special tax laws related to the coronavirus (COVID-19) modified some of these rules. For purposes of this study, I ignore these special coronavirus-related rules.

losses arising prior to December 31, 2017, NOLs can offset 100 percent of taxable income and be carried backward for up to two years and forward for up to 20 years (Gale et al., 2018, p. 6).

In terms of taxation on foreign income, prior to 2017, American corporations were able to defer taxes on income earned by foreign subsidiaries until that income is repatriated to the United States.[2] In these cases, firms pay tax at the rate of the foreign jurisdiction in which each subsidiary is located. Upon repatriation, U.S. tax is due if the foreign tax rate is below the U.S. tax rate, which was common throughout the 2000s and 2010s. In contrast, if the U.S. tax rate was below the foreign tax rate, the firm could receive foreign tax credits (FTCs) for the foreign tax paid and use these to offset the U.S. tax due on low-tax-rate foreign income.[3] That said, if the U.S. firm never repatriates the foreign income, it never pays the additional U.S. tax that would be due upon repatriation of low-tax-rate foreign income.

However, Subpart F income, which includes income such as interest, dividends, annuities, rents, and royalties (IRC § 952; IRC § 954), cannot be deferred and corporations must pay taxes on this type of income in the year it is earned, regardless of repatriation. The Subpart F rules exist to prevent corporations from transferring this type of taxable income from high-tax to low-tax jurisdictions to avoid U.S. income tax liability (CRS, 2016, p. 2). Thus, Subpart F income helps to mitigate profit shifting away from the United States. After 2017, the TCJA generally exempted the taxation of income upon repatriation, though retaining Subpart F, but imposed several additional taxes which I discuss next.

[2] The repatriation is executed through a dividend payment from a foreign subsidiary to the U.S. parent company.
[3] A full discussion of the operating of the FTC—which is much more complicated than this high-level discussion—is beyond the scope of this paper.

Institutional Details – Tax Cuts and Jobs Act of 2017

The TCJA introduced significant, complex changes to the Internal Revenue Code, affecting a plethora of tax rules. Most of the non-corporate provisions expire after 2025 but the majority of the corporate provisions are permanent (Gale et al., 2018, p. 1). For instance, the TCJA reduced the statutory C corporation income tax rate from 35 to 21 percent (IRC § 11(b)). A key systemic change to U.S. international corporate income taxation was the shift from a hybrid-worldwide system to a hybrid-territorial system, a shift driven by the elimination of taxation on foreign income upon repatriation. Prior to the TCJA, the United States taxed corporations under a more worldwide (resident-based) tax system. A worldwide system means that a jurisdiction imposes tax on all income earned at home or abroad (CRS, 2016, p. 1). Under this system, a key issue is double taxation because the income would be taxed by both the jurisdiction in which the income was generated and the domestic jurisdiction. Double taxation is alleviated by FTCs (IRS, n.d., p. 5). In contrast, a territorial system imposes tax on income earned within the borders of the tax jurisdiction (CRS, 2016, p. 1). For example, if a U.S. company has a foreign subsidiary that earns income in Switzerland, in a territorial system the U.S. would generally not tax the income earned in Switzerland. It is important to note that no country uses a pure version of either of these two systems; jurisdictions use hybrid systems that combine worldwide and territorial system components (IRS, n.d., p. 6).

Although pure versions of these systems are not used, it is worthwhile to discuss their business implications. In a pure worldwide tax system, taxes should play virtually no role in influencing geographic investment allocation because the income earned will be taxed using domestic rates regardless of location (“capital *export* neutrality”). Accordingly, situating operations in tax havens would have no direct tax benefits unless there are non-tax advantages

associated with the haven. This should theoretically incentivize corporations to direct investments to locations that would be most productive (CRS, 2016, p. 1). Alternatively, in a pure territorial system, tax considerations would play a role in global investment decisions because corporations only pay taxes on income earned in each jurisdiction the corporation is located in. This means that corporations would be taxed at the same rates as foreign competitors in the foreign market. In this way, a territorial system theoretically neutralizes tax disadvantages faced by an investor seeking to make a foreign investment, hence the terms "competitive neutrality" or "capital *import* neutrality." However, territorial taxation systems are not neutral in reality because this system incentivizes investment in tax havens for multinational enterprises seeking to maximize net income by reducing tax liability (CRS, 2016, p. 2).[4]

The TCJA made several significant additions and adjustments within the overarching systemic shift in the U.S. taxation system from hybrid-worldwide to hybrid-territorial, one of which was participation exemption or a dividends received deduction (DRD) for dividends from foreign subsidiaries. More specifically, "dividends paid to US corporate parents from non-Subpart F income of their foreign subsidiaries are exempt from US tax" (Avi-Yonah, 2017, p.1). This exemption is a primary component of how the TCJA shifted the taxation system toward a more territorial system because it provides a full tax deduction for dividends that U.S. parents receive from foreign subsidiaries that are at least 10 percent owned (IRC § 245A(a)).[5] This study

[4] Arguably, territorial taxation lead *countries* to engage in a "race to the bottom" in tax rates so as to attract investment from multinational corporations.

[5] The exemption applied prospectively, raising a question as to how existing, untaxed, unrepatriated earnings would be taxed. Exempting these was politically infeasible because it would be viewed as rewarding firms that appeared to be aggressively offshoring income under the old tax system. To address this, IRC § 965 treats the pre-existing deferred foreign income as Subpart F income. Specifically, in the foreign subsidiary's last taxable year that begins before January 1, 2018, the foreign subsidiary's Subpart F income will be increased by the greater of "1) the accumulated post-1986 deferred foreign income of such corporation determined as of November 2, 2017, or 2) the accumulated post-1986 deferred foreign income of such corporation determined as of December 31, 2017" (IRC § 965(a)). The alternative dates were used to prevent firms from attempting to manipulate foreign earnings between the announcement and enactment of TCJA. The post-1986 period was selected because 1986 was the last major U.S.

does not analyze firm-year data following the TCJA due to a lack of data availability for years after 2013. However, the elimination of taxes on repatriated income and related shift toward a territorial system support the idea that certain firms may be further incentivized to situate subsidiaries in tax havens like Switzerland following 2017.

As a counterbalance to participation exemption, the TCJA strengthened Subpart F by introducing a 10.5 percent tax on global intangible low-taxed income (GILTI) earned by U.S. parent companies' controlled foreign corporations (CFCs) (IRC § 951A). A CFC is a foreign corporation if more than 50 percent of the voting power or value of all stock is owned by United States shareholders on any day of the foreign corporation's taxable year (IRC § 957(a)). GILTI can be defined as the income that exceeds a 10 percent return on the CFC's adjusted basis in tangible property (IRC § 951A(b)(2)). Specifically, GILTI is calculated as the total active income earned by a U.S. firm's foreign affiliates that exceeds 10 percent of the firm's foreign depreciable tangible property. Note that these calculations are based on aggregate amounts, not using country-by-country amounts, allowing firms to net high- and low-tax foreign income. A corporation (but not other businesses) can generally deduct 50 percent of the GILTI until 2025 (37.5 percent after 2025) and claim a foreign tax credit for 80 percent of foreign taxes paid or accrued on GILTI (IRC § 250(a)). Thus, if the foreign tax rate is zero, the effective U.S. tax rate on GILTI will be 10.5 percent (half of the regular 21 percent corporate rate because of the 50 percent deduction). If the foreign tax rate is 13.125 percent or higher, there will be no U.S. tax after the 80 percent credit for foreign taxes (Gale et al., 2018, pp. 6-7).

Because GILTI exempts return on foreign tangible property, Avi-Yonah (2017) describes how the GILTI tax incentivizes movement of profits and jobs overseas to decrease GILTI tax

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tax reform which resulted in the tax system in place before TCJA. Corporations pay 15.5 percent tax on accumulated earnings and profits related to cash assets and 8 percent on other assets (IRC § 965(c)(1)).

liabilities by maximizing the exemption of the 10 percent return on foreign assets. For example, companies like Apple, Google, Microsoft, and others will be subject to more GILTI tax because their income is generated primarily through intangible assets, which consequently means that there will be a greater excess over the 10 percent basis in foreign tangible assets. In contrast, MNEs like General Electric or Caterpillar Inc. will pay less because their foreign operations require more tangible assets, decreasing the excess over the 10 percent basis (Avi-Yonah, 2017, pp. 4-5). As a result, companies like Apple could react by increasing tangible assets and employment overseas.

Another crucial TCJA change is the creation of a base erosion anti-abuse tax (BEAT). This tax was implemented to help limit profit-shifting away from the United States by taxing deductible payments (e.g., interest, royalties, certain service payments), which are also known as base erosion payments, made to a foreign subsidiary (PWC, 2018, p. 1). Notably, however, the BEAT does not capture cost of goods sold payments to foreign entities as base erosion payments; COGS is the primary mechanism for firms to shift income through their supply chain. The BEAT is a minimum tax, applicable to large corporations (gross receipts over $500 million), on a base equal to taxable income without factoring in 1) the tax benefits arising from base erosion payments and 2) the base erosion percentage of any NOL allowed for the tax year (IRC § 59A(c)(1)). As a minimum tax, the BEAT is calculated and compared to the corporation's regular tax liability. If the BEAT is larger than the regular tax liability, the corporation pays its regular liability plus the difference so that the total tax equals the BEAT minimum tax calculation.[6] The BEAT rate is five percent for tax years beginning in 2018, 10 percent for tax

[6] This calculation is similar to how the corporate Alternative Minimum Tax (AMT) worked prior to being repealed by TCJA. Discussion of the AMT is beyond the scope of this study.

years beginning in 2019 to 2025, and 12.5 percent for years beginning after December 31, 2025 (IRC § 59A(b)(2); PWC, 2018, p. 1).

The TCJA also added new IRC section 250, which applies a reduced 13.125 percent to foreign derived intangible income (FDII), further addressing concerns about income shifting from the U.S. to foreign CFCs (Avi-Yonah, 2017, p. 5). That is, FDII is designed as an export incentive, to provide tax benefits for firms operating in the U.S. and selling their U.S. produced goods and services overseas. FDII represents "the amount which bears the same ratio to the deemed intangible income of such corporation as the foreign-derived deduction eligible income of such corporation, bears to the deduction eligible income of such corporation" (IRC § 250(b)(1)). The share of the excess income allocated to the sale of goods and services abroad is taxed at a reduced rate. This tax rate reduction is achieved by allowing a FDII deduction of 37.5 percent of the excess income (IRC § 250(a)(1)). Thus, the United States would tax this income at 13.125 percent (i.e., 21 percent × (1—37.5 percent) = 13.125 percent) rather than the regular 21 percent. After 2025, the FDII deduction drops to 21.875 percent (from 37.5 percent currently), which will raise the effective FDII tax rate to 16.4 percent (from 13.125 percent currently) (IRC § 250(a)(3)(A)). Deemed intangible income is the excess of the U.S. parent corporation's deduction eligible income (i.e., gross income without Subpart F income, GILTI, and other specified categories) over its deemed tangible income return (i.e., 10 percent of qualified business asset investment (QBAI)) (IRC § 250(b)(2), (3); Avi-Yonah, 2017, p. 5).

Background Information

As the global economy continues to expand, MNEs are increasing their focus on how they can reduce costs through globalization. Rapid developments in technology (e.g. communication, transportation) and the simultaneous deterioration of trade barriers has

supported growing global economic interconnectivity (Webber, 2011, p. 149). While this trend has increased business opportunities, it has also enabled the shift of certain business activities from high-tax to low-tax jurisdictions. These changes have led to a "race to the bottom" where some low-tax countries (e.g., Ireland, Switzerland) create attractive business tax environments to attract business, jobs, and income tax revenue. Simultaneously, there is concern from high-tax countries about losing these revenues to low-tax countries (Webber, 2011, p. 149). Supply chain management is one way that firms can shift income from high-tax to low tax countries.

More broadly, supply chain tax practices force firms to focus on two factors: the arm's length standard and business purpose doctrine (Webber, 2011, p. 150). The arm's length standard describes how transactions between a parent company and its subsidiary should not be preferentially priced or conducted solely because they are related parties (IRS, 2015). Relatedly, the business purpose doctrine prevents businesses from undertaking transactions solely to reduce or avoid taxes (Webber, 2011, p. 150).

Despite these limitations, it is evident that one key benefit arising from restructuring supply chains is a reduction in income tax liabilities (Webber 2011, p. 150). Reduction of *pre-tax* costs has been a common focus for many years in supply chain literature but there has been an increasing emphasis on how strategies to maximize net income (i.e., after taxes) can be interwoven with supply chain restructuring decisions (Webber, 2011, pp. 149-150). Both supply chain management and international tax planning share a major decision area, which involves selecting where to locate operations. This location decision can impact both pre-tax costs and tax obligations. It is important to note that the complete picture of supply chain efficiency must include an assessment of supply chain costs (e.g., duties, tariffs, distribution expenses) in addition to taxes (Webber 2011, pp. 150-151). If the net effect of tax benefits and supply chain

costs on profits is negative, the goals of an efficient supply chain strategy have not been met. As such, these pre-tax supply chain costs and tax benefits should ideally be analyzed in tandem: "Low tax rates become particularly attractive when products are profitable and the tax savings are not offset by supply chain costs" (Webber 2011, p. 151).

Caterpillar Inc. Case Study Overview

A tax strategy used by Caterpillar Inc. (Caterpillar), a staple American manufacturer of construction equipment, power generators, and sophisticated engines, provides a recent example of how tax efficient supply chain management can decrease U.S. tax liability (Senate, 2014, p. 1). Before delving into the details of the strategy, it is important to understand the circumstances that enabled Caterpillar to leverage this strategy. Caterpillar provides aftermarket services for equipment that it sells. In particular, its 24-hour replacement part delivery gives the company a sharp competitive advantage. Prior to 1999, the finished-parts portion of Caterpillar's business was operated out of Morton, Illinois and the company directly owned all the parts in the Morton, IL warehouse (Avi-Yonah, 2014, p. 5). Accordingly, all profits from the parts business were taxed by the United States regardless of whether sales were made overseas or domestically.[7]

Around 1999, Caterpillar paid over $55 million to PricewaterhouseCoopers (PWC) to formulate a strategy explicitly intended to reduce Caterpillar's U.S. effective tax rate, which involved establishing a Swiss subsidiary, Caterpillar SARL (CSARL), as a global purchaser of Caterpillar's third party manufactured replacement parts (Senate, 2014, p. 4). This subsidiary enabled Caterpillar to record non-U.S. parts sales in Switzerland rather than in the U.S., significantly lowering the company's tax expenses as follows (Senate, 2014, p. 4). First, following its inception, CSARL took ownership of the parts inventory at the Morton location. If

[7] Under the TCJA, this type of sales would be eligible for the FDII deduction. However, only income above a 10 percent return on assets is eligible, so it is not clear that Caterpillar would have benefitted from FDII had it existed.

parts were to be sold in the U.S. market, they would be sold to the parent Caterpillar with no price markup (i.e., no profit to CSARL but the ultimate sale by the parent to a third-party would be fully taxed in the U.S.). In contrast, if the parts were designated for foreign sales, CSARL would sell them to independent dealers at a gain, allowing CSARL to capture the bulk of profits in Switzerland rather than in the U.S. (Avi-Yonah, 2014, p. 6). As mentioned previously, those profits would then be taxed at considerably lower rates. Caterpillar successfully negotiated with Switzerland for an effective tax rate between four and six percent (Senate, 2014, p. 4). Hence, from the period of 2000 to 2013, Caterpillar was able to redistribute over $8 billion in non-U.S. parts profits to Switzerland, deferring around $2.4 billion in U.S. taxes on those profits (Senate, 2014, p. 6).[8] Although this is only one example of a strategic supply chain arrangement that optimizes taxes, this case study clearly illustrates that Switzerland offers unique characteristics that allow firms to optimize their net income through supply chain decisions. As mentioned above, Caterpillar was able to negotiate preferential Swiss tax rates (i.e., four to six percent) but this does not alter the fact that Switzerland's low corporate income tax rates provide an opportunity for tax savings. Thus, it is worthwhile to examine how ownership of a Swiss subsidiary affects other MNEs' effective tax rates, on average across a broad sample, and if there is any substantive relationship between these variables.

While this is certainly a beneficial arrangement for Caterpillar, it would be short-sighted to ignore this strategy's potential or real negative implications to the U.S. The U.S. Senate Permanent Subcommittee on Investigations emphasizes that this activity shifted 85 percent or more of Caterpillar's non-U.S. replacement parts profits away from the United States to Switzerland (Senate, 2014, pp. 5-6). Clausing (2016) writes, "Reduced revenues from one source

[8] $2.4 billion equals the $8 billion profit times 30 percent, the difference between the U.S. statutory rate at that time (35 percent) and the approximate tax already paid to Switzerland (approximately five percent).

must be compensated for by higher tax revenues from other sources, or lower government spending, or increased budget deficits" (p. 1). The Caterpillar case clearly represents a detriment to the United States because of the previously listed factors but Switzerland most likely benefited from the 85 percent of profits diverted to it through CSARL. Thus, it is quite difficult to analyze the *net* global effects of shifting tax revenue from one nation to another.

Furthermore, Senate (2014) and Avi-Yonah (2014) both posit that this strategy has neither valid business purpose nor economic substance. According to IRC § 7701(o)(1), economic substance is determined if "A) the transaction changes in a meaningful way (apart from Federal income tax effects) the taxpayer's economic position, and B) the taxpayer has a substantial purpose (apart from Federal income tax effects) for entering into such transaction." Senate (2014) writes that even though there was a significant decrease in tax liability and the CSARL transaction made changes on paper, there were no actual changes in Caterpillar's functions as they relate to the replacement parts business (p. 73). Relatedly, although CSARL was very profitable, there is no clear logic for creating the subsidiary besides its ability to shift tax liabilities to Switzerland and subsequently decrease Caterpillar's taxes (Avi-Yonah, 2014, p. 9). Thus, the creation and operation of CSARL represents a change in form but not substance. This concept is further accentuated by issues of how international tax strategies like Caterpillar's may be inconsistent with corporate social responsibility (CSR). Avi-Yonah (2014) argues that the underlying attitude behind this tactic initiates a negative cycle where MNEs prioritize competitiveness and shareholder value maximization over responsibility for sustaining society (pp. 28-29). These issues are crucial factors to consider in understanding tax efficient supply chains and their holistic effects not only on the businesses that implement them but also on other stakeholders.

Hypotheses

Given the above discussions, firms can reduce tax liabilities by locating subsidiaries in Switzerland. Specifically, under the U.S. rules in place prior to the TCJA, firms with subsidiaries in foreign countries with low corporate tax rates (e.g., Switzerland) can avoid U.S. tax on the income by refraining from repatriating income, as long as the income is not Subpart F income. Thus, at the average Swiss tax rate of 22.75 percent over my sample period (i.e., 1998-2013), a U.S. firm operating in Switzerland could save 12.25 percent (35 percent U.S. tax rate – 22.75 percent Swiss rate) by using a Swiss supply chain (Tax Foundation, n.d.). The Caterpillar case study offers an examination of the tax benefits that can be derived from Swiss subsidiaries. Caterpillar strategically restructured its replacement parts supply chain using CSARL, enabling the shift of profits to Switzerland, a country with which Caterpillar had negotiated preferential tax rates. The four to six percent rate was quite low even after considering Switzerland's status as a tax haven. Regardless, even if other corporations did not negotiate for even lower tax rates, Switzerland still possesses favorable tax rates that can enable MNEs to reduce their overall tax liabilities and maximize net income. Accordingly, I predict that U.S. corporations which possess at least one Swiss subsidiary will generally have a lower average ETR than U.S. corporations without any Swiss subsidiaries. That said, there is no information in the Caterpillar case study about the net effect of this supply chain decision when pre-tax supply chain costs are considered. Moreover, there are barriers to analyzing these costs, the most significant of which include a lack of data availability and disclosure transparency. Thus, while I examine proxies for other supply chain costs (e.g. cost of goods sold and selling, general, and administrative expense), I do not make predictions as to whether ownership of a Swiss subsidiary increases or decreases those costs.

The effectiveness of tax efficient supply chain strategies is also at least partially dictated by a business' industry. For example, sales companies seem to have limited potential to generate tax benefits because they need a local presence in order to complete larger volumes of sales. When sales volume is large, the retailer prefers to develop a sales division or subsidiary in the foreign country to serve local customers because it is often more logistically efficient. This in turn fulfills the conditions for "permanent establishment" and introduces local income tax liability (Webber, 2011, pp. 159-162).[9] While there are varying interpretations of what constitutes permanent establishment, the Organisation for Economic Co-operation and Development's (OECD) interpretation is widely used. According to OECD (2017), a permanent establishment is defined as "a fixed place of business through which the business of an enterprise is wholly or partly carried on" (p. 8).

In contrast, manufacturing organizations are better positioned to gain benefits from tax efficient supply chains. Webber (2011) describes, "most businesses prefer to concentrate manufacturing resources and limit the number of manufacturing sites. This makes the selection of manufacturing sites a particularly important task" (p. 162). From the tax side, the manufacturing process engages technology, skills, and fixed assets, which creates "business substance that international tax laws generally support" (Webber, 2011, p. 162). More specifically, according to Foreign Base Company Sales Income (2020) and IRM § 4.61.7.10 (2006), income from the sale of goods manufactured in the country of the foreign subsidiary's incorporation does not qualify as Subpart F income and thus is not taxed immediately. Consequently, the tax on the foreign income would be deferred until repatriation under the pre-TCJA rules, or, under post-TCJA rules, be subject to a GILTI tax or no taxation through the

[9] When sales are relatively low in quantity, businesses are able to sell their products through distributors. This means the MNE has no legal presence in the other country and consequently does not need to pay taxes on income.

participation exemption (Tax Policy Center, 2020). This manufacturing exception was accentuated by a 2009 regulation change: "A CFC can qualify for the manufacturing exception if it meets one of three tests. The first two [are] physical manufacturing tests: the substantial transformation test and the substantial activity test. The third test [is] the substantial contribution test" (Joint Committee on Taxation, 2010, p. 38). The substantial contribution test allows CFCs to qualify for the manufacturing exception by simply demonstrating that it had made a "substantial contribution" to the goods being sold as opposed to needing to demonstrate performance of a "physical" manufacturing activity (Senate, 2014, pp. 14-15). The details of the substantial contribution test are outside the scope of this study, but this change is noteworthy because it made claiming the manufacturing exception much easier for foreign subsidiaries. The potential for tax efficiency through manufacturing companies can be illustrated in Webber's (2011) example of an MNE that manufactures, distributes, and sells products in three different countries. Through transfer pricing that abides by both the arm's length principle and business purpose doctrine, earnings and risk can be allocated across these three locations such that the most profitable location is the one situated in a tax haven and also the primary risk-bearer. This location is often the manufacturing and/or intellectual property (IP) holder. The result of such an arrangement is maximum tax savings that are both not visible to and shielded from foreign tax jurisdictions (Webber, 2011, p. 163). Thus, I predict that U.S. manufacturing corporations with at least one Swiss subsidiary will have a lower average effective tax rate than U.S. manufacturing corporations without any Swiss subsidiaries.

Procurement organizations are another business type that can reap benefits from tax efficient supply chain strategies. Irving et al. (2005) note that, "it is possible for companies to centralize their procurement functions, proprietary procurement processes, and know-how into

specific corporate entities in low-tax jurisdictions" (p. 59). However, this ability is conditional on certain factors. In the case of U.S. tax law prior to the changes accompanying the TCJA, if the procurer is located in the same country where it purchases or sells goods, the local income tax rate applies (Webber, 2011, p. 165). This means that if the procurement organization is located in a tax haven, the desired tax benefits would be received. In contrast, if the procurer is in one country while the firm's purchasing and selling activity occurs in another, the U.S. tax rate would apply, resulting in no tax savings.

Data and Methodology

I obtain financial data from Compustat databases covering firm-year information across the years 1998 to 2013. I require that the firm-years be public by requiring a market value of equity from each observation. I use information from the years 1998-2013 because these are the years that subsidiary information is available from Scott Dyreng's website. As with most tax studies, I include only profitable firm-years, because tax rates are difficult to interpret for loss firms. Finally, to ensure that firm-years are subject to the same U.S. rules, I require that firm-years be incorporated in the U.S. This yields a maximum of 55,221 firm-year observations, but my analyses sometimes use fewer observations when specific variables are missing or additional conditions are set.

It is important to acknowledge that one of the key limitations of this study is that Compustat only provides aggregate data. As mentioned earlier, analysis of the tax efficiency of international supply chains should contain calculations of net effects that encapsulate both pre-tax supply chain costs such as duties, tariffs, and transportation-type costs, and tax liabilities directly related to the supply chain. This yields a more comprehensive understanding of whether or not a supply chain arrangement ultimately produces meaningful financial benefits for the

MNE. Due to a lack of data availability and transparency however, there is no direct way to distinguish the amounts specifically related to the supply chain from their associated aggregate amounts related to all of the firm's operations. Some firms may bundle supply chain costs into cost of goods sold (COGS) and/or selling, general, and administrative (SG&A) expenses.

Before discussing the findings of the multivariable regressions with regards to the primary research question, I can make some important observations from comparisons of summary statistics between firms with and without at least one Swiss subsidiary. In particular, variables inspected include average effective tax rate (*ETR*), *size* (natural logarithm of total assets), return on assets (*ROA*), deferred foreign taxes (*txdfo*), and whether or not a firm has a net operating loss (*NOL_Dum*). After running independent t-tests comparing these means to determine if there are differences based on ownership of a Swiss subsidiary, the results show that companies with Swiss subsidiaries are statistically significantly larger, as measured by *size* (7.952±0.026), than those without any Swiss subsidiaries (6.077±0.010), $t = -54.6002$, $p = 0$. Based on these results, it is possible that larger firms are more likely to possess the resources and incentives to leverage their supply chains in a tax efficient manner through the use of Swiss subsidiaries. This result is consistent with the findings of Rego (2003), who found that "firms with greater pre-tax income [have] more incentives and resources to engage in tax planning" (p. 805).

In order to test the hypothesis of this study, I use various multivariable linear regression models. The first regression model used assesses how *ETR* is impacted by the following variables: *Swiss*, *NonSwiss_HAVEN*, *size*, *roa*, *NOL_Dum*, *mnc*, *PPE_PCT*, and *rd*. Variables and their definitions are denoted in Table 1. The results of the regression model (2) are tabulated in Table 5.

$$ETR = \alpha_0 + \alpha_1 Swiss + \alpha_2 NonSwiss\_Haven + \alpha_3 size + \alpha_4 roa + \alpha_5 NOL\_Dum + \alpha_6 mnc + \alpha_7 PPE\_PCT + \alpha_8 rd + \sum_{i=1}^{15} \alpha_{i+8} fyear_i + \sum_{j=1}^{30} \alpha_{j+23} FF30_j \quad (2)$$

The resulting coefficient for *Swiss* is –0.0101 and statistically significant, with a t-value of –2.33 and p-value of 0.020. This demonstrates that corporations with a Swiss subsidiary (i.e. a 1 returned for the Swiss variable) have an average effective tax rate approximately 1.01 percent lower than the average rate for corporations without any (i.e. a 0 returned for the Swiss variable), which is consistent with my hypothesis that corporations with at least one Swiss subsidiary will have lower average effective tax rates than corporations without any Swiss subsidiaries. To a slightly greater extent, the coefficient for *NonSwiss_HAVEN* also demonstrates the potential for subsidiaries located in other tax haven countries to reduce the parent company's effective tax rate. Specifically, the coefficient for *NonSwiss_HAVEN* is –0.0133 with a t-value and p-value of –4.40 and 0.000 respectively, which demonstrate statistical significance. These results align with the findings of Dyreng and Lindsey (2009). They found that from around 1995-2007, U.S. MNEs with disclosed material operations in at least one tax haven country had an average worldwide tax rate on global income that is roughly 1.5 percent lower than those without operations in at least one tax haven country (Dyreng & Lindsey, 2009, pp. 1286-1287).

I use additional multivariable regression models to test this study's hypothesis in samples stratified by business industry. First, I examine firm-years in Fama and French 30 industry 22, "Personal and Business Services." Examples of businesses in industry 22 include Florists' Transworld Delivery (FTD) LLC, which is a floral wire service, retailer, and wholesaler; AFA Protective Systems Inc., which designs, installs, and services a variety of safety and surveillance

related systems (e.g., fire alarms, burglar alarms, CCTV systems); and Ackerley Group Inc., a media and entertainment company. I estimate equation (3) separately for industry 22 using the same explanatory variables as equation (2), excluding industry fixed effects, and the results of the regression are illustrated in Table 5.

$$ETR = \alpha_0 + \alpha_1 Swiss + \alpha_2 NonSwiss\_Haven + \alpha_3 size + \alpha_4 roa + \alpha_5 NOL\_Dum + \alpha_6 mnc + \alpha_7 PPE\_PCT + \alpha_8 rd + \sum_{i=1}^{15} \alpha_{i+8} fyear_i \quad (3)$$

As depicted, the Swiss coefficient is –0.0280 and statistically significant, with t- and p-values of –2.39 and 0.017 respectively. The negative coefficient value shows that corporations in the "Personal and Business Services" industry with a Swiss subsidiary have an average effective tax rate approximately 2.80 percent lower than the average tax rate of industry corporations without at least one Swiss subsidiary. Based on these results, firms that provide personal and business services and have at least one Swiss subsidiary are generally more optimally positioned to reap tax benefits in comparison to the broader firm sample. This finding agrees with comments made by Webber (2011) regarding service providers' ability to leverage supply chain management and tax planning: "Shared service providers are another good opportunity… It makes sense to consider income tax rates when determining where to locate these activities" (p. 167). Unlike the base model however, it is unclear whether industry 22 firms with subsidiaries in non-Swiss tax havens experience decreased effective tax rate effects as shown in the base model. The *NonSwiss_HAVEN* coefficient is -0.0008 and not statistically significant, with a t-value of –0.08 and p-value of 0.933.

I also test firm-years in the manufacturing industry, which span many different *FF30* classifications. Consequently, I stratify the sample by identifying which firms are classified as manufacturers using the Occupational Safety and Health Administration's (OSHA) Standard Industrial Classification (SIC) Manual.[10] To create a manufacturing industry subsample, I create the variable *manufacturingco* and set it to one whenever a firm has an SIC code that falls into the code ranges classified under Division D: Manufacturing in OSHA's SIC Manual. I estimate equation (4) separately for the manufacturing industry using the same explanatory variables as equation (2) and (3). Regression results for (4) are displayed in Table 5.

$$ETR = \alpha_0 + \alpha_1 Swiss + \alpha_2 NonSwiss\_Haven + \alpha_3 size + \alpha_4 roa + \alpha_5 NOL\_Dum + \alpha_6 mnc + \alpha_7 PPE\_PCT + \alpha_8 rd + \sum_{i=1}^{15} \alpha_{i+8} fyear_i \quad (4)$$

The coefficient for *Swiss* is 0.0037 but this result is statistically insignificant with a t-value of 0.56 and p-value of 0.577. Thus, no conclusions can be drawn about my hypothesis that U.S. manufacturing corporations with at least one Swiss subsidiary have a lower average effective tax than U.S. manufacturing corporations without any Swiss subsidiaries. One of the potential reasons behind these inconclusive results is the sheer breadth of firms that are considered a part of the manufacturing industry. According to OSHA's SIC Manual, there are 20 diverse establishment groups that compose Division D: Manufacturing, including manufacturers of food, textiles, chemicals, furniture, industrial and commercial machinery, computers, and much more. While these groups are all classified as manufacturing corporations, there are likely differences in the way these entities utilize or do not utilize Swiss subsidiaries. Specifically, some groups

[10] Available at https://www.osha.gov/data/sic-manual

may be better positioned or possess greater incentives to qualify for the aforementioned manufacturing exception, which would potentially enable corporations in these groups to obtain tax benefits. It is important to note that the coefficient for *NonSwiss_Haven* is –0.0222 and statistically significant, with a t-value of –4.15 and p-value of 0.000. This finding suggests that manufacturing corporations with foreign subsidiaries in non-Swiss tax havens have an average ETR that is around 2.22 percent lower than the average ETR of manufacturing corporations without any foreign subsidiaries in non-Swiss tax havens.

In addition to predicting effective tax rate, it is valuable to analyze the relation between whether or not an MNE has a Swiss subsidiary and pre-tax supply chain costs. COGS and SG&A are divided by total assets to reduce the influence of variations in firm size and consequently facilitate interpretation. I perform the following regression analyses on the firm-year sample:

$$COGS\_AT = \alpha_0 + \alpha_1 Swiss + \alpha_2 NonSwiss\_Haven + \alpha_3 size + \alpha_4 roa + \alpha_5 NOL\_Dum + \alpha_6 mnc + \alpha_7 PPE\_PCT + \alpha_8 rd + \sum_{i=1}^{15} \alpha_{i+8} fyear_i + \sum_{j=1}^{30} \alpha_{j+23} FF30_j \quad (5)$$

$$SGA\_AT = \alpha_0 + \alpha_1 Swiss + \alpha_2 NonSwiss\_Haven + \alpha_3 size + \alpha_4 roa + \alpha_5 NOL\_Dum + \alpha_6 mnc + \alpha_7 PPE\_PCT + \alpha_8 rd + \sum_{i=1}^{15} \alpha_{i+8} fyear_i + \sum_{j=1}^{30} \alpha_{j+23} FF30_j \quad (6)$$

Although there are important limitations in the aforementioned lack of transparency and use of aggregate data that may influence regression results, I find that firms with at least one Swiss subsidiary have a lower average COGS divided by total assets ratio (*COGS_AT*) than the *COGS_AT* ratio of firms without at least one Swiss subsidiary. As shown in Table 6, the results

of model (5) are statistically significant, indicating a *Swiss* coefficient of –0.0886 with a t-value of –2.79 and p-value of 0.005. This finding aligns with the idea that MNEs can derive pre-tax supply chain cost savings using Swiss subsidiaries in addition to the previously discussed tax benefits. In contrast, I find that firms with at least one Swiss subsidiary have a *higher* average SG&A divided by total assets ratio (*SGA_AT*) than the *SGA_AT* ratio of firms without at least one Swiss subsidiary. The results of (6) are shown in Table 7. Specifically, the *Swiss* coefficient is 0.1113 and statistically significant, with a t-value of 3.11 and p-value of 0.002. This positive coefficient means that model (6) estimates an increase in the SGA divided by total assets ratio if a firm possesses a foreign subsidiary in Switzerland. It is difficult to ascertain the exact reasons behind this inconsistency, but it is reasonable to infer that factors including varying firm classifications of supply chain costs into SG&A and COGS, a lack of transparency, and aggregate data use contribute to this result. It is also possible that gaining tax efficiency comes at the cost of increased administrative expenses.

Conclusion

This study presents evidence of tax efficient supply chains formed through U.S. MNEs' usage of Swiss subsidiaries. As the base regression model results depict, there is a negative relation between the Swiss variable, which denotes whether or not a corporation has a Swiss subsidiary, and effective tax rate. This demonstrates that corporations with at least one Swiss subsidiary have lower effective tax rates than corporations without any subsidiaries in Switzerland. This effect was observed to a greater extent in the "Personal and Business Services" industry after stratifying by industry type. Notably, the average effective tax rate of firms with at least one Swiss subsidiary was approximately 2.80 percent lower than that of firms without Swiss subsidiaries. It may be reasonable to infer then that the findings of this stratified regression

model are the product of favorable operational and policy-related conditions that enable multinational service organizations to better leverage tax efficient supply chains via Swiss subsidiaries, which supports the aforementioned analysis made by Webber (2011). For manufacturing corporations, although there was reason to believe that firms with Swiss subsidiaries would have an average effective tax rate that is lower than that of manufacturing corporations without any Swiss subsidiaries, I do not find any statistically significant results. Thus, for firm years from 1998-2013, I conclude that the ownership of Swiss subsidiaries generally allows U.S. parent corporations to enjoy lower average effective tax rates, with variations in industry regarding the degree of these effects.

There are numerous avenues for further research and analysis on the topic of tax efficient supply chain management. While unlikely, if data availability improves in the future, it would be highly beneficial to factor in pre-tax supply chain costs in order to form a more complete picture of how MNEs strategically organize global supply chains to maximize net income. Additionally, it would be valuable to revisit this research question and hypothesis when firm-year data becomes available for years following the TCJA. As described in the earlier discussion, the TCJA introduced changes that shifted U.S. international taxation from a hybrid-worldwide system to a hybrid-territorial system, providing further support for the viability of obtaining tax benefits from strategically organizing supply chains. Although key provisions including a GILTI tax, BEAT, and FDII tax were implemented to offset the impact of the participation exemption for dividends repatriated to U.S. parent corporations, the shift may result in a system that possesses incentives for MNEs to locate foreign subsidiaries in tax havens to reduce tax liability. Thus, evaluating the effects of the TCJA on supply chains can provide insight on how taxes, and tax changes, in various countries may affect firms' supply chain management decisions in firm-

years after 2017. Furthermore, the results of the base and manufacturing models signal that examining the impact of tax efficient supply chain management in other tax haven countries may be worthwhile.

TABLE 1

Variable Definitions

Variable	Definition
etr	Generally Accepted Accounting Principles (GAAP) effective tax rate (*txt*/PI). Set to 1 if greater than 1 and 0 if less than 0.
Cash_ETR	Cash effective tax rate (*txpd*/PI). Set to 1 if greater than 1 and 0 if less than 0.
sale	Sales/turnover (net)
cogs	Cost of goods sold
COGS_AT	Cost of goods sold divided by total assets (*cogs*/AT)
xsga	Selling, general, and administrative expense
SGA_AT	Selling, general, and administrative expense divided by total assets (*xsga*/AT)
xrd	Research and development expense (set to 0 if missing)
rd	Research and development expense divided by assets (*xrd*/AT)
txdfo	Foreign deferred tax expense
txdi	Deferred tax expense
txfed	Federal income tax expense
txfo	Foreign income tax expense
txpd	Income taxes paid
txt	Total income tax expense
size	Natural logarithm of total assets (AT)
ppent	Net property, plant, and equipment
PPE_PCT	Property, plant, and equipment divided by assets (*ppent*/AT)
roa	Pre-tax income divided by total assets (PI/AT)
mnc	Set to 1 if firm is multinational enterprise, and 0 otherwise. Multinational is indicated by a firm having foreign income (PIFO), positive *txfo*, or positive *txdfo*.
Swiss	Set to 1 if firm has Swiss tax haven subsidiary, and zero otherwise. From Scott Dyreng's website.
NonSwiss_Haven	Set to 1 if firm has non-Swiss tax haven subsidiary, and zero otherwise.
NOL_Dum	Set to 1 if firm has net operating loss (TLCF), and zero otherwise.
manufacturingco	Set to 1 if firm has a manufacturing SIC code (*sich*)
sich	Standard Industrial Classification (historical)
fyear	Dummy variable for firm-year observations
FF30	Dummy variable for industry indicators, based on Fama and French 30 industry classification.

TABLE 2

Descriptive statistics for the firm-year sample of U.S. incorporated firms

Variable	Observations	Mean	Std. Dev.	P1	P25	P50	P75	P99
etr	55,164	0.286	0.181	0.000	0.184	0.331	0.381	1.000
Cash_ETR	50,763	0.251	0.230	0.000	0.057	0.230	0.355	1.000
sale	55,218	2,807.868	12,639.610	0.541	66.790	305.117	1,315.325	46,565.000
cogs	55,221	1,858.065	9,239.711	0.000	28.871	161.100	790.956	30,611.100
COGS_AT	55,221	0.670	1.381	0.000	0.117	0.434	0.906	3.647
xsga	46,161	489.739	2,280.722	0.417	14.285	56.091	222.989	8,811.000
SGA_AT	46,161	0.291	2.272	0.006	0.057	0.187	0.349	1.307
xrd	55,221	47.301	376.724	0.000	0.000	0.000	2.291	986.000
rd	55,221	0.022	0.216	0.000	0.000	0.000	0.014	0.233
txdfo	37,839	-1.045	51.972	-60.000	0.000	0.000	0.000	45.477
txdi	46,504	9.864	302.693	-188.000	-0.691	0.039	4.540	436.000
txfed	42,194	54.024	260.396	-34.500	0.000	2.924	22.022	982.000
txfo	42,008	35.424	441.795	-0.388	0.000	0.000	3.600	611.000
txpd	50,792	82.456	536.352	-14.548	0.495	4.877	28.000	1,500.000
txt	55,217	94.980	627.206	-22.300	0.690	6.779	37.569	1,675.000
size	55,221	6.234	2.300	0.578	4.822	6.305	7.695	11.620
ppent	53,028	1,023.671	5,306.267	0.000	8.122	48.057	310.925	18,850.970
PPE_PCT	53,028	0.224	0.238	0.000	0.033	0.136	0.336	0.891
roa	55,221	0.246	7.735	0.001	0.024	0.064	0.124	0.722
mnc	55,221	0.402	0.490	0.000	0.000	1.000	1.000	1.000
Swiss	55,221	0.084	0.278	0.000	0.000	0.000	0.000	1.000
NonSwiss_Haven	55,221	0.273	0.445	0.000	0.000	0.000	1.000	1.000
NOL_Dum	55,221	0.315	0.464	0.000	0.000	0.000	1.000	1.000

TABLE 3

Descriptive statistics for the firm-year sample of U.S. incorporated firms with Swiss Subsidiaries

Variable	Observations	Mean	Std. Dev.	P1	P25	P50	P75	P99
etr	4,642	0.315	0.169	0.000	0.246	0.314	0.370	1.000
Cash_ETR	4,554	0.286	0.219	0.000	0.146	0.251	0.351	1.000
sale	4,643	8,740.369	21,785.580	67.698	757.414	2,060.702	6,470.600	104,286.000
cogs	4,643	5,341.388	15,691.890	16.160	325.662	1,076.191	3823.304	76,356.000
COGS_AT	4,643	0.578	0.596	0.022	0.253	0.470	0.733	3.147
xsga	4,298	1,677.014	3,760.109	23.690	198.507	485.569	1,295.933	22,769.000
SGA_AT	4,298	0.264	0.166	0.018	0.149	0.232	0.343	0.798
xrd	4,643	273.261	905.267	0.000	0.000	32.234	142.300	5,167.000
rd	4,643	0.040	0.050	0.000	0.000	0.021	0.060	0.210
txdfo	4,060	6.115	100.456	-311.000	-4.246	-0.177	1.037	197.000
txdi	4,546	7.068	340.157	-713.000	-10.187	0.261	15.878	863.000
txfed	4,187	143.664	426.889	-116.000	2.170	21.848	100.900	1,917.000
txfo	4,461	161.469	892.062	-0.879	5.136	18.592	61.000	2,454.000
txpd	4,555	302.260	1,167.664	-18.731	12.900	43.696	158.092	4,250.000
txt	4,643	339.303	1,258.584	-61.100	17.373	56.739	198.084	4,370.000
size	4,643	7.952	1.794	4.202	6.756	7.781	9.009	13.413
ppent	4,623	2,185.500	7,251.728	2.668	96.610	348.653	1,200.726	27,232.000
PPE_PCT	4,623	0.183	0.143	0.005	0.781	0.149	0.241	0.685
roa	4,643	0.101	0.085	0.002	0.046	0.085	0.136	0.353
mnc	4,643	0.963	0.188	0.000	1.000	1.000	1.000	1.000
NonSwiss_Haven	4,643	0.897	0.304	0.000	1.000	1.000	1.000	1.000
NOL_Dum	4,643	0.526	0.499	0.000	0.000	1.000	1.000	1.000

TABLE 4

Descriptive statistics for the firm-year sample of U.S. incorporated firms without Swiss Subsidiaries

Variable	Observations	Mean	Std. Dev.	P1	P25	P50	P75	P99
etr	50,522	0.283	0.182	0.000	0.169	0.333	0.381	1.000
Cash_ETR	46,209	0.248	0.230	0.000	0.048	0.226	0.356	1.000
sale	50,575	2,263.240	11,284.330	0.403	58.547	249.354	1,037.123	37,218.000
cogs	50,578	1,538.300	8,330.286	0.000	24.563	131.937	638.173	25,481.000
COGS_AT	50,578	0.678	1.432	0.000	0.105	0.429	0.928	3.747
xsga	41,863	367.844	2,030.986	0.391	12.424	44.716	162.507	6,162.000
SGA_AT	41,863	0.294	2.386	0.006	0.048	0.178	0.351	1.346
xrd	50,578	26.558	273.161	0.000	0.000	0.000	0.705	462.000
rd	50,578	0.020	0.225	0.000	0.000	0.000	0.007	0.237
txdfo	33,779	-0.435	42.541	-29.446	0.000	0.000	0.000	28.040
txdi	41,958	10.167	298.354	-135.000	-0.468	0.034	3.869	376.000
txfed	38,007	44.149	232.856	-26.324	0.000	2.270	17.645	759.000
txfo	37,547	20.449	348.903	-0.347	0.000	0.000	1.348	302.000
txpd	46,237	60.802	420.112	-14.000	0.374	3.810	21.098	1,010.000
txt	50,574	72.550	527.375	-19.671	0.542	5.318	29.702	1,211.000
size	50,578	6.077	2.276	0.473	4.669	6.149	7.528	11.340
ppent	48,405	912.708	5,067.834	0.000	6.886	38.486	243.873	17,849.000
PPE_PCT	48,405	0.228	0.245	0.000	0.029	0.134	0.351	0.895
roa	50,578	0.259	8.082	0.001	0.023	0.062	0.123	0.777
mnc	50,578	0.351	0.477	0.000	0.000	0.000	1.000	1.000
NonSwiss_Haven	50,578	0.215	0.411	0.000	0.000	0.000	0.000	1.000
NOL_Dum	50,578	0.295	0.456	0.000	0.000	0.000	1.000	1.000

TABLE 5

Results of ETR regression analyses

Variable	Base Model (2)	Personal and Business Services (3)	Manufacturing (4)
Swiss	-0.0101*	-0.0280*	0.0037
	0	0.01	0.01
NonSwiss_Haven	-0.0133***	-0.0008	-0.0222***
	0	0.01	0.01
size	0.0148***	0.0269***	0.0153***
	0	0	0
roa	-0.0003**	0	0
	0	0	0
NOL_Dum	-0.0245***	-0.0339***	-0.0366***
	0	0.01	0
mnc	0.0327***	0.0206*	0.0232***
	0	0.01	0.01
PPE_PCT	0.0066	0.0409	0.0697***
	0.01	0.02	0.02
rd	-0.0197	-0.0159	-0.0196
	0.01	0.01	0.02
Constant	0.2407***	0.1670***	0.1881***
	0.01	0.01	0.01
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	No	No
N	52,975	5,977	13,207
Adj. R^2	0.0838	0.1170	0.0762

Notes:

Cluster robust standard errors are presented below each coefficient.

***** Significant at 0.05 level ($p < 0.05$)

** Significant at 0.01 level ($p < 0.01$)

*** Significant at 0.001 level ($p < 0.001$)

TABLE 6

Results of COGS divided by total assets regression analysis

Variable	*COGS_AT* Model (5)
Swiss	-0.0886**
	0.03
NonSwiss_Haven	0.0672**
	0.02
size	-0.0489***
	0.01
roa	0.0089
	0.01
NOL_Dum	0.0618**
	0.02
mnc	-0.0954**
	0.03
PPE_PCT	-0.2716***
	0.07
rd	3.3772
	1.86
Constant	0.9900***
	0.11
N	53,028
Adj. R^2	0.3879

Notes:

Cluster robust standard errors are presented below each coefficient.

***** Significant at 0.05 level ($p < 0.05$)

** Significant at 0.01 level ($p < 0.01$)

*** Significant at 0.001 level ($p < 0.001$)

TABLE 7

Results of SG&A divided by total assets regression analysis

Variable	*SGA_AT* Model (6)
Swiss	0.1113**
	0.04
NonSwiss_Haven	0.1201***
	0.04
size	-0.1223***
	0.03
roa	0.0967**
	0.03
NOL_Dum	0.0135
	0.02
mnc	0.0656
	0.03
PPE_PCT	-0.0802
	0.09
Constant	0.9168***
	0.15
N	45,801
Adj. R^2	0.1491

Notes:

Cluster robust standard errors are presented below each coefficient.

***** Significant at 0.05 level ($p < 0.05$)

** Significant at 0.01 level ($p < 0.01$)

*** Significant at 0.001 level ($p < 0.001$)

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IRC § 11(b)

IRC § 59A

IRC § 172(a), (b)

IRC § 245A(a)

IRC § 250(b)

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