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# Offshore activities and corporate tax avoidance

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Keywords: Offshore activities; Tax avoidance; Uncertainty; Flexibility; Passing on shocks; Tax uncertainty; Multinational firms

## Offshore Activities and Corporate Tax Avoidance

### Abstract

We investigate the relation between tax avoidance and offshore activities using a new text-based measure for offshore activities based on Hoberg and Moon (2017, 2019). Our evidence shows that, although providing cross-border tax-avoidance opportunities, offshore activities reduce the marginal benefits of tax avoidance by introducing incremental foreign-market risk exposure. We find that the intensity of offshore sales of outputs is positively associated with the cash effective tax rate. The effect is stronger when the offshore sales rely on overseas production rather than domestic production, when the offshore sales are located in countries with higher economic uncertainty, when the firm has a lower ability to pass on shocks, and when the firm has less flexibility in adjusting tax strategies.

**Key Words:** Offshore activities; tax avoidance; uncertainty; flexibility; passing on shocks; tax uncertainty; multinational firms

*JEL* Classification: G18; H26; M41

# Offshore Activities and Corporate Tax Avoidance

## 1. Introduction

Taxation of multinational companies (MNCs) has received increasing attention from politicians, the media, regulators, and academics. While the popular press provides anecdotal evidence that large MNCs pay lower taxes than their domestic counterparts (e.g., Toplensky 2018), the overall empirical evidence on the effect of multinationality on taxation remains mixed (e.g., Dyreng and Hanlon, 2019). Although foreign operations provide additional cross-border tax-avoidance opportunities, studies conclude that MNCs do *not* have significantly lower effective tax rates than purely domestic firms (e.g., Markle and Shackelford, 2012; Dyreng, Hanlon, Maydew, and Thornock, 2017; Christensen, Kenchington, and Laux, 2022). As an increasing number of U.S. firms become multinational and engage in offshore activities to serve foreign markets or relocate production overseas (McCallum and Lincoln 2016; Jackson, 2017), further research on the tax impacts of offshore activities is needed. In this paper, we shed light on this issue by examining how offshore activities relate to corporate tax avoidance among U.S. MNCs.<sup>1</sup>

It is a priori unclear how offshore activities affect tax avoidance. On one hand, relocating operations overseas, such as establishing subsidiaries in tax-haven countries, facilitates cross-border tax-avoidance strategies (e.g., Dyreng and Lindsey 2009). Furthermore, expanding into foreign markets may increase expected profits, thereby enhancing the benefits of investing in tax avoidance (Rego, 2003).

On the other hand, the economics literature on international trade and foreign direct investment suggests that serving overseas markets introduces incremental exposure to the risks associated with the aggregate demand of the global economy (e.g., Helpman, Melitz, and Yeaple, 2004; Fillat and Garetto, 2015; Fillat, Garetto, and Oldenski, 2015). Additionally, firms incur sunk costs when entering foreign

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<sup>1</sup> We use the term “tax avoidance” to be consistent with the literature. Another term could be “tax planning.”

markets. In the event of negative shocks to aggregate demand, firms may hesitate to exit foreign markets to avoid the costs associated with market re-entry, which exacerbates the impact of these negative shocks.

If firms are unable to flexibly adjust their tax strategies in response to these shocks, they must make tax-related decisions *ex ante* based on their expectations of taxable income and marginal tax rates (Hopland, Lisowsky, Mardan, and Schindler, 2018; 2019). If firms cannot pass on these shocks, the heightened risk exposures can lead to deviations from their expected values of taxable income and marginal tax rates. These deviations, in turn, may reduce the effectiveness of a previously committed aggressive tax-avoidance strategy; firms may further reduce their tax-planning investments when they anticipate a reduced benefit of tax avoidance (McGuire, Omer, and Wilde, 2014; Kubick, Lynch, Mayberry, and Omer, 2015; Hopland et al., 2019). We refer to this phenomenon as the *uncertainty* channel.

We employ the text-based measure of offshore activities developed by Hoberg and Moon (2017, 2019). Specifically, we gauge the intensity of sales in foreign markets (*offshore output activities*) by counting keywords indicating output sales mentioned alongside foreign countries in the firm's 10-K filing. Similarly we measure the intensity of overseas production (*offshore input activities*) by counting keywords signifying purchases or production of inputs mentioned alongside foreign countries. As we discuss in Section 3, in comparison to measures based on geographic segment disclosures and foreign subsidiary data in Exhibit 21, our text-based measures offer a more comprehensive perspective of offshore activities and better identify their precise location.

We document a significantly positive association between the intensity of offshore output activities and cash effective tax rates (ETR) for a sample of U.S. MNCs over years 1997-2017. An inter-quartile increase in offshore output activities is associated with an increase in cash ETR of 0.76% to 0.9% (about 3.1% to 3.7% of the sample mean), depending on the model specification. Moreover, research suggests that overseas production has higher sunk entry costs and fixed operating costs than domestic production

and therefore leverages the risk exposure brought by overseas sales (e.g., Helpman et al., 2004; Fillat and Garetto, 2015). Therefore, if overseas sales increase cash ETR through the uncertainty channel, the effect should be stronger for those via overseas production than those via domestic production. To evaluate this hypothesis, we decompose the measure of offshore output activities into the *predicted* and *residual* values by regressing it on the measure of the offshore input activities that proxy for the overseas production. Conceptually, the *predicted* value captures foreign sales via overseas production, while the *residual* value measures foreign sales via domestic production. We find that cash ETR has a greater positive relation with *predicted* offshore output activities than with the *residual* ones. Depending on the model specification, an inter-quarter increase in the *predicted* offshore output activities is associated with an increase in cash ETR of 1.1% to 1.7% (4.6% to 6.9% of the sample mean), and an inter-quarter increase in the *residual* ones is only associated with an increase in cash ETR of 0.5% to 0.7% (2.1% to 2.7% of the sample mean). The results are also robust to measuring tax avoidance by long-term cash ETR or worldwide current ETR.

The results from the main analysis support our hypotheses that serving foreign markets, especially via overseas production, exposes the firms to incremental uncertainty on taxable income and thereby impedes tax avoidance. In line with this argument, we expect a stronger positive relation between cash ETR and the offshore output activities (especially those predicted by the offshore input activities) when (1) the offshore outputs are sold in the counterparty countries with higher uncertainty that may cause larger shocks to the firm; (2) the firm has lower ability to pass on the shocks to other business parties such as customers or suppliers; and (3) the firm has lower flexibility to adjust its tax-avoidance strategies in response to the shocks.

The evidence from our cross-sectional analyses supports these predictions. First, we show that the positive association between the offshore output activities and cash ETR is greater when the offshore sales are in the counterparty countries with higher uncertainty, as measured by the World Uncertainty

Index (WUI) developed by Ahir, Bloom, and Furceri (2019). The positive relation is also larger when the counterparty countries have lower GDP growth, which implies that the countries are more vulnerable to a negative shock.

Second, firms with greater product market power have a greater ability to pass on shocks (Gaspar and Massa 2006; Kubick et al. 2015). We construct a composite measure of market power based on the excess price-cost margin (Gaspar and Massa, 2006) and product market fluidity (Hoberg, Phillips, and Prabhala, 2014). We find that the positive association between the offshore output activities and cash ETR is weaker when the market power is stronger.

Third, income shifting based on transfer pricing of intangibles has greater flexibility to adjust (Hopland et al. 2018). Following De Simone, Mills, and Stomberg (2019), we construct a composite measure of intangible intensity to measure the flexibility to adjust tax-avoidance strategies. We observe that the positive correlation between cash ETR and the offshore output activities is weaker for firms with higher intangible intensity.

Finally and importantly, we demonstrate that the moderating effects of the uncertainty of counterparty countries, the ability to pass on shocks, and the ability to flexibly adjust tax strategies manifest in the association between cash ETR and the *predicted* offshore output activities, but not the *residual* offshore output activities. This evidence further supports the uncertainty channel.

We conduct several additional analyses. First, we conduct a test to rule out one potential alternative explanation. Specifically, progressive tax rates may discourage firms from entering risky foreign markets. Firms with high profits, which are more likely to face a higher and linear tax rate, are more likely to enter into foreign markets than firms with low or close to zero profits, which face a lower and progressive tax rate. This alternative hypothesis suggests that tightening the control for profitability (that affects the tax status) should render the relation between offshore activities and cash ETR weaker or even insignificant. Nevertheless, we continue to observe a similar positive association when we estimate our

main regressions within each subsample sorted by profitability. This evidence is not consistent with the alternative explanation that our findings are driven by insufficient control for profitability or tax status.

Second, as our main hypothesis is built on the assumption that more intensive offshore activities lead to higher uncertainty in predicting future taxable incomes, we provide evidence for this assumption by directly examining the association between offshore activities and the uncertainty of forecasting earnings. We measure the uncertainty using forecast errors of a random walk model and forecast errors of financial analysts. Consistent with our hypothesis, we find a significantly positive relation between offshore output activities and both forecast errors measures. The correlation is also stronger for the *predicted* than the *residual* offshore output activities.

Third, we investigate how offshore output activities affect firms' tax-planning investments. On one hand, firms may increase the investment to develop more flexible and costly tax strategies to counter the adverse effect of increased uncertainty. On the other hand, firms may decrease the investment when they perceive a lower benefit of tax planning. We find no evidence that offshore output activities are associated with firms' *external* investment in tax planning (Kim, McGuire, Savoy, and Wilson 2021) and some evidence that these activities are negatively associated with firms' *internal* investment in tax planning (Chen, Cheng, Chow, and Liu 2021), though the sample size for this analysis is smaller.

We also evaluate the link between offshore output activities and foreign effective tax rate and domestic effective tax rate separately as a falsification test. If offshore output activities make tax-avoidance strategies such as income transfer less effective, firms are less likely to transfer income both across foreign subsidiaries and between foreign and domestic subsidiaries. While the reduced income transfers increase both foreign and overall tax rates, they are less likely to affect domestic tax rates. Consistent with this prediction, we find a positive association between offshore output activities and foreign tax rates, though the results are generally not significant in firm fixed effects regressions. In contrast, the relation between offshore output activities and domestic tax rates is largely not significant.



Finally, we evaluate our hypothesis that selling abroad via overseas production is riskier than via domestic production based on an alternative specification that does not rely on the decomposition of the offshore output activities. Access to foreign markets is more likely to rely on foreign production for firms with more intensive offshore input activities. Therefore, these firms should exhibit a stronger positive relation between the offshore output activities and cash ETR. Our results support this prediction. Moreover, the moderating effects of counterparty country uncertainty, the ability to pass on shocks, and the flexibility of tax strategies are only significant for these firms.

This paper contributes to the literature on the relation between offshore activities and tax avoidance. Rego (2003) suggests that foreign operations facilitate cross-border income shifting that helps reduce the tax burden. Nevertheless, the literature shows that MNCs, which have more intensive foreign activities, do not have lower tax rates than domestic firms (e.g., Markle and Shackelford, 2012; Dyreng et al., 2017; Christensen et al., 2022). In addition, following Rego (2003), a number of studies measure foreign operations by foreign income, foreign sales, or foreign assets provided in Compustat but find mixed results (e.g., Hope, Ma, and Thomas, 2013; Gallemore and Labro, 2015; Koester, Shevlin, and Wangerin, 2017; Dyreng et al., 2017; Akamah, Hope, and Thomas 2018). This suggests that overseas activities may also affect tax avoidance through other channels in addition to income-shifting incentives. Using the text-based measures of offshore activities developed by Hoberg and Moon (2017, 2019), we show that foreign sales and overseas production jointly affect tax avoidance through a different channel, namely by introducing the uncertainty in predicting future taxable income.<sup>2</sup>

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<sup>2</sup> However, our evidence should not be interpreted as offshore activities eliminating potential marginal tax benefits. We show that input-related offshore activities in tax-haven countries are associated with lower tax rates, consistent with the existing literature that suggests offshore activities bring cross-border tax avoidance opportunities (e.g., Dyreng and Lindsey, 2009; Law and Mills, 2022). While MNCs set up holding companies in tax havens, these companies also conduct substantial production activities. For example, the 2005 10-K of Intel indicates “[O]utside the US, nearly 23% of our wafer manufacturing ... was conducted at our facilities in Ireland and Israel.” Our evidence about the offshore output activities highlights a particular cost of tax avoidance associated with offshore sales of output and overseas production through the uncertainty channel, which is new to the literature.

Our study also joins the research on how uncertainty affects corporate tax avoidance. Maydew (2001) notes that uncertainty enters into early tax research only as non-tax factors (e.g., financial reporting costs) rather than as primary aspects of the tax issue in question. Recent research shows that uncertainty directly enters into tax decisions and plays an important role in understanding how firms' operating environment such as competition and internal information quality affects tax avoidance (Kubick et al., 2015; Gallemore and Labro, 2015; McGuire et al., 2014; Wilde and Wilson, 2018). We draw on the economics literature (Fillat and Garetto, 2015) and extend this line of research by showing the offshore activities are associated with tax avoidance through the uncertainty channel.<sup>3</sup>

Law and Mills (2022) also use the offshore-activity data in Hoberg and Moon (2017, 2019) to study tax avoidance. However, our paper significantly differs from theirs. First, Law and Mills (2022) focus on offshore activities, and especially the input activities, in tax-haven countries and find that tax-haven subsidiaries with substantial input-related activities are more effective in reducing taxes than tax-haven subsidiaries without input-related activities.<sup>4</sup> In contrast, we focus on offshore output-related activities in all foreign countries and find that the intensity of these activities is positively related to cash ETR. Second, Law and Mills (2022) and our study rely on different economic theories. Our hypothesis is based on the idea that serving overseas markets brings incremental exposure to risks of aggregate demand of the global economy (Fillat and Garetto 2015). We argue and find evidence that these incremental risk exposures can make tax-avoidance strategies less effective and even reduce firms' tax-planning investments, which in turn increase tax rates. In contrast, Law and Mills (2022)'s study is based on the notion that having a physical presence in a tax-haven country adds more economic substance to

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<sup>3</sup> Our research also relates to the literature on foreign operations in tax-haven countries. Dyreng and Lindsey (2009) find that firms that have subsidiaries (as reported in Exhibit 21 of the 10-K) in tax-haven countries pay lower tax rates. Law and Mills (2022) extend this line of research by showing that the tax burden reduction is greater when the tax-haven subsidiaries have substantive offshore input activities. Nevertheless, a significant part of offshore activities is conducted in non-haven countries, and Exhibit 21 also misses a significant number of non-haven countries in which U.S. firms have offshore activities. Our study complements Law and Mills (2022) by highlighting that offshore activities also affect tax avoidance through the uncertainty channel.

<sup>4</sup> We control for the intensity of offshore input activities in tax-haven countries in all regressions. We show that this intensity is negatively related with cash ETR, consistent with Law and Mills (2022).

commercial transactions, which makes profit shifting into the location easier and less likely to be challenged by the IRS (e.g., Grubert and Slemrod 1998; De Simone et al. 2019).

## **2. Literature Review and Hypotheses Development**

### *2.1. Multinationality, Foreign Activities, and Tax Avoidance*

Conventional wisdom and empirical evidence suggest that foreign operations provide cross-border income-shifting opportunities (Collins, Kemsley, and Lang, 1998; Klassen and Laplante, 2012) that help reduce tax burdens. Consistent with this idea, Rego (2003) finds a negative association between the intensity of foreign operation, measured by the percentage of foreign assets (sales) over total assets (sales), and worldwide effective tax rates. Subsequent studies on tax avoidance typically control for foreign operations measured based on Compustat data on foreign income or foreign sales. However, these studies do not find a consistent negative relation between foreign operations and tax rates.<sup>5</sup>

Moreover, MNCs do not have lower tax rates than domestic firms. For example, Markle and Shackelford (2012) do not find a significant difference in effective tax rates between MNCs and domestic firms. Dyreng et al. (2017) find that MNCs have higher annual tax rates than domestic firms in every year of their sample period (1988 – 2012). Although the difference shrinks as the horizon to measure tax rate extends, there is no conclusive evidence that MNCs have lower tax rates (Dyreng and Hanlon 2019). In addition, Christensen et al. (2022) find that MNCs are less likely to attain a low ETR even after controlling for large net operating loss carryforwards.<sup>6</sup>

Another line of research finds that MNCs with subsidiaries located in the tax-haven countries pay lower taxes (Dyreng and Lindsey, 2009; Law and Mills, 2022). Nevertheless, a significant portion of foreign operations is conducted in non-haven countries or in countries without subsidiaries (see Figure

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<sup>5</sup> Among others, Gallemore and Labro (2015) and Koester et al. (2017) find that firms with non-zero foreign income have higher tax rates, and Dyreng et al. (2017) find that firms with higher percentage of foreign sales have higher tax rates.

<sup>6</sup> Although Rego (2003) finds a negative relation between foreign operation intensity and worldwide effective tax rates, on average MNCs still have higher effective tax rates than domestic firms (p. 820).

OA-1 in the online appendix for detail). As a result, it is not straightforward to infer the overall effects of foreign activities on tax avoidance from these studies.

## 2.2. *Offshore Activities and Uncertainty of Cash Flows*

As discussed, the literature has not achieved consensus that MNCs, which have more offshore activities, have a lower ETR even though they have more opportunities for aggressive tax planning. Thus, overseas activities are likely to affect tax avoidance through other channels. We hypothesize that offshore activities hinder tax planning because they expose firms to additional risks, which may make it more difficult for managers to predict future cash flows.

The literature on international trade and foreign direct investment examines both benefits and costs of overseas activities. On one hand, serving overseas markets (i.e., output-related offshore activities) helps capitalize the growth opportunities from high productivity (e.g., Fillat and Garetto 2015; Bernard, Jensen, and Schott 2009) and offer diversification benefits (e.g., Reeb et al. 1998). Sourcing production overseas (i.e., input-related offshore activities) benefit firms by reducing costs through relocating production, secure market shares against foreign competitors, and increase productivity and innovation (e.g., Bloom et al. 2016; Magyari 2017; Bretscher 2023).<sup>7</sup>

On the other hand, more importantly, the literature also suggests that overseas activities may increase risk even though they offer the above discussed benefits (e.g., Fillat and Garetto, 2015; Fillat et al., 2015). Specifically, serving foreign markets (i.e., offshore output activities) leads to greater exposure to risks of aggregate demand in the global economy. The greater exposure makes it harder for managers to predict future cash flows. In addition, a firm needs to bear sunk costs of entry and fixed costs to maintain operations in a foreign market. When a negative shock hits the foreign market, the firm chooses to quit the market or continue the operation. On one hand, the firm may experience unforeseeable losses

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<sup>7</sup> Of course, offshoring activities can be motivated by agency problem such as empire-building (Hope et al. 2013).

besides the fixed operating costs if it continues to operate. On the other hand, quitting the foreign market implies a repayment of the entry costs if the firm plans to enter the foreign market again in the future. Thus, the firm is willing to absorb the loss to the extent that it is lower than the entry costs. The costs of entry and fixed operating costs exacerbate the impact of adverse shocks to the global economy and further increase the uncertainty of its earnings.<sup>8</sup> Consistent with this notion, multinational firms have a higher earnings yield, suggesting that investors demand a risk premium for the higher uncertainty (Fillat and Garetto, 2015; Fillat et al., 2015). Hoberg and Moon (2019) extend this line of research and show a positive association between text-based measures of the intensity of offshore output activities and expected returns. The relation is stronger for offshore output activities in countries with higher systematic consumption risk and countries at the center of international trade.<sup>9</sup> The evidence supports the notion that investors demand risk premiums to compensate the higher uncertainty associated with more intensive offshore activities.

### *2.3. Cash-Flow Uncertainty and Tax Avoidance*

Corporate tax-avoidance strategies can be viewed as investments that involve risky expected benefits (Armstrong, Blouin, and Jagolinzer, 2015). To decide whether to adopt a specific tax-avoidance strategy, managers weigh the expected benefits (i.e., the tax savings) from the strategy against the costs of implementing the strategy. For many strategies, firms may need to incur large upfront costs to reorganize their organization structure and operations long before realizing the benefits of tax savings (Mills, Erickson, and Maydew, 1998). Firms also need to make accounting decisions to implement these

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<sup>8</sup> Overseas sales and operations also expose the firm to political risks, fluctuation of exchange rates, breach of trade agreements, trade barriers, social chaos, and disruption of supply chains located in foreign countries, unfavorable discrimination by foreign governments, and aggregate volatility cascades driven by idiosyncratic shocks (Kouvelis and Niederhoff, 2007; Acemoglu, Carvalho, Ozdaglar, and Tahbaz-Salehi, 2012; Dinc and Erel, 2013).

<sup>9</sup> Fillat et al. (2015) also show that the contribution of a counterparty country to the risk premium of multinational firms is positively associated with the systematic consumption risk of the counterparty country.

strategies.<sup>10</sup> Importantly, many of these decisions have to be initiated *ex ante* before observing the actual taxable income in order to comply with taxation laws and regulations. These decisions are also difficult to adjust or reverse *ex post*, that is, when managers find that the actual taxable income deviates from the expectation (e.g., Hoopes, Mescall, and Pittman, 2012; De Simone, Klassen and Seidman, 2017; Hopland et al., 2018; 2019).<sup>11</sup> Consistent with this notion, Hopland et al. (2018) find that only transfer pricing related to intangibles provides *ex-post* flexibility to adjust income shifting; internal debt and transfer pricing based on tangibles provide no such flexibility.

To the extent that firms cannot adjust tax-related decisions after observing the actual taxable income and actual marginal tax rates, they have to commit their decisions *ex ante* based on the *expected* values of taxable income and marginal tax rates (Hopland et al., 2018; 2019). When the actual taxable income and marginal tax rate deviate from the expectations due to changes in economic conditions, the committed decisions based on the expectations will be less efficient or may even backfire.<sup>12</sup> Indeed, Dyreng, Lewellen, and Lindsey (2018) show that firms that adopt aggressive tax-avoidance strategies receive lower tax benefits when suffering from loss.

Cash-flow uncertainty makes it harder for managers to forecast future taxable income and estimate the marginal tax rates for each tax-paying affiliate (Graham, 1996; Shevlin, 1990; Erickson, Hanlon, Maydew, and Shevlin, 2020). The uncertainty of taxable income makes tax opportunities less apparent,

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<sup>10</sup> For example, these decisions include setting up the range of transfer prices, collecting information to prepare supporting documents, and arranging inter-affiliate loans.

<sup>11</sup> The real operation decisions are certainly time-consuming and costly to reverse. The adjustment of accounting decisions may also have its limit. For example, while transfer prices related to intangibles are flexible because of the lack of directly observable arm's length prices, ad hoc adjustments to transfer prices could be costly, as any adjustment can potentially trigger additional audits by tax authorities. Also, even if firms can make ad hoc adjustments to unit prices, the volume of transferred products is more difficult to adjust without having a material impact on real operations. Contracts that use internal debt and intercompany interest payments to shift income across borders may also need to be signed before the fiscal period for which the firm wants to shift income. Adjusting the internal debt and the capital structure of subsidiaries also requires significant costs (e.g., Buttner and Wamser, 2013).

<sup>12</sup> For example, Xerox implemented the "Project Global" strategy that restructured its European business to shift income to Ireland, a low tax rate jurisdiction (Bandler and Maremont, 2001). The strategy rested on an assumption of 15% annual growth in pretax profits. However, this strategy eventually led to an increased effective tax rate for Xerox due to the unexpected operating losses that occurred both worldwide and in Ireland. The reason lies in the fact that the loss in a low tax rate jurisdiction brings lower tax benefits than a loss in a high tax rate jurisdiction.

introduces substantial doubts about the payoffs of particular tax-avoidance strategies, and increases the difficulty of forecasting the range of potential tax outcomes (Graham, 1996; Gallemore and Labro, 2015; Kubick et al., 2015). Chen and Lehmer (2021) also argue that income shifting requires managers to accurately predict income streams. More volatile income streams make it harder for managers to set up transfer pricing, cost sharing, debt location, or other plans *ex ante*. The more uncertain the cash flow is, the more likely the actual value of taxable income and marginal tax rate will deviate from the expectations, and therefore the less effective the committed decisions in achieving the planned tax savings. As a result, the firm needs to bear higher risks to achieve a given planned tax outcome. McGuire et al. (2014) find that operating uncertainty discourages the use of tax shelters because the uncertainty reduces the expected benefit generated from the shelter. Hopland et al. (2019) document that managers tend to be more cautious in committing *ex ante* to a given tax strategy when taxable income is uncertain and the strategy is difficult to adjust *ex post*. In addition, many tax strategies require contracting with various stakeholders (e.g., Cen, Maydew, Zhang and Zuo, 2017). The uncertainty increases the demand for flexibility in tax strategies to respond to unexpected changes in tax status, and building flexibility into contracts is costly (Erickson et al., 2020).

Overall, cash-flow uncertainty reduces the net expected benefits of tax strategies that need to be committed *ex ante* and are hard to adjust *ex post*, and therefore reduce the effectiveness of these tax strategies. Further, anticipating the reduced benefit of these strategies, managers may have lower incentives to adopt them.

#### 2.4. Hypotheses

As discussed, offshore output activities (i.e., sales of outputs in foreign markets) expose firms to additional shocks of the global economy, leading to a higher cash-flow uncertainty that makes *ex ante* prediction of future taxable income and marginal tax rate more difficult. To the extent that the firms are

unable to pass on the shocks introduced by overseas activities and/or unable to flexibly adjust their tax strategies in response to the shocks, the greater uncertainty may reduce the effectiveness of aggressive tax-avoidance strategies that have to be committed *ex ante* and are difficult to adjust *ex post*, which leads to a higher effective tax rate. Managers may also have reduced incentives to design and implement these strategies when they have lower perceived benefits. This may further increase the effective tax rate. Following Hoberg and Moon (2019), we use the intensity of offshore output activities to measure the exposure to risks of the global economy. The above analysis leads to our first hypothesis, stated in the alternative form:

**H1:** *The intensity of offshore output activities is positively associated with the effective tax rate (ETR).*

However, there are reasons why we may not observe the predicted relation. For example, the higher uncertainty may increase the demand for precautionary savings and increase managerial incentives to use tax-avoidance strategies to save funds (e.g., Law and Mills, 2015). Alternatively, the diversification effect of foreign sales may dominate and increase the resilience to uncertainty. In addition, Fillat and Garetto (2015) suggest that firms with high productivity are more likely to expand into foreign markets. To the extent that the expansion into foreign market increases the expected profits, firms may have more incentives to invest into tax-avoidance strategies because the expected tax saving can be larger (Rego, 2003).

Sunk entry costs and fixed operating costs are greater for overseas production than for domestic production (e.g., Rob and Vettas, 2003; Helpman et al., 2004). These greater costs associated with the overseas production leverage the exposure to the risk of global economy as they increase the amount of



loss that the firms are more willing to absorb (Fillat and Garreto, 2015).<sup>13</sup> Accordingly, offshore output activities may result in higher uncertainty when they rely on overseas production (as measured by offshore input activities). If offshore output activities affect tax avoidance by increasing the uncertainty of future taxable income, the effect on ETR should be more evident when the offshore output activities rely on offshore input activities. To empirically assess this prediction, we decompose the offshore output activities into those predicted by the offshore input activities and the residual term. We discuss the decomposition further in Section 3.2. Conceptually, the predicted value proxies for the sales of outputs in foreign markets that rely on overseas production (i.e., offshore input activities), and the residual value proxies for the overseas sales that rely on domestic production. The above discussion leads to the following hypothesis.

**H2:** *The positive association between the predicted offshore output activities and ETR is greater than that between the residual offshore output activities and ETR.*

If the offshore output activities affect tax planning through the *uncertainty* channel, the above discussion also leads to cross-sectional predictions. Specifically, the relation between the offshore output activities and ETR should depend on the magnitude of the shocks from the counterparty countries, the ability of the firm to pass on the shocks, as well as the ability of the firm to adjust tax strategies in response to the shock.

First, the offshore output activities are likely to expose the firm to a larger shock if they are conducted in counterparty countries with higher economic and political uncertainty. Therefore, we state the third hypothesis as below.

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<sup>13</sup> Fillat et al. (2015) show that the contribution of a counterparty country to the risk premium of multinational firms is positively related to the estimates of entry cost of the counterparty country.

**H3:** *The positive association between offshore output activities and ETR is more pronounced when the counterparty countries have a higher level of uncertainty.*

Second, if the firm has a stronger ability to pass on the shocks to other stakeholders such as customers and suppliers, the same magnitude of raw shock brought by offshore output activities should result in a smaller net shock to the firm. Research concludes that firms with greater market power have a higher ability to pass on the shocks to customers (Gaspar and Massa, 2006). Consistent with this argument, Kubick et al. (2015) find that firms with greater product market power engage in more tax avoidance activities. In addition, the entry of potential competitors into the product market increases product substitutability and decreases the product market power of the existing firms (Raith, 2003; Hoberg et al., 2014). These arguments lead to our fourth hypothesis:

**H4:** *The positive association between offshore output activities and ETR is more pronounced when firms have a lower ability to pass on shocks to other parties.*

Third, the same magnitude of net shock should have a smaller impact when the firm has higher flexibility to adjust its tax strategies after observing the shock. Note that *ex-ante* prediction of future taxable income and marginal tax rate only matters for tax strategies that have to be committed *ex ante* and cannot be adjusted *ex post*. In an extreme case, if a firm can sufficiently and quickly adjust its tax-avoidance strategy after knowing its taxable income, the *ex-ante* prediction does not matter and thus the shock should result in no effect. The above discussion leads to our final hypothesis:<sup>14</sup>

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<sup>14</sup> Finally, as discussed in H2, the offshore output activities result in a greater increase in uncertainty when they rely on offshore input activities. Therefore, we expect the moderating effects predicted in H3 to H5 to manifest more in the effect of the predicted than the residual offshore output activities.

**H5:** *The positive association between offshore output activities and ETR is more pronounced for firms with lower flexibility in adjusting their tax-avoidance strategies.*

### **3. Research Design**

#### *3.1. Sample Selection*

Our sample selection starts from all U.S. multinational firms (MNCs) covered by the Compustat database from 1997 to 2017. We exclude domestic U.S. firms as they have fundamentally different tax avoidance practices than MNCs though our main inference remains when including domestic firms. A firm is defined as a multinational company if the reported foreign income (Compustat data item PIFO) or the reported foreign income taxes (Compustat data item TXFO) are non-missing and non-zero. The sample period is restricted to 1997 to 2017 as the offshore activities data developed by Hoberg and Moon (2017, 2019) cover this period. We exclude the observations in the financial (SICs 6000-6999) and utility (SICs 4900-4999) industries. We further drop observations with total assets less than \$10 million. We also require non-missing values for effective tax rates, the offshore activities data compiled by Hoberg and Moon (2017), and control variables. The sample-selection procedure, as shown in Panel A of Table 1, results in a final sample of 23,229 firm-year observations from 3487 unique firms. The sample firms have offshore activities in 185 counterparty countries in total.

#### *3.2. The Text-based Measure of the Intensity of Offshore Activities*

We measure a firm's foreign sales and overseas production by using the text-based measures developed by Hoberg and Moon (2017, 2019). Hoberg and Moon (2019) identify keywords that indicate sales of outputs (e.g., sales, markets, and customers) and purchases/production of inputs (e.g., suppliers, import, subsidiaries, and facilities). They then search in each firm's 10-Ks for the name of any

country/region alongside the keywords indicating the sales of outputs and the purchases/production of inputs. The existence and intensity of the sales of outputs and purchases/production of inputs in each foreign country or region for each firm-year observation are measured by counting the mentions of the corresponding keywords along with the foreign country.<sup>15</sup> To validate their measures, Hoberg and Moon (2017, 2019) document that number of textual mentions of offshore output (input) words related to a counterparty country is highly correlated with the exports to (imports from) the country as recorded in the U.S. Census's foreign trade database. They also show that appearance of offshore words about output and input in a counterparty country is correlated with the exposure to the counterparty country's market return and exchange rate.

Following Hoberg and Moon (2019), we define *Output* as the natural logarithm of one plus the count of offshore words indicating the sales of outputs in all foreign countries/regions. *Input* is defined as the natural logarithm of one plus the count of offshore words indicating the purchases or production of inputs in all foreign countries/regions. Conceptually, *Output* captures the intensity of sales of output in foreign markets, and *Input* captures the intensity of overseas production.

To evaluate H2, we decompose the measure of the intensity of offshore output activities (i.e., *Output*) into the predicted and residual value by regressing it on the intensity of offshore input activities (i.e., *Input*, see the Appendix for details) each year. The average R-squared of the annual regressions is 60%, consistent with the findings by Hoberg and Moon (2019) that the offshore output activities are highly correlated with the offshore input activities. The predicted offshore output activities (*Output\_Pred*) measure the portion of offshore output activities that increase with the offshore input activities. Conceptually, *Output\_Pred* proxies for the offshore sales of outputs that rely on overseas production. In

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<sup>15</sup> Hoberg and Moon (2019) provide several examples. For instance, the sentence “The NCP system is currently *sold* by a direct *sales* force in *Germany, France, Austria, Switzerland, and the United Kingdom*” (Cyberonics Inc., 10-K, 2000) indicates that the count of output-related words (*sold* and *sales*) is one in each of the five countries (i.e., Germany, France, Austria, Switzerland, and the United Kingdom). The total count of keywords indicating offshore output activities (i.e., *Output*) is 5.

contrast, the residual offshore output activities (*Output\_Resid*) measure the portion of offshore output activities that do not vary with offshore input activities. Conceptually, *Output\_Resid* proxies for the offshore sales of outputs that rely on domestic production.

The text-based measures of offshore activities (Hoberg and Moon, 2017, 2019) identify a complete time-varying network of the countries to which each U.S. firm has offshore connections and offer important advantages. First, the text-based measures provide a more complete picture about both output- and input-related offshore activities, which enables us to assess how the two types of offshore activities interact with each other in affecting tax avoidance (i.e., H2). In contrast, the foreign activity measures derived from segment reporting suffer from agency problems and selection biases (Hope et al. 2013).<sup>16</sup> Second, the text-based measures identify each counterparty country in which the offshore activities are located, facilitating the analysis to better identify the sources of the uncertainty (i.e., H3). Nevertheless, the text-based measure has its limitations. For example, the measure is based on the count of a set of offshore-related words that appear along with the names of foreign countries rather than the dollar amounts of transactions and is potentially noisy.

As we aim to examine whether substantive offshore activities affect tax avoidance through the uncertainty channel, the location of the offshore activities are likely to matter more than the location of the incorporation. For this purpose, the Hoberg and Moon (2017, 2019) data appear more appropriate than the data of foreign subsidiaries as reported in Exhibit 21 (Dyreg and Lindsey, 2009; Law and Mills, 2022). Law and Mills (2022) point out that Exhibit 21 data has two limitations in capturing substantive offshore operations. First, Exhibit 21 tabulates subsidiaries' places of incorporation, not operations. If a firm's subsidiary is incorporated in country X but operates in country Y, the Exhibit 21 information on

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<sup>16</sup> For example, around 94% (92%) of the observations in our final sample have positive *Output (Input)*, whereas only 83% (24%) of the observations disclose foreign sales (foreign assets) in segment reporting. While we observe positive correlation between the text-based measures of offshore activities (*Output* or *Input*) and the measures based on geographic segment disclosures (foreign sales or foreign assets), the magnitude is not very large (the highest correlation is about 0.33). In addition, the foreign sales and foreign income numbers in Compustat are susceptible to manipulation through income shifting and are not reliable indicators of the location of the firm's operation (Rego, 2003).

the subsidiary may not be useful to measure the substantive operations. A mere mention of a counterparty country in an Exhibit 21 does not necessarily indicate the existence of offshore operations in this country. A shell subsidiary without substantive operations may not expose the firm to the economic shocks to the incorporation country. In contrast, making offshore sales to a counterparty country without incorporating a subsidiary in that country (e.g., exporting products from US or from foreign subsidiaries in other countries) can expose the firm to global consumption shocks. Second, Exhibit 21 does not identify the types of transactions (e.g., output or input) conducted. In addition, as we show in Figure OA-1 in the online appendix, the overlap between the data in Exhibit 21 and Hoberg and Moon (2019) is not large. A significant portion of overseas subsidiaries do not have substantive operating activities and a significant portion of offshore activities are conducted in countries without subsidiaries as reported in Exhibit 21. Law and Mills (2022) also find that a significant portion of their observations do not have Exhibit 21, and the information contained in the offshore data by Hoberg and Moon (2019) can predict offshore activities when Exhibit 21 information is unavailable.<sup>17</sup>

### 3.3. Model Specification

We estimate regression models (1) and (2) to test H1 and H2, respectively.

$$CashETR_{i,t} = \beta \cdot Output_{i,t} + Controls + industry\ FE + year\ FE + \varepsilon_{i,t} \quad (1)$$

$$CashETR_{i,t} = \beta_1 \cdot Output\_Pred_{i,t} + \beta_2 \cdot Output\_Resid_{i,t} + Controls \quad (2)$$

$$+ industry\ FE + year\ FE + \varepsilon_{i,t}$$

where  $i$  and  $t$  index firm and year, respectively. We follow extant research (e.g., Hoopes et al. 2012) and use cash effective tax rate (*CashETR*) as the measure of tax avoidance in our main analyses. Cash

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<sup>17</sup> In untabulated analysis, we examine the difference between the Hoberg and Moon data and the Exhibit 21 data in their association with tax avoidance. We find that access to foreign countries without having a subsidiary (as reported in Exhibit 21) there also increases cash ETR. In contrast, access to foreign countries by establishing subsidiaries without substantive operation does not increase cash ETR. This evidence implies that substantive operation is important and is also consistent with the findings in Law and Mills (2022) that a MNC's tax-haven subsidiaries without substantive operations (as measured by the Hoberg and Moon data) do not help reduce ETR.

ETR captures all sources of non-conforming tax avoidance, including both permanent and temporary book-tax differences (Law and Mills, 2015). Specifically, *CashETR* is defined as total cash tax paid (#TXPD) scaled by pretax income (#PI) adjusted for special items (#SPI). Following Hoopes et al. (2012), we truncate *CashETR* to range between zero and one. Inferences are unaffected when we winsorize *CashETR* between zero and one (untabulated). *Output*, *Output\_Pred*, and *Output\_Resid* are defined in Section 3.2. H1 predicts a positive coefficient of *Output* (i.e.,  $\beta > 0$ ). H2 predicts a larger positive coefficient of *Output\_Pred* than *Output\_Resid* (i.e.,  $\beta_1 > \beta_2 > 0$ ).

Recent methodology studies suggest that control variables should include factors that are common causes (i.e., confounders) of, and avoid factors that are common consequences (i.e., colliders) of independent and dependent variables (e.g., Gow, Larcker, and Reiss, 2016; Cinelli, Forney and Pearl, 2023; Whited, Swanquist, Shipman, and Moon, 2022). The inclusion (exclusion) of the confounders (colliders) are important to reduce coefficient estimate biases. In addition, controlling for determinants (of the dependent variable) that do not affect the independent variable helps improve estimation precision though not affecting estimate bias. In contrast, controlling for determinants (of the independent variable) that do not affect the dependent variable hurts estimation precision. Finally, controlling for one channel that links the independent and dependent variables (i.e., mediators) obtains an estimate of the link between the independent and dependent variables through other channels.<sup>18</sup>

Guided by this framework, we include the following variables (*Control*) in regressions. First, we control for a series of firm characteristics that the prior literature shows to affect tax avoidance (e.g., Frank, Lynch, and Rego, 2009; Chen, Chen, Cheng, and Shevlin, 2010; Cen et al., 2017) and offshore activities (Fillat and Garetto, 2015; Hoberg and Moon, 2019): size (*LnMVE*), market-to-book ratio (*MTB*), pretax return on assets (*ROA*), leverage (*Leverage*), cash holdings (*Cash*), capital expenditures

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<sup>18</sup> Gow et al. (2016) and Cinelli et al. (2023) show that in a regression of Y on X controlling for mediator (channel) variable Z, the coefficient on X captures the effect of X on Y not through channel Z.

(*Capex*), research and development expenditures (*R&D*), tangible assets (*PP&E*), and intangible assets (*Intangible*). We also control for several additional variables that the prior literature shows to be correlated with tax avoidance: tax loss carryforward (*NOL*), change in tax loss carryforward ( $\Delta NOL$ ),<sup>19</sup> equity income in earnings (*Eqinc*), and financial reporting aggressiveness as measured by abnormal accruals (*Accruals*).<sup>20</sup> Even though these variables may not directly affect the offshore activities, controlling for these variables help improve the precision of coefficient estimates (Cinelli et al., 2023, p.7). Based on the prior literature, we expect a positive sign for the coefficients on *ROA* and  $\Delta NOL$  and a negative sign for that on *MTB*, *NOL*, *Intangible*, *R&D*, *PP&E*, *Capex*, and *Eqinc* (Chen et al., 2010; Grubert and Slemrod, 1998; Dyreng and Lindsey, 2009; Koester et al., 2017). We have no directional prediction for *LnMV*, *Leverage*, *Foreign Income*, *Cash*, and *Accrual* (Belz, Hagen, and Steffens, 2019; Zimmerman, 1983; Graham, 1996; Mills et al., 1998; Edwards, Schwab, and Shevlin, 2016; Lennox, Lisowsky, and Pittman, 2013; Hanlon, Maydew, and Saavedra, 2017).

Second, as discussed in the introduction, the existing tax literature suggests that offshore activities may affect tax avoidance through channels other than providing cross-border tax-avoidance opportunities. Since our study aims to examine these “other” channels, we also control for proxies for cross-border tax-avoidance opportunities (i.e., mediators) as documented in the prior studies. Dyreng and Lindsey (2009) show that have tax-haven subsidiaries help reduce taxes. Law and Mills (2022) further show that subsidiaries in tax-haven countries need to have substantive operation activities, especially input-related activities, to reduce taxes. We include *Input\_Haven* to control for these channels as we aim to search for other channels through which offshore activities link to tax avoidance.

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<sup>19</sup> We conduct a robustness test by controlling for the hand-collected data of foreign tax loss benefits by Heitzman and Lester (2021, 2022) rather than Compustat *NOL*. We obtain similar results though the sample size is much smaller. We thank Heitzman for sharing the foreign tax loss benefits data.

<sup>20</sup> Dyreng, Hanlon, and Maydew (2012) show that foreign operations, especially in weak rule of law countries, provide earnings management opportunities, which may affect tax avoidance (Frank et al., 2009). Including *Accrual* in the regression helps control for this factor.



*Input\_Haven* is defined as the natural logarithm of one plus the counts of input words in the tax-haven countries. We predict a negative coefficient on *Input\_Haven*.

Third, we control for tax, economic, geographic, and legal attributes of the counterparty countries that the firm has offshore operations in to ensure that the link between offshore operations and tax avoidance is not driven by the exposure to these attributes. Specifically, we control for the weighted average of the statutory tax rates (*WA\_STR*), GDP (*WA\_GDP*), distance to the U.S. (*WA\_DistUS*), and rule of law index (*WA\_RuleLaw*) of the counterparty countries in which the firm has offshore operations. We use the counts of offshore output and input words related to each counterparty country as the weight. Using the counts of offshore output words or counts of offshore input words as the weight generates similar results. We do not have directional prediction for the sign of these control variables. We also include foreign income (*Foreign Income*) in the regression to control for the return on foreign investments. Based on the prior research, we also have no directional prediction for *Foreign Income*.

Finally, we include industry fixed effects (based on 2-digit SIC codes) and year fixed effects to control for the variations in effective tax rates across industries and over time. We also estimate firm fixed effects regressions that help control for time-invariant confounds and strengthen identification. We measure all control variables contemporaneously with the dependent variable but use the one-year lagged term for *LnMVE* and *MTB* (Chen et al., 2010). The appendix contains detailed descriptions of all variables. We cluster standard errors at the firm level to account for arbitrary correlation within firms (Gow, Ormazabal, and Taylor, 2010).

## **4. Offshore Activities and Corporate Tax Avoidance**

### *4.1. Summary Statistics and Correlations*

Table 2 presents the descriptive statistics for all variables in our main analysis. The mean and median values of *CashETR* are 0.246 and 0.234, respectively. The mean and median values of *Output*

and *Inputs* are larger than the statistics reported in Hoberg and Moon (2019) because our sample only includes MNCs, which conduct more offshore activities than other firms. The summary statistics for the control variables are also comparable to the prior literature (e.g., Cen et al., 2017).

Panel B shows the Pearson and Spearman correlations between the variables used in the baseline regressions. We note the positive correlation between *CashETR* and *Output*, though only the Spearman correlation is significant. The correlations between *CashETR* and *Output\_Pred* are significant and positive, and those between *CashETR* and *Output\_Resid* are not significant. These results are consistent with our hypothesis. The correlations between *CashETR* and *Input\_Haven* are also significantly negative, consistent with extant research (e.g., Dyreng and Lindsey 2009; Law and Mills 2022).

#### 4.2. *Multivariate Regression Results*

Table 3 reports the results of the tests of H1 and H2. The left (right) two columns show results of regressions with industry (firm) and year fixed effects. Column (1) reports results for testing H1. The coefficient on *Output* is positive and statistically significant at the 1% level ( $t = 4.12$ ), supporting H1. The magnitude of the coefficient (0.006) is also economically significant, which suggests that an inter-quarter-increase in *Output* (1.517, see Panel A of Table 2) is associated with an increase in cash ETR by about 0.9%, or about 3.7% of the sample mean (0.246). Column (2) reports results consistent with H2. In particular, the coefficient on *Output\_Pred* (0.012,  $t = 5.32$ ) is significantly greater than that on *Output\_Resid* (0.004,  $t = 2.24$ ). The  $p$ -value for the difference between the coefficient is 0.001.<sup>21</sup> In terms of the economic significance, the coefficients estimates suggest that an inter-quartile increase in

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<sup>21</sup> Offshore input activities conducted in the same country to which the outputs are sold help hedge the incremental risk exposure induced by the output activities (Hoberg and Moon 2017). We measure the hedging benefit by the extent to which the input and output activities are concentrated in the same counterparty countries. We find that *Output\_Pred* is only significantly greater than that on *Output\_Resid* when the hedging benefit is low (results untabulated). We also continue to observe a greater coefficient on *Output\_Pred* than that on *Output\_Resid* after controlling for the weighted average geographic distance between output and input counterparty countries (untabulated).

*Output\_Pred* (1.411) relates to an increase in cash ETR by 1.7% (or 6.9% of the sample mean), whereas an inter-quartile increase in *Output\_Resid* (1.308) is only associated with an increase in cash ETR by 0.5% (2.1% of the sample mean).<sup>22</sup>

The results regarding the control variables are largely consistent with studies of cash ETR using large sample of MNCs. Both columns 1 and 2 show a negative coefficient on *Input\_Haven*. The magnitude of the coefficient suggests that an inter-quartile increase in *Input\_Haven* (1.609) relates to a decrease in cash ETR by 0.6% (or 2.6% of the sample mean) based on the coefficient estimate in column 1 and by 1.1% (or 4.6% of the sample mean) based on the coefficient in column 2. The evidence is consistent with past findings that offshore activities in tax-haven countries reduces the tax burden (Law and Mills 2022).<sup>23</sup> The cash ETR is significantly and negatively associated with *MTB*, *Leverage*, *Cash*, *R&D*, *PP&E*, *NOL*, *Intangible*, *Eqinc*, and *Foreign Income*. The coefficients on *Accrual* and  $\Delta NOL$  are significantly positive. The coefficients on *lnMVE*, *ROA*, and *Capex* are not statistically significant. The coefficients on the counterparty country characteristics (i.e., *WA\_STR*, *WA\_RuleLaw*, *WA\_DistUS*, and *WA\_GDP*) are not significant.<sup>24</sup>

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<sup>22</sup> We follow the recommendation of Mitton (2023) and gauge the economic significance of our test variables (i.e., *Output*, *Output\_Pred*, and *Output\_Resid*) against that of the key control variables that are accepted in the literature as important determinants of the dependent variable. We find that the economic significance of the test variables is comparable to that of these controls (results untabulated).

<sup>23</sup> We obtain similar results when we use the indicator of having subsidiaries in the haven countries (Dyreng and Lindsey 2009). Law and Mills (2022) show that haven subsidiaries with active offshore input activities (i.e., active haven) reduce cash ETR more. For the observations that do not have Exhibit 21 data, they find that cash ETR is negatively related to the predicted active haven based on offshore activities. Consistent with their findings, we find that the offshore input activities in haven countries are negatively associated with cash ETR no matter the firm has subsidiaries in the haven country or not (results not tabulated).

<sup>24</sup> We examine but do not find that the statutory tax rates moderate the positive relation between the intensity of offshore activities and cash ETR (untabulated). Nevertheless, we find some evidence that the statutory tax rates increase the positive association between cash ETR and offshore input activities in non-haven countries. Sales of outputs in a country may not be subject to the statutory tax rate in that country as the profits from the sales may be reported in other countries. In contrast, to conduct the input (i.e., production) activities in a country, the firm is likely to have an entity in that country, and thus is more likely to subject to the statutory tax rate in that country.

The inference is similar based on firm fixed effect regressions.<sup>25</sup> Column (3) shows a significantly positive coefficient on *Output* (0.005,  $t = 2.83$ ). In column (4), the coefficient on *Output\_Pred* (0.008,  $t = 2.66$ ) is also greater than that on *Output\_Resid* (0.005,  $t = 2.31$ ), though the difference is not significant ( $p$ -value = 0.237). Regarding the economic importance. The coefficient on *Output* (0.005) in column (3) suggests that an inter-quarter-increase in *Output* is associated with an increase in cash ETR by about 0.76% (3.1% of the sample mean). The coefficients on *Output\_Pred* (0.008) and *Output\_Resid* (0.005) suggest that an inter-quarter-increase in *Output\_Pred* and *Output\_Resid* is associated with an increase in cash ETR by about 1.1% and 0.7% respectively (4.6% and 2.7% of the sample mean respectively).

#### 4.3. Alternative Measures of Tax Avoidance

We examine whether the baseline results are sensitive to alternative measures of tax avoidance. Table 4 shows the results. The left four columns report the results of regressions measuring tax avoidance by 3-year cash ETR (*CashETR3*). Consistent with Brown and Drake (2014), we use the 3-year mean value of the offshore variables and control variables in the regression of *CashETR3*. The right four columns report the results of regression measuring tax avoidance by worldwide current ETR (*WWETR*). The inference is the same. Specifically, we observe a significantly positive coefficient on *Output* in columns (1), (3), (5) and (7). Columns (2), (4), (6), and (8) show that the coefficient on *Output\_Pred* is greater than that on *Output\_Resid*. Similar to the findings documented in Table 3, the difference is

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<sup>25</sup> To evaluate the remaining possibility of correlated omitted correlated variables, we follow the method outlined in Frank (2000) and recommended in Larcker and Rusticus (2010) to compute the minimum correlations of the omitted correlated variable (with cash ETR and with offshore activities) that are necessary to turn to significant coefficient on *Output* into insignificant and use the correlations of the existing control variables as the benchmark. We find that the required correlations of the omitted correlated variable are far above the correlations of the control variables that we include in the regression (results untabulated). This evidence suggests that the likelihood of correlated omitted variables is low.

significant in the regressions controlling for industry fixed effects (columns 2 and 6), though not significant in the firm fixed effects regressions (columns 4 and 8).<sup>26</sup>

## 5. Cross-Sectional Analyses

In this section, we conduct cross-sectional analyses to substantiate the main hypothesis that offshore activities reduce tax avoidance due to increased uncertainty in predicting taxable incomes. Specifically, we examine whether the positive relation between *Output* and cash ETR, and especially the positive relation between *Output\_Pred* and cash ETR, is stronger when (1) the firm's offshore output activities are in counterparty countries with higher uncertainty (H3); (2) the firm has a lower ability to pass on shocks (H4); and (3) the firm has lower flexibility in adjusting tax-avoidance strategies (H5).

### 5.1. Uncertainty of Counterparty Countries (H3)

In each year, we partition all counterparty countries into three groups (High, Medium, and Low) based on the counterparty country uncertainty. We then compute *Output* for each group of counterparty countries separately. We also compute *Output\_Pred* and *Output\_Resid* within each counterparty country group by estimating the annual regression of *Output* on *Input* within each group of counterparty countries.

We consider two proxies to measure the uncertainty of the counterparty countries. The first proxy is the World Uncertainty Index (WUI) developed by Ahir et al. (2019), defined as the frequency counts of the word “uncertainty” (and its variants) in the quarterly Economist Intelligence Unit country reports.<sup>27</sup> A country with a high WUI index has a more uncertain economic and political environment.

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<sup>26</sup> In untabulated analyses, inferences are unaffected when we (1) control for the predicted valuation allowance release (Drake, Hamilton, and Lusch, 2020), (2) control for an indicator for negative lagged retained earnings (Christensen et al., 2022) and an indicator for whether the predicted NOL (Heitzman and Lester, 2021) falling in the top quartile, (3) measure tax avoidance by Henry and Sansing's (2018)  $\Delta$ , and (4) measure tax avoidance by the industry-size adjusted cash ETR (Armstrong et al., 2015).

<sup>27</sup> Ahir et al. (2019) show that the WUI index spikes near the 9/11 attack, SARS outbreak, Gulf War II, Euro debt crisis, El Niño, European border crisis, U.K. Brexit vote, and the 2016 U.S. election. The WUI index is significantly higher in

The second proxy is the actual GDP growth, which measures the actual macroeconomic shocks to the counterparty countries. A country with low GDP growth is more vulnerable to a negative shock.

The results are reported in Table 5. Columns (1) to (4) report the results of partitioning the counterparty countries based on WUI. The first (last) two columns report the results of regressions with industry (firm) fixed effects. In column (1), we find that the positive association between the offshore output activities and cash ETR increases with the WUI index of the counterparty countries. Specifically, we observe a greater positive coefficient on *Output with High WUI* (0.006,  $t = 4.55$ ) than that on *Output with Med WUI* (0.002,  $t = 1.66$ ) and *Output with Low WUI* (0.002,  $t = 1.34$ ). The difference between the coefficient on *Output with High WUI* and that on *Output with Low WUI* is also statistically significant ( $p$ -value = 0.033). In column (2), we decompose *Output* into *Output\_Pred* and *Output\_Resid* and find that the moderating effect of the counterparty country WUI index mainly manifests in the effect of *Output\_Pred*. The coefficient on *Output\_Pred with High WUI* (0.009,  $t = 5.19$ ) is larger than that on *Output\_Pred with Low WUI* (0.005,  $t = 2.63$ ), and the difference is also statistically significant ( $p$ -value = 0.082). The coefficient on *Output\_Resid with High WUI* (0.004,  $t = 2.70$ ) is also greater than that on *Output\_Resid with Low WUI* (0.001,  $t = 0.51$ ), though the difference is not significant ( $p$ -value = 0.176). The inference from firm fixed effects regressions (columns 3 and 4) is the same. In column (3), the coefficient on *Output with High WUI* (0.003,  $t = 2.75$ ) is larger than that on *Output with Low WUI* (0.000,  $t = 0.36$ ), though the difference is significant ( $p$ -value = 0.091). In column (4), the coefficient on *Output\_Pred with High WUI* (0.005,  $t = 2.68$ ) is larger than that on *Output\_Pred with Low WUI* (0.001,  $t = 0.55$ ). The difference is significant ( $p$ -value = 0.094). Though the coefficient on *Output\_Resid with High WUI* (0.003,  $t = 1.90$ ) is also larger than that on *Output\_Resid with Low WUI* (0.001,  $t = 0.35$ ), the difference is not significant ( $p$ -value = 0.312).

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developing countries and is associated with larger EPU indexes developed by Baker, Bloom, and Davis (2016), higher stock market volatility, more risks, and lower GDP growth. The raw counts are scaled by the total number of words in each report, making the WUI comparable across countries.

The right four columns report the results when we measure the actual shocks based on GDP growth, which are similar though weaker in firm fixed effects regressions. Column (5) finds a larger coefficient on *Output with Low GDP growth* (0.005,  $t = 3.83$ ) than that on *Output with High GDP growth* (0.001,  $t = 0.96$ ). The difference is marginally significant ( $p$ -value = 0.104). Column (6) also shows that the coefficient on *Output\_Pred with Low GDP growth* (0.009,  $t = 4.86$ ) is larger than that on *Output\_Pred with High GDP growth* (0.005,  $t = 2.37$ ), though the difference is not significant ( $p$ -value = 0.201). The coefficient on *Output\_Resid with Low GDP growth* (0.003,  $t = 2.02$ ) is also larger than that on *Output\_Resid with High GDP growth* (0.000,  $t = 0.11$ ), and the difference is not significant ( $p$ -value = 0.258). Columns (7) and (8) show weaker results when we control for firm fixed effects. In column (7), the coefficient on *Output with Low GDP growth* (0.003,  $t = 2.22$ ) is still larger than that on *Output with High GDP growth* (0.001,  $t = 0.39$ ), but the difference is not significant ( $p$ -value = 0.263). In column (8), though the coefficient on *Output\_Pred with Low GDP growth* (0.004,  $t = 1.92$ ) is larger than that on *Output\_Pred with High GDP growth* (0.003,  $t = 1.11$ ), the difference is not significant ( $p$ -value = 0.633). The difference between the coefficient on *Output\_Resid with Low GDP growth* (0.003,  $t = 1.83$ ) and that on *Output\_Resid with High GDP growth* (-0.000,  $t = -0.08$ ) is also not significant ( $p$ -value = 0.240).

## 5.2. Ability to Pass on Shocks (H4)

Next, we evaluate whether the relation between offshore output activities and tax avoidance varies with the firm's ability to pass on shocks as measured by product market power. We construct a composite measure of product market power based on two proxies. The first proxy is the excess price-cost margin (PCM), which is the raw PCM minus the sales-weighted PCM within the same (2-digit SIC) industry and year (Gaspar and Massa, 2006; Kubick et al., 2015). The second proxy is the competitive threats measured as the product-market fluidity developed by Hoberg et al. (2014). Intuitively, a firm's product-market fluidity measure is higher when it is easier for rivals to enter into its product market space. As a

result, fluidity is an inverse measure of market power. The composite measure (*Market Power*) is defined as the mean value of the within-year percentile rank of excess PCM and that of negative product-market fluidity.

The results reported in Table 6 are consistent with H4. The coefficient on *Output*  $\times$  *Market Power* as reported in column (1) is significantly negative (-0.023,  $t = -2.97$ ). Column (2) decomposes *Output* into *Output\_Pred* and *Output\_Resid*. We find a significantly negative coefficient on *Output\_Pred*  $\times$  *Market Power* (-0.035,  $t = -3.83$ ) whereas the coefficient on *Output\_Resid*  $\times$  *Market Power* is not significant (-0.009,  $t = -0.97$ ). Accordingly, the moderating effect of market power mainly manifests in the association between cash ETR and the offshore sales of outputs relying on overseas production. Columns (3) and (4) report the results of regressions controlling for firm fixed effects and the inference is similar. In column (3), the coefficient on *Output*  $\times$  *Market Power* negative though not significant (-0.011,  $t = -1.20$ ). Column (4) finds a significantly negative coefficient on *Output\_Pred*  $\times$  *Market Power* (-0.022,  $t = -1.90$ ) and a non-significant coefficient on *Output\_Resid*  $\times$  *Market Power* (-0.004,  $t = -0.31$ ).

### 5.3. Flexibility in Tax-avoidance strategies (H5)

Finally, we examine the moderating effect of the flexibility of tax-avoidance strategies. Firms are more flexible in adjusting tax-avoidance strategies when using transfer pricing on intangibles than other methods such as transfer pricing on intermediate inputs and internal debt (e.g., Hopland et al., 2018). Following De Simone et al. (2019), we construct a composite measure of the flexibility based on seven proxies for intangible intensity: R&D and advertising expenditures, SG&A expenses, intangible assets, Tobin's Q, the negative value of capital expenditure, and soft assets. The composite measure (*Flexibility*) is the mean value of the within-year percentile ranks of these seven proxies.

The results are reported in Table 7. Column (1) shows a significantly negative coefficient on *Output*  $\times$  *Flexibility* (-0.030,  $t = -2.65$ ) in the regression controlling for industry fixed effects. When we



decompose *Output* into *Output\_Pred* and *Output\_Resid* in column (2), we find that the moderating effect of *Flexibility* applies to *Output\_Pred* but not *Output\_Resid*. The coefficient on *Output\_Pred*×*Flexibility* (-0.032,  $t = -2.38$ ) is significant whereas that on *Output\_Resid* × *Flexibility* is not (-0.014,  $t = -1.03$ ). Thus, the moderating effect of the tax strategy flexibility also mainly manifests in the relation between cash ETR and the offshore sales of outputs relying on overseas production. Columns (3) and (4) repeat the analyses by controlling for firm fixed effects. The results are generally weaker. The coefficient on *Output*×*Flexibility* (-0.014,  $t = -1.07$ ) is insignificant in column (3), and that on *Output\_Pred*×*Flexibility* (-0.026,  $t = -1.57$ ) is marginally significant. Overall, the evidence is consistent with H5.<sup>28</sup>

Overall, the results reported in Tables 5 to 7 provide support for H3 through H5, and further substantiate our main hypothesis by highlighting the uncertainty channel through which the offshore activities are associated with tax avoidance.

## 6. Additional Analyses

### 6.1. Tightening the control for profitability

One potential alternative explanation for the positive association between offshore output activities and cash ETR is that progressive tax rates discourage firms from taking risks by entering into foreign markets. For example, firms with high profits, which are more likely to face a higher and linear tax rate, are more likely to enter into foreign markets than firms with low or close to zero profits, which face a lower and progressive tax rate. Thus, our inference might be driven by an insufficient control for firms' profitability that affects the tax status. Note that we control for firms' profitability in all empirical analyses. We conduct an additional test to further address this possibility by tightening the control for profitability. Specifically, we partition the sample based on profitability (pre-tax ROA) into three (high,

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<sup>28</sup> *Market Power* and *Flexibility* are not highly correlated with the offshore variables (*Output*, *Output\_Pred*, *Output\_Resid*, and *Input\_Haven*). As a sensitivity test, we first orthogonalize the *Market Power* and *Flexibility* against the offshore variables and use the residual values as the moderating variables. The inference is the same.

medium, and low) groups and estimate our main regressions within each group. This analysis controls for the effect of profitability more tightly. If the significant positive association between *Output* and cash ETR is due to insufficient control for profitability (that affects the tax status), the relation should become weaker or even insignificant when we tighten the control by partitioning the sample. We report the results in Table 8. We observe a significant association between *Output* and cash ETR in all three subsamples. The magnitude of the coefficient on *Output* (and *Output\_Pred*) is also similar to that shown in the main regressions (Table 3). This evidence is not consistent with the argument that our primary findings are driven by insufficient control for profitability or tax status.<sup>29</sup>

## 6.2. *Offshore Activities and Uncertainty of Forecasting Earnings*

Our hypothesis builds on the assumption that offshore sales expose additional risks to firms and therefore make it more difficult to predict future taxable income. Thus, we first directly examine the link between offshore activities and the forecast uncertainty to substantiate our hypothesis. We measure the forecast uncertainty using two variables: (1) forecast error of the random walk model (*FE\_RW*) and (2) forecast errors of financial analysts (*FE\_FA*).<sup>30</sup> Since we are interested in the forecast uncertainty when making tax avoidance decisions, we measure the forecast errors using the forecasts made one year before the target fiscal year end. Following the recommendation by Monahan (2017), we scale the forecast

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<sup>29</sup> We also examine whether cash ETR, volatility of cash ETR, profitability, and volatility of profitability in the previous period predict *Output* and *Input* in the current period. The results are reported in Table OA-1 in the online appendix. We find a significant association between profitability and *Input*, but cash ETR, volatility of cash ETR, and volatility of profitability are not significantly related to future *Output* and *Input*. We also conduct an additional test and continue to find a significant coefficient on *Output* and a significantly more positive coefficient on *Output* than that on *Input* when we control for the lagged value of cash ETR, cash ETR volatility, profitability, and profitability volatility (untabulated). This evidence also further reduces the possibility of reverse causality.

<sup>30</sup> In untabulated analysis, we use foreign income to measure the random walk forecast errors (*FE\_RW*) and find similar results. Specifically, the coefficients on *Output* and *Output\_Pred* are all significant. We also examine the link between offshore activities and management forecast errors. We do not find a significant positive correlation between offshore activities and management forecast errors. However, the sample size is small, and the test suffers from sample selection bias as managers may not issue earnings forecasts when uncertainty is high. Consistent with this notion, we find stronger relation between offshore activities and *FE\_RW* and *FE\_FA* for firms that do not issue management earnings forecasts than those issue management forecasts (results untabulated).

errors by book value of equity. Scaling by market value of equity (Bradshaw, Drake, Myers, and Myers 2012) does not change our inferences. We control for a series of firm characteristics that are correlated with the offshore activities and forecast errors (e.g., Hoberg and Moon, 2019; Dichev and Tang, 2009; Tan, Wang, and Welker, 2011), return on foreign investments (*Foreign Income*), and the attributes of the counterparty countries (i.e., GDP per capita, rule of law, and statutory tax rate).

The results are reported in Table 9. The dependent variable is *FE\_RW* in the left four columns and *FE\_FA* in the right four columns. We document significantly positive coefficients on *Output* and *Output\_Pred* in all specifications, including the regressions that control for the firm fixed effects.<sup>31</sup> Overall, the evidence is consistent with the notion that more intensive offshore activities are associated with greater difficulty in forecasting future taxable income.<sup>32</sup>

### 6.3. Investment in Tax Planning

A related issue is how offshore sales in overseas markets, which increase firms' risk exposure and difficulty in predicting taxable income, affect firms' investment in tax planning. The prediction is not clear ex ante. On one hand, firms may not change their tax strategies or even increase their tax-planning investments to develop more flexible and costly tax strategies to counter the adverse effect of the increased risk exposure. On the other hand, the increased risk exposure may reduce firms' perceived benefits from tax planning and therefore reduce the investment in tax planning.

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<sup>31</sup> Controlling for *Input\_Haven* does not affect the inferences. When we include *Input\_Haven* in the regressions, the coefficients are positive in the OLS regressions and not significant in the firm fixed effect regressions. Thus, input-related offshore activities in tax-haven countries may also increase the forecast uncertainty.

<sup>32</sup> Another implication of our hypothesis is that firms with more intensive offshore activities are likely to face higher tax uncertainty if they do use aggressive tax-avoidance strategies. We also evaluate this implication. We follow Dyreng, Hanlon, and Maydew (2019) and measure tax uncertainty using the reported unrecognized tax benefits related to the current year positions and define a firm as adopting aggressive tax-avoidance strategy if the cash ETR falls in the bottom tercile by each year. The results (untabulated) are consistent with the prediction. Specifically, conditional on the adoption of an aggressive tax strategy, we observe a significant positive association between the intensity of offshore activities and tax uncertainty. In contrast, the relation is not significant when firms do not adopt aggressive tax strategies.

To address this question, we follow the literature and measure firms' external and internal investments in tax plannings using fees paid for auditor-provided tax services (*TAX\_FEE*) and number of in-house tax employees (*TAX\_EMPLOYEE*) respectively (Chen et al. 2021; Kim et al. 2021).<sup>33</sup> The results are reported in Table 10. We do not find a significant association between *TAX\_FEE* and offshore output activities. In the regressions of *TAX\_EMPLOYEE*, we find significantly negative coefficients on *Output\_Pred*. Thus, the evidence appears consistent with the second mechanism. Nevertheless, as pointed out by Kim et al. (2021) and Chen et al. (2021), *TAX\_FEE* only captures fees paid to the firms' auditor and not fees paid to other tax-service providers, and *TAX\_EMPLOYEE* are self-reported data from LinkedIn and may not be complete. In addition, the sample of *TAX\_EMPLOYEE* only covers S&P1500 firms between 2009 and 2014. Given these caveats, the evidence should be interpreted with caution.

#### 6.4. Association between Offshore Activities and Foreign ETR and Domestic ETR

In the main analysis we use cash ETR to measure tax avoidance. This measure captures the effects of tax avoidance transactions (e.g., income shifting) that involve foreign subsidiaries only and those involve both domestic and foreign subsidiaries. This measure is appropriate for our research question to capture the overall effect of offshore activities, as operations of MNCs are likely to be highly integrated and the uncertainty driven by offshore sales should affect both types of tax avoidance transactions. To further substantiate our hypothesis, we examine the link between offshore activities and foreign effective tax rate and that between offshore activities and domestic effective tax rate. If offshore activities affect overall tax rate through the uncertainty channel, we expect that these activities should also affect foreign tax rate by influencing the tax transactions that involve foreign subsidiaries only. However, these activities should have little effect on the domestic tax rate. In contrast, if offshore activities are associated

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<sup>33</sup> We thank Travis Chow for sharing the in-house tax employee data.

with overall tax rate due to other confounding factors, the association is more likely to manifest in both foreign and domestic tax rate, or domestic tax rate only. In other words, examining the link between offshore activities and foreign and domestic ETR respectively can serve as a falsification test.

We repeat the analyses in Tables 3, 5, 6, and 7 using foreign and domestic ETR as the dependent variable, respectively. We report the results in Table OA-2 of the online appendix. We find similar results when we use foreign ETR as the dependent variable, though the results are weaker when the firm fixed effects are included. In contrast, the relation between the offshore activities and domestic ETR is largely not significant.

#### 6.5. *Alternative Specification to Test H2*

Our primary tests of H2 rely on the decomposition of the measure of offshore output activities. In this section, we examine whether the results are robust to alternative specifications that do not rely on the decomposition method. An alternative way to state H2 is that the positive association between *Output* (a proxy for sales of outputs in overseas markets) and cash ETR should be greater when *Input* (a proxy for overseas production) is higher. The sales of output are more likely to rely on overseas (domestic) production when *Input* is high (low). To empirically assess the prediction, we partition the sample into high and low *Input* groups based on the annual median value of *Input* and examine how the relation between *Output* and cash ETR varies between the firms with high and low *Input*. We then repeat the tests in Tables 3, 5, 6, and 7 based on this alternative research design and report the results in Table OA-3 of the online appendix. We find a more pronounced positive association between *Output* and *Cash ETR* for the firms with high *Input* than those with low *Input*. In addition, the moderating effect of uncertainty of counterparty countries, the ability to pass shocks, and the flexibility in tax-avoidance strategies also manifest in the firms with high *Input*. We conclude that the inferences are robust to alternative specifications.

## 7. Conclusion

This paper studies the relation between offshore activities and corporate tax avoidance by employing a new text-based measure of offshore activities. The literature on international trade and foreign direct investment suggests that offshore sales of outputs lead to incremental exposure to risks of aggregate demand in the global economy (e.g., Helpman et al., 2004; Fillat and Garetto, 2015). Firms also need to bear sunk costs to enter into and fixed costs to maintain operations in foreign markets. The combination of the incremental risk exposures, sunk costs of entry, and fixed operating costs increases the uncertainty of taxable income. Many tax-avoidance strategies rely heavily on accurate forecasts of future taxable income, and last for multiple years, which are difficult to adjust or to revert. If firms cannot pass on the shocks from the foreign markets, they would be more cautious to implement such strategies. Consequently, offshore sales of outputs may lead to less tax avoidance. Moreover, because offshore production brings higher entry costs and fixed operating costs, the incremental risk exposures due to offshore sales should have a greater impact on the uncertainty. Therefore, offshore sales of outputs should have stronger effects on tax avoidance when they rely more on offshore input activities.

Using the text-based measures of the intensity of offshore activities developed by Hoberg and Moon (2017, 2019) for a sample of U.S. MNCs from 1997 to 2017, we find evidence consistent with the above predictions. We document a significantly positive association between cash ETR and offshore output activities, and the relation is stronger when the offshore output activities rely on offshore input activities. In addition, we observe strong positive moderating effects of economic and political uncertainty of counterparty countries, and negative moderating effects of the ability to pass on shocks and the flexibility of adjusting tax strategies. The moderating effects are also stronger when the offshore output activities rely on offshore input activities. Overall, our study contributes to the prior international business research by highlighting a cost (uncertainty) on MNCs' tax avoidance imposed by offshore activities.

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## Appendix: Variable Definitions

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### Tax Avoidance and Tax-Planning Investment Variables

Cash ETR	Total taxes paid in cash (#TXPD) scaled by the pre-tax income (#PI) adjusted for special items (#SPI), constrained between zero and one. The missing value of #SPI is set to zero.
WWETR	Worldwide current tax expense (#TXT - #TXDI) scaled by the pre-tax income (#PI), constrained between zero and one.
CashETR3	The sum of total taxes paid in cash(#TXPD) over year $t$ to year $t+2$ scaled by the sum of pre-tax income (#PI) adjusted for special items (#SPI) over year $t$ to $t+2$ , constrained between zero and one. The missing value of #SPI is set to zero.
TAX_FEE	Natural logarithm of fees paid for tax services provided by auditors (variable <i>tax_fees</i> in Audit Analytics). Following Kim et al. (2021), we remove the observations with missing or zero <i>tax_fees</i> .
TAX_EMPLOYEE	Total number of in-house tax employees of the firm, obtained from Chen et al. (2021).

### Earnings Forecasts Errors Variables

FE_RW	Earnings forecast error of the random walk model, defined as the absolute value of pre-tax income (#PI) adjusted for extraordinary items (#XI) of (fiscal) year $t+1$ minus pre-tax income of year $t$ , scaled by shareholders' equity (#CEQ) at the end of year $t$ .
FE_FA	Analysts' earnings forecast error, defined as the absolute value of the actual EPS of (fiscal) year $t+1$ minus the consensus analysts' forecasts of EPS of year $t+1$ issued at the end of year $t$ , scaled by shareholders' equity (#CEQ) at the end of year $t$ .

### Offshore Activities Variables

Output	Natural logarithm of one plus the sum of the counts of offshore output words in the firm's 10-K filing.
Input	Natural logarithm of one plus the sum of the counts of offshore input words in the firm's 10-K filing.
Output_Pred	The predicted value from the annual regression of <i>Output</i> on <i>Input</i> , where <i>Output</i> and <i>Input</i> are defined above.
Output_Resid	The residual value from the annual regression of <i>Output</i> on <i>Input</i> , where <i>Output</i> and <i>Input</i> are defined above.
Input_Haven	Natural logarithm of one plus the sum of the counts of offshore input words in the tax-haven countries in the firm's 10-K filing.

### Control Variables

LnMVE	Natural logarithm of the market value of equity, defined as fiscal-year-end price (#PRCC_F) multiplied by the number of shares outstanding (#CSHO).
MTB	Market-to-book ratio, defined as the market value of equity (#PRCC_F×#CSHO) scaled by the book value of equity (#CEQ).

ROA	Pre-tax income (#PI) minus extraordinary items (#XI) scaled by lagged total assets (#AT). The missing value of #XI is set to zero.
Leverage	Long-term debt (#DLTT) scaled by lagged total assets (#AT). The missing value of #DLTT is set to zero.
Cash	Cash holding (#CHE) scaled by lagged total assets (#AT).
Capex	Capital expenditure (#CAPX) scaled by lagged total assets (AT). The missing value of #CAPX is set to zero.
R&D	Research and development expense (#XRD) scaled by lagged total assets (#AT). The missing value of #XRD is set to zero.
PP&E	Net property, plant, and equipment (#PPENT) scaled by lagged total assets (#AT).
Intangible	Intangible assets (#INTAN) scaled by lagged total assets (#AT). The missing value of #INTAN is set to zero.
NOL	An indicator variable that equals one if the lagged tax loss carryforward (#TLCF) is positive, and zero otherwise. The missing value of #TLCF is set to zero.
ΔNOL	Change in tax-loss carryforward (#TLCF) scaled by lagged total assets (AT).
EqInc	Equity income in earnings (#ESUB) scaled by lagged total assets (#AT). The missing value of #ESUB is set to zero.
Foreign Income	Foreign pre-tax income (#PIFO) scaled by lagged total assets (#AT).
Accruals	Performance-adjusted discretionary accruals estimated following Kothari, Leone, and Wasley (2005).
WA_STR	Weighted average statutory tax rate of the counterparty countries in which the focal firm conducts offshore operations. We use the total number of counts of both input and output-related words as the weights.
WA_GDP	Weighted average of natural logarithm GDP of the counterparty countries in which the focal firm conducts offshore operations. We use the total number of counts of both input and output-related words as the weights.
WA_DistUS	Weighted average of natural logarithm distance from the United States, computed using the latitude and longitude information of the nation's capital city. We use the total number of counts of both input and output-related words as the weights.
WA_RuleLaw	Weighted average rule of law index of the counterparty countries in which the focal firm conducts offshore operations. We use the total number of counts of both input and output-related words as the weights.
NSeg	Natural logarithm of one plus number of business segments.
StdROE	Standard deviation of return on equity (ROE) over the previous 5 years. ROE is defined as pre-tax income (#PI) minus extraordinary items (#XI) scaled by shareholders equity (#CEQ). The missing value of #XI is set to zero.

## Partition Variables

World Uncertainty Index (WUI)	The world uncertainty index for the counterparty country, developed by Ahir et al. (2019).
GDP growth	The growth rate of real GDP per capita, obtained from the World Bank.
Market power	The aggregate measure of the product market power, defined as the mean value of the annual percentile ranks of (1) excess price-cost margin and (2) negative product market fluidity. Product market fluidity is obtained from Hoberg et al. (2014). Excess price-cost margin (PCM) is defined as raw PCM minus the sales-weighted mean of PCM of the firms in the same (2-digit SIC) industry and year, where PCM is defined as operating profit ( $\#SALE - \#COGS - \#XSGA$ ) scaled by sales ( $\#SALE$ ). If $\#COGS$ or $\#XSGA$ is missing, we define operating profit as operating income after depreciation ( $\#OIADP$ ).
Flexibility	The aggregate measure of tax strategy flexibility, defined as the average of the annual percentile ranks of the following seven variables (De Simone et al. 2019): (1) R&D, (2) $\#XAD$ scaled by lagged total assets, (3) $\#XSGA$ scaled by lagged total assets, (4) Intangible, (5) Tobin's Q, (6) negative Capex, and (7) Soft assets ( $\#AT - \#PPENT - \#CHE$ , scaled by lagged total assets).

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**Table 1. Sample-Selection Procedure**

Selection Procedure	Firm-years	Unique Firms
U.S. firms covered in Compustat during 1997-2017	179,731	21,202
<i>Delete:</i>		
Domestic firm observations	131,620	
Observations in financial or utilities (SICs 4900-4999, 6000-6999) industries or missing SICs	4,973	
Observations with #AT<10million	994	
Observations with missing #TXPD	2,043	
Observations with missing or non-positive denominator(#PI-#SPI)	12,112	
Observations missing data of offshore activities	2,407	
Observations with missing control variables	2,353	
Final Sample	23,229	3,487

**Table 2. Summary Statistics and Correlations***Panel A. Summary Statistics*

Variable	N	Mean	Std	Q1	Median	Q3
CashETR	23,229	0.246	0.164	0.126	0.234	0.333
WWETR	21,597	0.299	0.163	0.192	0.299	0.380
CashETR3	21,389	0.270	0.196	0.150	0.247	0.336
Output	23,229	2.901	1.129	2.197	3.045	3.714
Output_pred	23,229	2.611	0.991	1.952	2.736	3.363
Output_Resid	23,229	0.289	1.022	-0.351	0.308	0.957
Input_haven	23,229	0.859	1.109	0.000	0.000	1.609
LnMVE	23,229	6.949	1.983	5.668	6.919	8.204
MTB	23,229	3.562	3.718	1.595	2.460	4.012
ROA	23,229	0.111	0.098	0.049	0.093	0.154
Leverage	23,229	0.189	0.199	0.006	0.149	0.293
Cash	23,229	0.198	0.217	0.041	0.117	0.279
Capex	23,229	0.054	0.052	0.021	0.037	0.067
RD	23,229	0.042	0.063	0.000	0.014	0.062
PPE	23,229	0.242	0.202	0.095	0.184	0.325
Intangible	23,229	0.229	0.237	0.037	0.162	0.352
NOL	23,229	0.483	0.500	0.000	0.000	1.000
$\Delta$ NOL	23,229	0.002	0.061	0.000	0.000	0.001
Eqinc	23,229	0.001	0.004	0.000	0.000	0.000
Foreign Income	23,229	0.031	0.047	0.000	0.014	0.047
Accruals	23,229	-0.054	0.078	-0.096	-0.053	-0.012
WA_STR	23,229	0.307	0.050	0.272	0.302	0.338
WA_GDP	23,229	27.657	1.672	27.343	27.812	28.165
WA_DistUS	23,229	8.582	0.690	8.350	8.760	9.024
WA_RuleLaw	23,229	10.108	0.498	9.890	10.174	10.458
WUI	2,693	0.166	0.145	0.064	0.128	0.233
GDP Growth	3,482	0.024	0.051	0.004	0.024	0.046
Market power	21,934	0.500	0.177	0.382	0.506	0.624
Flexibility	22,934	0.539	0.118	0.454	0.538	0.622
FE_RW	28,310	0.197	0.402	0.033	0.080	0.192
FE_FA	24,682	0.090	0.223	0.012	0.032	0.080
StdROE	28,310	0.271	0.728	0.053	0.102	0.210
Nseg	28,310	1.032	0.561	0.693	0.693	1.609

See the appendix for variable definitions. WUI and GDP growth is summarized at the counterparty country-year level.

Panel B. Correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]
Cash ETR [1]		.008	<b>.014</b>	-.005	<b>-.042</b>	<b>-.016</b>	<b>-.082</b>	<b>-.044</b>	<b>-.023</b>	<b>-.170</b>	<b>-.025</b>	<b>-.173</b>	-.008	<b>-.017</b>	<b>-.116</b>	<b>.042</b>	-.008	<b>-.072</b>	<b>.074</b>	<b>-.012</b>	<b>-.090</b>	<b>.064</b>	<b>-.065</b>	<b>-.023</b>	<b>-.025</b>
Output [2]	<b>.012</b>		<b>.524</b>	<b>.583</b>	<b>.301</b>	<b>.039</b>	<b>-.015</b>	<b>.036</b>	<b>-.059</b>	<b>.073</b>	<b>-.033</b>	<b>.049</b>	<b>-.072</b>	<b>-.066</b>	<b>.082</b>	-.001	<b>.047</b>	<b>.181</b>	<b>.015</b>	<b>-.067</b>	<b>.026</b>	<b>-.168</b>	<b>.201</b>	<b>.000</b>	<b>.049</b>
Output_Pred [3]	<b>.011</b>	<b>.542</b>		<b>-.385</b>	<b>.535</b>	<b>.082</b>	<b>-.099</b>	<b>-.039</b>	<b>.065</b>	<b>-.099</b>	<b>.001</b>	<b>-.085</b>	<b>.111</b>	<b>-.093</b>	<b>.076</b>	<b>.004</b>	<b>.126</b>	<b>.249</b>	<b>.085</b>	<b>.057</b>	<b>-.177</b>	<b>-.225</b>	<b>-.271</b>	<b>-.030</b>	<b>-.092</b>
Output_Resid [4]	<b>.000</b>	<b>.532</b>	<b>-.363</b>		<b>-.185</b>	<b>-.036</b>	<b>.077</b>	<b>.078</b>	<b>-.128</b>	<b>.173</b>	<b>-.040</b>	<b>.134</b>	<b>-.187</b>	<b>.018</b>	<b>.016</b>	<b>-.006</b>	<b>-.071</b>	<b>-.042</b>	<b>-.064</b>	<b>-.125</b>	<b>.199</b>	<b>.034</b>	<b>-.041</b>	<b>.029</b>	<b>-.141</b>
Input_Haven [5]	<b>-.046</b>	<b>.309</b>	<b>.533</b>	<b>-.175</b>		<b>.099</b>	<b>-.025</b>	<b>.015</b>	<b>-.028</b>	<b>.060</b>	<b>-.014</b>	<b>.075</b>	<b>-.025</b>	<b>-.051</b>	<b>.054</b>	<b>.014</b>	<b>.039</b>	<b>.227</b>	<b>-.006</b>	<b>.002</b>	<b>.007</b>	<b>-.319</b>	<b>.317</b>	<b>-.135</b>	<b>.043</b>
LnMVE [6]	<b>.017</b>	<b>.059</b>	<b>.099</b>	<b>-.040</b>	<b>.115</b>		<b>.288</b>	<b>.115</b>	<b>.140</b>	<b>-.074</b>	<b>.010</b>	<b>-.065</b>	<b>.078</b>	<b>.173</b>	<b>.067</b>	<b>.034</b>	<b>.144</b>	<b>.211</b>	<b>-.120</b>	<b>.220</b>	<b>.107</b>	<b>-.157</b>	<b>.018</b>	<b>-.006</b>	<b>.126</b>
MTB [7]	<b>-.043</b>	<b>.004</b>	<b>-.109</b>	<b>.109</b>	<b>-.005</b>	<b>.447</b>		<b>.328</b>	<b>.122</b>	<b>.199</b>	<b>.106</b>	<b>.190</b>	<b>-.017</b>	<b>.012</b>	<b>-.009</b>	<b>.024</b>	<b>.000</b>	<b>.148</b>	<b>-.128</b>	<b>.129</b>	<b>.365</b>	<b>.027</b>	<b>.031</b>	<b>.015</b>	<b>.034</b>
ROA [8]	<b>.043</b>	<b>.032</b>	<b>-.046</b>	<b>.080</b>	<b>.017</b>	<b>.151</b>	<b>.436</b>		<b>-.178</b>	<b>.298</b>	<b>.218</b>	<b>.077</b>	<b>.064</b>	<b>-.099</b>	<b>-.140</b>	<b>-.075</b>	<b>.039</b>	<b>.338</b>	<b>-.086</b>	<b>.318</b>	<b>.348</b>	<b>.052</b>	<b>.037</b>	<b>-.007</b>	<b>-.055</b>
Leverage [9]	<b>.007</b>	<b>-.054</b>	<b>.109</b>	<b>-.169</b>	<b>-.015</b>	<b>.223</b>	<b>.029</b>	<b>-.210</b>		<b>-.316</b>	<b>.120</b>	<b>-.234</b>	<b>.311</b>	<b>.389</b>	<b>.044</b>	<b>.075</b>	<b>.030</b>	<b>-.055</b>	<b>.064</b>	<b>.156</b>	<b>-.021</b>	<b>.018</b>	<b>-.127</b>	<b>-.020</b>	<b>-.028</b>
Cash [10]	<b>-.144</b>	<b>.102</b>	<b>-.055</b>	<b>.172</b>	<b>.092</b>	<b>-.057</b>	<b>.212</b>	<b>.238</b>	<b>-.502</b>		<b>-.027</b>	<b>.529</b>	<b>-.270</b>	<b>-.195</b>	<b>.023</b>	<b>-.022</b>	<b>-.104</b>	<b>.146</b>	<b>-.232</b>	<b>-.133</b>	<b>.257</b>	<b>-.055</b>	<b>.225</b>	<b>.033</b>	<b>.053</b>
Capex [11]	<b>.014</b>	<b>-.025</b>	<b>.038</b>	<b>-.071</b>	<b>-.005</b>	<b>.053</b>	<b>.175</b>	<b>.225</b>	<b>.092</b>	<b>-.083</b>		<b>-.030</b>	<b>.709</b>	<b>-.233</b>	<b>-.103</b>	<b>.036</b>	<b>.040</b>	<b>.070</b>	<b>-.033</b>	<b>.092</b>	<b>.086</b>	<b>.146</b>	<b>-.042</b>	<b>-.058</b>	<b>-.186</b>
R&D [12]	<b>-.190</b>	<b>.078</b>	<b>.044</b>	<b>.042</b>	<b>.137</b>	<b>-.024</b>	<b>.216</b>	<b>.052</b>	<b>-.283</b>	<b>.431</b>	<b>-.070</b>		<b>-.245</b>	<b>-.081</b>	<b>.047</b>	<b>.004</b>	<b>-.081</b>	<b>.059</b>	<b>-.160</b>	<b>-.185</b>	<b>.481</b>	<b>.058</b>	<b>.259</b>	<b>.052</b>	<b>.099</b>
PP&E [13]	<b>.049</b>	<b>-.043</b>	<b>.168</b>	<b>-.220</b>	<b>-.004</b>	<b>.085</b>	<b>-.010</b>	<b>.088</b>	<b>.298</b>	<b>-.316</b>	<b>.738</b>	<b>-.238</b>		<b>-.244</b>	<b>-.102</b>	<b>.041</b>	<b>.112</b>	<b>.030</b>	<b>.055</b>	<b>.202</b>	<b>-.261</b>	<b>.122</b>	<b>-.120</b>	<b>-.076</b>	<b>-.208</b>
Intangible [14]	<b>.013</b>	<b>-.053</b>	<b>-.059</b>	<b>.001</b>	<b>-.029</b>	<b>.224</b>	<b>.051</b>	<b>-.097</b>	<b>.317</b>	<b>-.214</b>	<b>-.305</b>	<b>-.053</b>	<b>-.283</b>		<b>.114</b>	<b>.084</b>	<b>-.045</b>	<b>-.041</b>	<b>-.075</b>	<b>.101</b>	<b>.361</b>	<b>-.155</b>	<b>-.056</b>	<b>.044</b>	<b>.164</b>
NOL [15]	<b>-.138</b>	<b>.075</b>	<b>.083</b>	<b>.013</b>	<b>.055</b>	<b>.083</b>	<b>-.016</b>	<b>-.143</b>	<b>.055</b>	<b>.050</b>	<b>-.125</b>	<b>.064</b>	<b>-.131</b>	<b>.136</b>		<b>-.101</b>	<b>-.023</b>	<b>.035</b>	<b>-.028</b>	<b>-.061</b>	<b>-.011</b>	<b>-.250</b>	<b>.071</b>	<b>.048</b>	<b>.160</b>
ΔNOL [16]	<b>.077</b>	<b>.001</b>	<b>.011</b>	<b>-.009</b>	<b>.005</b>	<b>.053</b>	<b>.004</b>	<b>-.063</b>	<b>.066</b>	<b>-.042</b>	<b>.021</b>	<b>-.037</b>	<b>.047</b>	<b>.042</b>	<b>-.133</b>		<b>-.006</b>	<b>.017</b>	<b>-.010</b>	<b>-.016</b>	<b>.036</b>	<b>.008</b>	<b>.009</b>	<b>-.009</b>	<b>-.012</b>
Eqinc [17]	<b>.008</b>	<b>.043</b>	<b>.134</b>	<b>-.086</b>	<b>.026</b>	<b>.175</b>	<b>-.009</b>	<b>.014</b>	<b>.117</b>	<b>-.152</b>	<b>.043</b>	<b>-.100</b>	<b>.135</b>	<b>.012</b>	<b>.002</b>	<b>.012</b>		<b>.042</b>	<b>.056</b>	<b>.012</b>	<b>-.101</b>	<b>-.018</b>	<b>.018</b>	<b>-.016</b>	<b>-.032</b>
Foreign Income [18]	<b>-.039</b>	<b>.204</b>	<b>.303</b>	<b>-.074</b>	<b>.243</b>	<b>.263</b>	<b>.159</b>	<b>.244</b>	<b>-.002</b>	<b>.125</b>	<b>.014</b>	<b>.120</b>	<b>.010</b>	<b>.029</b>	<b>.076</b>	<b>-.004</b>	<b>.073</b>		<b>-.077</b>	<b>.192</b>	<b>.114</b>	<b>-.128</b>	<b>.204</b>	<b>-.012</b>	<b>-.042</b>
Accruals [19]	<b>.083</b>	<b>.019</b>	<b>.086</b>	<b>-.067</b>	<b>-.002</b>	<b>-.119</b>	<b>-.165</b>	<b>-.108</b>	<b>.103</b>	<b>-.240</b>	<b>-.015</b>	<b>-.126</b>	<b>.079</b>	<b>-.075</b>	<b>-.028</b>	<b>.013</b>	<b>.086</b>	<b>-.039</b>		<b>-.078</b>	<b>-.155</b>	<b>.088</b>	<b>-.023</b>	<b>-.003</b>	<b>-.067</b>
Market Power [20]	<b>.043</b>	<b>-.065</b>	<b>.053</b>	<b>-.120</b>	<b>.004</b>	<b>.232</b>	<b>.198</b>	<b>.347</b>	<b>.168</b>	<b>-.124</b>	<b>.103</b>	<b>-.077</b>	<b>.221</b>	<b>.099</b>	<b>-.063</b>	<b>-.011</b>	<b>.040</b>	<b>.199</b>	<b>-.074</b>		<b>.024</b>	<b>.020</b>	<b>-.024</b>	<b>.014</b>	<b>-.033</b>
Flexibility [21]	<b>-.061</b>	<b>.033</b>	<b>-.177</b>	<b>.212</b>	<b>.017</b>	<b>.103</b>	<b>.514</b>	<b>.378</b>	<b>-.105</b>	<b>.231</b>	<b>.169</b>	<b>.438</b>	<b>-.195</b>	<b>.339</b>	<b>-.008</b>	<b>.004</b>	<b>-.132</b>	<b>.085</b>	<b>-.174</b>	<b>.027</b>		<b>.075</b>	<b>.065</b>	<b>.047</b>	<b>.130</b>
WA_STR [22]	<b>.065</b>	<b>-.162</b>	<b>-.231</b>	<b>.037</b>	<b>-.312</b>	<b>-.156</b>	<b>.033</b>	<b>.055</b>	<b>.017</b>	<b>-.130</b>	<b>.188</b>	<b>.035</b>	<b>.159</b>	<b>-.185</b>	<b>-.262</b>	<b>.020</b>	<b>-.018</b>	<b>-.127</b>	<b>.099</b>	<b>.025</b>	<b>.067</b>		<b>-.226</b>	<b>.066</b>	<b>-.200</b>
WA_DistUS [23]	<b>-.112</b>	<b>.169</b>	<b>.219</b>	<b>-.032</b>	<b>.317</b>	<b>-.014</b>	<b>.044</b>	<b>.025</b>	<b>-.180</b>	<b>.290</b>	<b>-.045</b>	<b>.330</b>	<b>-.136</b>	<b>-.083</b>	<b>.072</b>	<b>-.003</b>	<b>-.017</b>	<b>.189</b>	<b>-.050</b>	<b>-.047</b>	<b>.067</b>	<b>-.222</b>		<b>.004</b>	<b>.737</b>
WA_GDP [24]	<b>-.044</b>	<b>-.063</b>	<b>-.131</b>	<b>.060</b>	<b>-.352</b>	<b>-.039</b>	<b>.028</b>	<b>-.030</b>	<b>-.050</b>	<b>.080</b>	<b>-.121</b>	<b>.117</b>	<b>-.125</b>	<b>.107</b>	<b>.089</b>	<b>-.022</b>	<b>-.030</b>	<b>-.062</b>	<b>-.022</b>	<b>-.004</b>	<b>.065</b>	<b>.055</b>	<b>-.088</b>		<b>.154</b>
WA_RuleLaw [25]	<b>-.029</b>	<b>.003</b>	<b>-.134</b>	<b>.141</b>	<b>.007</b>	<b>.118</b>	<b>.076</b>	<b>-.030</b>	<b>-.043</b>	<b>.112</b>	<b>-.198</b>	<b>.076</b>	<b>-.229</b>	<b>.216</b>	<b>.179</b>	<b>-.018</b>	<b>-.032</b>	<b>.002</b>	<b>-.080</b>	<b>-.040</b>	<b>.128</b>	<b>-.309</b>	<b>-.336</b>		<b>.206</b>

Panel B shows the Pearson (upper) and Spearman (below) correlations of the variables used in the baseline model. Correlations in bold font are significant at the 10% or better level.



**Table 3. Offshore Activities and Tax Avoidance**

Independent Variable	Dependent Variable = Cash ETR			
	(1)	(2)	(3)	(4)
Output	0.006*** (4.12)		0.005*** (2.83)	
Output_Pred	(1)	0.012*** (5.32)		0.008*** (2.66)
Output_Resid	(2)	0.004** (2.24)		0.005** (2.31)
Input_Haven	-0.004*** (-2.67)	-0.007*** (-3.81)	0.002 (0.82)	0.001 (0.27)
LnMVE	0.002* (1.71)	0.002* (1.76)	0.018*** (6.74)	0.017*** (6.71)
MTB	-0.002*** (-3.64)	-0.002*** (-3.51)	-0.001** (-2.26)	-0.001** (-2.22)
ROA	-0.009 (-0.50)	-0.005 (-0.30)	-0.193*** (-8.98)	-0.193*** (-8.95)
Leverage	-0.044*** (-4.53)	-0.046*** (-4.75)	-0.014 (-1.22)	-0.014 (-1.23)
Cash	-0.091*** (-9.93)	-0.090*** (-9.77)	-0.049*** (-4.16)	-0.049*** (-4.15)
Capex	0.045 (1.07)	0.052 (1.23)	0.095** (2.03)	0.095** (2.03)
RD	-0.315*** (-9.21)	-0.307*** (-8.96)	-0.136** (-2.16)	-0.135** (-2.14)
PPE	-0.082*** (-5.22)	-0.086*** (-5.45)	-0.046** (-2.14)	-0.046** (-2.12)
Intangible	-0.018** (-2.31)	-0.017** (-2.13)	-0.005 (-0.53)	-0.005 (-0.53)
NOL	-0.030*** (-9.31)	-0.030*** (-9.37)	-0.017*** (-4.61)	-0.017*** (-4.65)
ΔNOL	0.120*** (5.74)	0.120*** (5.76)	0.073*** (3.72)	0.073*** (3.70)
Eqinc	-0.973** (-2.51)	-1.068*** (-2.76)	-1.669*** (-3.86)	-1.667*** (-3.86)
Foreign Income	-0.122*** (-3.06)	-0.134*** (-3.41)	-0.320*** (-6.65)	-0.321*** (-6.69)
Accruals	0.043** (2.53)	0.042** (2.46)	0.104*** (6.01)	0.103*** (6.01)
WA_STR	0.057 (1.11)	0.042 (0.83)	0.035 (0.60)	0.031 (0.54)
WA_RuleLaw	0.003 (1.02)	0.005 (1.53)	-0.001 (-0.37)	-0.001 (-0.24)
WA_Dist.toUS	0.003 (1.15)	0.003 (0.91)	0.004 (1.09)	0.004 (1.01)
WA_GDP	-0.001	-0.002	-0.000	-0.000

	(-1.52)	(-1.64)	(-0.43)	(-0.45)
Industry fixed effects	√	√		
Year fixed Effects	√	√	√	√
Firm fixed effects			√	√
N	23,229	23,229	23,229	23,229
Adj. R <sup>2</sup>	0.087	0.088	0.295	0.295
<i>p</i> -value for (1) = (2)		0.001		0.237

See the Appendix for detailed variable definitions. *t*-statistics in parentheses are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 4. Alternative Measures of Tax Avoidance**

Independent Variable	Dependent Variable =							
	CashETR3				WWETR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output	0.006*** (3.28)	0.006** (2.36)			0.009*** (5.80)	0.008*** (4.35)		
Output_Pred	(1)		0.015*** (5.02)	0.009** (2.05)			0.014*** (6.48)	0.012*** (3.66)
Output_Resid	(2)		0.003 (1.34)	0.006** (2.09)			0.006*** (3.67)	0.008*** (3.60)
Input_Haven	-0.004* (-1.79)	0.001 (0.36)	-0.008*** (-3.14)	0.000 (0.06)	-0.003** (-2.04)	0.002 (1.14)	-0.006*** (-3.26)	0.001 (0.46)
Control Variables in Table 3	√	√	√	√	√	√	√	√
Industry fixed effects	√	√			√	√		
Year fixed effects	√	√	√	√	√	√	√	√
Firm fixed effects			√	√			√	√
N	21,389	21,389	21,389	21,389	21,597	21,597	21,597	21,597
Adj. R <sup>2</sup>	0.057	0.360	0.059	0.360	0.077	0.289	0.078	0.289
<i>p</i> -value for (1) = (2)			0.000	0.545			0.001	0.206

See the Appendix for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 5. The Moderating Effect of the Uncertainty of and Shocks from Counterparty Countries**

Independent Variable		Dependent Variable = Cash ETR							
		Zc = WUI				Zc = GDP growth			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output with High Zc	(1)	0.006*** (4.55)		0.003*** (2.75)		0.001 (0.96)		0.001 (0.39)	
Output with Med Zc	(2)	0.002* (1.66)		0.002** (1.97)		0.003** (1.97)		0.001 (0.97)	
Output with Low Zc	(3)	0.002 (1.34)		0.000 (0.36)		0.005*** (3.83)		0.003** (2.22)	
Output_Pred with High Zc	(4)		0.009*** (5.19)		0.005*** (2.68)		0.005** (2.37)		0.003 (1.11)
Output_Pred with Med Zc	(5)		0.006*** (3.58)		0.004** (2.33)		0.005*** (2.81)		0.002 (0.80)
Output_Pred with Low Zc	(6)		0.005*** (2.63)		0.001 (0.55)		0.009*** (4.86)		0.004* (1.92)
Output_Resid with High Zc	(7)		0.004*** (2.70)		0.003* (1.90)		0.000 (0.11)		-0.000 (-0.08)
Output_Resid with Med Zc	(8)		0.000 (0.13)		0.002 (1.11)		0.001 (0.96)		0.001 (0.82)
Output_Resid with Low Zc	(9)		0.001 (0.51)		0.001 (0.35)		0.003** (2.02)		0.003* (1.83)
Input_Haven		-0.005*** (-3.02)	-0.009*** (-4.57)	0.002 (0.92)	0.001 (0.34)	-0.005*** (-3.05)	-0.009*** (-4.64)	0.002 (1.03)	0.001 (0.54)
Control Variables in Table 3		√	√	√	√	√	√	√	√
Industry Fixed Effects		√	√			√	√		
Year Fixed Effects		√	√	√	√	√	√	√	√
Firm Fixed Effects				√	√			√	√
Number of Obs.		23229	23229	23229	23229	23229	23229	23229	23229
Adj. R <sup>2</sup>		0.089	0.090	0.295	0.295	0.088	0.090	0.295	0.295
<i>p</i> -value for									
(1) = (3)		0.033		0.091		0.104		0.263	
(4) = (6)			0.082		0.094		0.201		0.633
(7) = (9)			0.176		0.312		0.258		0.240

See the Appendix for detailed variable definitions.  $t$ -statistics (in parentheses) and  $p$ -values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 6. The Moderating Effect of the Ability to Pass on Shocks**

Independent variable	Dependent Variable = Cash ETR			
	(1)	(2)	(3)	(4)
Output	0.017*** (3.92)		0.011** (1.99)	
Output × Market Power	-0.023*** (-2.97)		-0.011 (-1.20)	
Output_Pred		0.028*** (5.22)		0.019*** (2.69)
Output_Pred × Market Power		-0.035*** (-3.83)		-0.022* (-1.90)
Output_Resid		0.008 (1.57)		0.006 (0.98)
Output_Resid × Market Power		-0.009 (-0.97)		-0.004 (-0.31)
Input_Haven	-0.005*** (-2.94)	-0.007*** (-3.87)	0.001 (0.59)	0.000 (0.15)
Market Power	0.048** (1.99)	0.077*** (2.84)	-0.048 (-1.59)	-0.022 (-0.65)
Control Variables in Table 3	√	√	√	√
Industry Fixed Effects	√		√	
Firm fixed Effects		√		√
Year Fixed Effects	√	√	√	√
Number of Obs.	21,934	21,934	21,934	21,934
Adj. R <sup>2</sup>	0.093	0.094	0.300	0.300

See the Appendix for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 7. The Moderating Effect of the Flexibility of Tax-Planning Strategy**

Independent variable	Dependent Variable = Cash ETR			
	(1)	(2)	(3)	(4)
Output	0.023*** (3.54)		0.013* (1.77)	
Output × Flexibility	-0.030*** (-2.65)		-0.014 (-1.07)	
Output_Pred		0.029*** (3.81)		0.022** (2.21)
Output_Pred × Flexibility		-0.032** (-2.38)		-0.026 (-1.57)
Output_Resid		0.012 (1.54)		0.004 (0.42)
Output_Resid × Flexibility		-0.014 (-1.03)		0.003 (0.18)
Input_Haven	-0.005*** (-2.79)	-0.007*** (-3.84)	0.002 (1.02)	0.001 (0.53)
Flexibility	0.029 (0.75)	0.034 (0.81)	-0.152*** (-3.20)	-0.125** (-2.37)
Control Variables in Table 3	√	√	√	√
Industry Fixed Effects	√		√	
Firm fixed Effects		√		√
Year Fixed Effects	√	√	√	√
Number of Obs.	22,934	22,934	22,934	22,934
Adj. R <sup>2</sup>	0.089	0.089	0.298	0.298

See the Appendix for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 8. Tightening the Control for Profitability**

Independent variable	Dependent variable = <i>Cash ETR</i>					
	Low ROA	Medium ROA	High ROA	Low ROA	Medium ROA	High ROA
<i>Output</i>	0.008*** (2.95)	0.005** (2.27)	0.005** (2.44)			
<i>Output_Pred</i> [1]				0.017*** (4.63)	0.008*** (2.63)	0.012*** (3.88)
<i>Output_Resid</i> [2]				0.003 (1.14)	0.003 (1.44)	0.002 (0.83)
<i>p</i> -value for [1] = [2]				0.001	0.156	0.004
Other control variables	√	√	√	√	√	√
Industry and Year fixed effects	√	√	√	√	√	√
Adjusted. R <sup>2</sup>	0.086	0.103	0.170	0.088	0.104	0.172
Number of Obs.	7642	7642	7874	7642	7642	7874

In each year, we sort firms into three groups (low, medium, and high) based on pre-tax ROA. We then estimate the main regressions within each group. *t*-statistics in parentheses are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.



**Table 10. Offshore Activities and Investment in Tax Planning**

Independent variable	Dependent variable = <i>TAX_FEE</i>				Dependent variable = <i>TAX_EMPLOYEE</i>			
Output	0.011 (0.46)		0.009 (0.41)		-0.51 (-1.60)		-0.18 (-1.28)	
Output_pred		0.015 (0.43)		0.012 (0.33)		-1.512*** (-3.23)		-0.500** (-2.25)
Output_resid		0.009 (0.33)		0.01 (0.45)		-0.036 (-0.11)		-0.079 (-0.58)
Input_haven	0.023 (0.89)	0.02 (0.75)	0.046* (1.84)	0.045* (1.70)	-0.231 (-0.83)	0.272 (0.92)	0.055 (0.59)	0.169* (1.87)
Control Variables								
Industry FE	√	√			√	√		
Firm FE			√	√			√	√
Year FE	√	√	√	√	√	√	√	√
Adj.R <sup>2</sup>	0.360	0.360	0.703	0.703	0.450	0.456	0.967	0.967
N	13968	13968	13535	13535	3624	3624	3586	3586

See the Appendix for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 9. Offshore Activities and Earnings Forecast Errors**

Independent Variable	Dependent Variable = $FE_{RW}$				Dependent Variable = $FE_{FA}$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output	0.011*** (4.72)		0.017*** (4.32)		0.004*** (2.82)		0.004** (2.03)	
Output_Pred	(1)	0.020*** (6.22)		0.021*** (3.82)		0.007*** (2.99)		0.007** (2.00)
Output_Resid	(2)	0.006** (1.99)		0.015*** (3.50)		0.003* (1.82)		0.004* (1.69)
LnMVE	-0.035*** (-15.56)	-0.035*** (-15.62)	-0.126*** (-16.48)	-0.126*** (-16.49)	-0.032*** (-19.22)	-0.032*** (-19.23)	-0.062*** (-13.11)	-0.062*** (-13.12)
MTB	0.028*** (13.79)	0.028*** (13.87)	0.045*** (16.10)	0.045*** (16.10)	0.015*** (12.31)	0.015*** (12.32)	0.021*** (12.51)	0.021*** (12.51)
Leverage	0.181*** (9.07)	0.177*** (8.85)	0.065*** (2.63)	0.065*** (2.62)	0.085*** (6.95)	0.084*** (6.82)	0.032*** (2.65)	0.032*** (2.64)
StdROE	0.193*** (14.67)	0.193*** (14.63)	0.152*** (10.49)	0.152*** (10.50)	0.073*** (10.56)	0.073*** (10.55)	0.044*** (6.08)	0.044*** (6.09)
Nseg	0.017*** (3.49)	0.016*** (3.36)	0.012* (1.66)	0.012 (1.64)	0.011*** (3.64)	0.010*** (3.59)	0.005 (1.35)	0.005 (1.35)
RD	0.032 (0.62)	0.049 (0.94)	-0.123 (-1.11)	-0.120 (-1.08)	0.253*** (6.02)	0.257*** (6.12)	-0.008 (-0.13)	-0.006 (-0.11)
Capex	-0.056 (-0.74)	-0.045 (-0.60)	0.051 (0.62)	0.053 (0.64)	-0.037 (-0.87)	-0.034 (-0.80)	0.012 (0.24)	0.012 (0.26)
PPE	-0.122*** (-4.94)	-0.129*** (-5.25)	-0.193*** (-4.57)	-0.193*** (-4.57)	0.002 (0.15)	0.000 (0.02)	-0.017 (-0.82)	-0.017 (-0.81)
Intangible	-0.075*** (-5.24)	-0.072*** (-5.01)	0.007 (0.33)	0.007 (0.33)	-0.041*** (-4.79)	-0.040*** (-4.68)	0.020* (1.79)	0.020* (1.79)
Foreign Income	-0.889*** (-11.99)	-0.911*** (-12.21)	-0.932*** (-8.44)	-0.933*** (-8.45)	-0.218*** (-5.31)	-0.224*** (-5.39)	-0.100* (-1.75)	-0.101* (-1.76)
WA_STR	-0.047 (-0.54)	-0.028 (-0.32)	-0.057 (-0.49)	-0.048 (-0.42)	-0.029 (-0.51)	-0.024 (-0.42)	-0.006 (-0.08)	-0.002 (-0.02)
WA_Distance	0.006 (1.29)	0.003 (0.74)	-0.007 (-0.99)	-0.008 (-1.08)	-0.000 (-0.11)	-0.001 (-0.31)	0.001 (0.23)	0.000 (0.11)
WA_GDP	0.001 (0.43)	0.001 (0.55)	0.004 (0.76)	0.004 (0.78)	-0.001 (-0.36)	-0.000 (-0.29)	-0.003* (-1.71)	-0.003* (-1.68)
WA_RuleLaw	-0.009* (-1.71)	-0.007 (-1.30)	0.006 (0.65)	0.006 (0.72)	-0.004 (-0.91)	-0.003 (-0.79)	0.006 (1.33)	0.007 (1.40)
Industry Fixed Effects	√	√			√	√		
Year Fixed Effects	√	√	√	√	√	√	√	√
Firm Fixed Effects			√	√			√	√
Number of Obs.	28310	28310	28310	28310	24682	24682	24682	24682
Adj. R <sup>2</sup>	0.315	0.316	0.415	0.415	0.247	0.247	0.448	0.448
p-value for (1) = (2)		0.000		0.260		0.116		0.353

See the Appendix for the detailed definitions of other variables. *t*-statistics (in parentheses) are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table 10. Offshore Activities and Investment in Tax Planning**

Independent variable	Dependent variable = <i>TAX_FEE</i>				Dependent variable = <i>TAX_EMPLOYEE</i>			
Output	0.011 (0.46)		0.009 (0.41)		-0.51 (-1.60)		-0.18 (-1.28)	
Output_pred		0.015 (0.43)		0.012 (0.33)		-1.512*** (-3.23)		-0.500** (-2.25)
Output_resid		0.009 (0.33)		0.01 (0.45)		-0.036 (-0.11)		-0.079 (-0.58)
Input_haven	0.023 (0.89)	0.02 (0.75)	0.046* (1.84)	0.045* (1.70)	-0.231 (-0.83)	0.272 (0.92)	0.055 (0.59)	0.169* (1.87)
Control Variables								
Industry FE	√	√			√	√		
Firm FE			√	√			√	√
Year FE	√	√	√	√	√	√	√	√
Adj.R <sup>2</sup>	0.360	0.360	0.703	0.703	0.450	0.456	0.967	0.967
N	13968	13968	13535	13535	3624	3624	3586	3586

See the Appendix for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

## Online Appendix

### Overlap between Exhibit 21 and Hoberg and Moon (2019) Data

We compare the data of offshore activities from Exhibit 21 with that from Hoberg and Moon (2019). Exhibit 21 data show the incorporation location of the subsidiaries. Hoberg and Moon (2019) data provide the location of substantive offshore operations. The results are reported in Figure OA-1. The sample period is 1997-2014 as we use the Exhibit 21 data provided by Scott Dyreng, which only covers till year 2014. Panel A shows the overlap of offshore output activities. We count the *unique* firm-year-counterparty country observations that appear in at least one of the two datasets.<sup>34</sup> Only 15% ( $\frac{99,676}{99,676+575,335}$ ) of the observations are in the haven countries. For the observations in the non-haven countries, 18% appear in both datasets. 38% only appear in the Hoberg and Moon (2019) data and 44% only appear in the Exhibit 21.<sup>35</sup> A similar pattern is observed in Panel B for the offshore input activities. In conclusion, there are many overseas subsidiaries without substantive operating activities and some offshore activities are not conducted in countries reported in Exhibit 21.<sup>36</sup>

### Firm- and Country-Level Determinants of Offshore Activities

We follow Hoberg and Moon (2019) and examine the firm- and country-level determinants of offshore output and input activities and report the results in Table OA-1. Panel A shows the results of the analysis of the firm-level determinants. The dependent variable is *Output* and *Input*.

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<sup>34</sup> These counterparty countries (for each firm-year) are those in which the firm has registered at least one subsidiary or has conducted operating activities (i.e., sales, purchase, or production) in the year.

<sup>35</sup> We also separate the output activities into those in counterparty countries in which the MNC has at least one subsidiary as reported in Exhibit 21 and those in countries with Exhibit 21 subsidiaries. We find that cash ETR is associated with the output intensity in both types of counterparty countries (results untabulated).

<sup>36</sup> Law and Mills (2022) also find that a significant portion of their observations do not have Exhibit 21, and the information contained in the offshore data by Hoberg and Moon (2019) can predict offshore activities when Exhibit 21 information is unavailable.

Since our hypothesis relates to firms' risk and tax avoidance, the explanatory variables include profitability (*ROA*), volatility of profitability (*StdROA*), cash ETR (*Cash ETR*), and volatility of cash ETR (*StdCash ETR*). We also include the other determinants documented in Hoberg and Moon (2019), including firm size, firm age, market-to-book ratio, leverage, cash holdings, capital expenditure, R&D expenditure, PP&E, organizational capital, and capital-to-labor ratio. All independent variables are lagged by one year. Column 1 shows the results of the regression of *Output*. We do not find significant coefficients on *Cash ETR*, *StdCash ETR*, *ROA*, and *StdROA*. Column 2 reports the regression of *Input*. We observe a significant negative coefficient on *ROA*. The coefficients on *Cash ETR*, *StdCash ETR*, and *StdROA* are not significant.

Panel B shows the results of the analysis of country-level determinants. The dependent variable is the aggregated intensity of offshore activities (*Output* or *Input*) conducted by our sample firms in each counterparty country. The independent variables include statutory tax rate, GDP, GDP per capita, distance to the U.S., tariff tax rate, and rule of law. All independent variables also are lagged by one year. Columns 1 and 2 show the results of the regression of *Output* and *Input* respectively. We do not find a significant coefficient on *Statutory Tax Rate*. Consistent with Hoberg and Moon (2019), we find significant coefficients on *GDP*, *Distance to US*, and *Rule of Law*.

### **The Association between Offshore Activities and Foreign and Domestic ETR**

We examine the link between offshore activities and foreign ETR and domestic ETR separately. The regression results are reported in Table OA-2. Panel A shows the summary statistics. Panel B shows the results of the average effect. Column (1) shows that the coefficient on *Output* (0.014,  $t = 6.74$ ) is highly significant in the regressions of foreign ETR that control for

industry fixed effects. Column (2) shows that the coefficient on *Output\_Pred* (0.023,  $t = 7.47$ ) is significantly greater ( $p$ -value = 0.002) than that on *Output\_Resid* (0.011,  $t = 4.47$ ). In columns 3 and 4, the coefficients on *Output* (0.004,  $t = 1.39$ ) and *Output\_Pred* (0.006,  $t = 1.30$ ) are also positive though not statistically significant when firm fixed effects are included. In contrast, as shown in columns 5 to 8, the coefficients on *Output*, *Output\_Pred*, and *Output\_Resid* are far from significant in the regressions of domestic ETR.

Panel C reports the results of the moderating effect of uncertainty of counterparty countries on the link between offshore activities and foreign ETR. The left four columns measure the uncertainty using WUI. The inference is similar to that drawn from the regression of cash ETR albeit the statistical significance is weaker. In column 1, the coefficient on *Output with high WUI* is highly significant (0.008,  $t = 4.75$ ), and is greater than that on *Output with low WUI* (0.004,  $t = 2.37$ ), though the difference is only marginally significant ( $p$ -value = 0.104). Column 2 shows that the coefficient on *Output\_Pred with high WUI* (0.013,  $t = 6.03$ ) is also greater than that on *Output\_Pred with low WUI* (0.010,  $t = 4.38$ ), though the difference is also insignificant ( $p$ -value = 0.276). The results of *Output\_Resid* are similar. The coefficient on *Output\_Resid with high WUI* (0.005,  $t = 2.57$ ) is larger than that on *Output\_Resid with low WUI* (0.001,  $t = 0.72$ ), and the difference is insignificant ( $p$ -value = 0.239). The results from the firm fixed effects regressions, reported in columns 3 and 4, are statistically weaker but similar. In column 3, the coefficient on *Output with high WUI* (0.002,  $t = 1.33$ ) is larger than that on *Output with low WUI* (-0.001,  $t = -0.40$ ), and the difference is not statistically significant ( $p$ -value = 0.221). In column 4, the coefficient on *Output\_Pred with high WUI* (0.005,  $t = 1.92$ ) is larger than that on *Output\_Pred with low WUI* (0.001,  $t = 0.33$ ), and the difference is also insignificant ( $p$ -value = 0.184). Neither the coefficient on *Output\_Resid with high WUI* (0.001,  $t = 0.32$ ) nor that on *Output\_Resid with*

*low WUI* (-0.001,  $t = -0.35$ ) is significant, and the difference is insignificant ( $p$ -value = 0.657), either.

The right four columns report the results of measuring uncertainty of counterparty country by GDP growth. The results are similar. In column 5, the coefficient on *Output with high GDP growth* (0.002,  $t = 1.04$ ) is significantly lower ( $p$ -value = 0.021) than that on *Output with low GDP growth* (0.009,  $t = 5.20$ ). Column 6 shows that the coefficient on *Output\_Pred with high GDP growth* (0.008,  $t = 2.69$ ) is also lower than that on *Output\_Pred with low GDP growth* (0.016,  $t = 6.69$ ), and the difference is significant ( $p$ -value = 0.038). The coefficient on *Output\_Resid with high GDP growth* (0.001,  $t = 0.25$ ) is lower than that on *Output\_Resid with low GDP growth* (0.006,  $t = 2.76$ ), but the difference is insignificant ( $p$ -value = 0.141). Columns 7 and 8 repeat the tests by estimating the firm fixed effects regressions and the results are statistically weaker. In column 7, the coefficient on *Output with high GDP growth* (-0.001,  $t = -0.62$ ) is lower than that on *Output with low GDP growth* (0.002,  $t = 1.05$ ), but the difference is insignificant ( $p$ -value = 0.261). In column 8, the coefficient on *Output\_Pred with low GDP growth* (0.004,  $t = 1.58$ ) is greater than that on *Output\_Pred with high GDP growth* (0.001,  $t = 0.27$ ), but the difference is insignificant ( $p$ -value = 0.361). The coefficient on *Output\_Resid with low GDP growth* (-0.002,  $t = -0.79$ ) and *Output\_Resid with high GDP growth* (0.001,  $t = 0.65$ ) are both insignificant, and so is the difference ( $p$ -value = 0.331).

Panel D reports the results of the moderating effect of uncertainty of counterparty countries on the link between offshore activities and domestic ETR. In general, the link between offshore activities and domestic ETR are very weak. None of the coefficient on the offshore activities measures is significant, with the only two exceptions observed in column 5, where the coefficient



on *Output with low GDP growth* 0.004,  $t = 2.18$ ) is significant, and in column 6, where the coefficient on *Output\_Resid with low GDP growth* (0.005,  $t = 2.11$ ) is significant.

Panel E reports the results of the moderating effects of market power (columns 1 to 4) and tax strategy flexibility (columns 5-8) on the link between offshore activities and foreign ETR. The coefficient on *Output*×*Market Power* (-0.024,  $t = -2.36$ ) is significant in column 1. Column 2 shows that the coefficients on *Output\_Pred*×*Market Power* (-0.024,  $t = -1.96$ ) and *Output\_Resid*×*Market Power* (-0.025,  $t = -1.91$ ) are both significant. Nevertheless, these interaction terms become insignificant in the firm fixed effect regressions reported in columns 3 and 4. Column 5 reports a negative but insignificant coefficient on *Output*×*Flexibility* (-0.024,  $t = -1.55$ ), and column 6 shows a significant coefficient on *Output\_Pred*×*Flexibility* (-0.035,  $t = -1.85$ ). The coefficients on these interaction terms also become insignificant in the firm fixed effect regressions reported in columns 7 and 8.

Panel F reports the results of the moderating effects of market power and tax strategy flexibility on the link between offshore activities and domestic ETR. The moderating effects are insignificant with one exception. Column 2 shows that the coefficient on *Output\_Pred*×*Market Power* (-0.028,  $t = -2.24$ ) is significant.

### **Alternative Specification to Evaluate H2**

We conduct a robustness test that does not rely on the decomposition (of *Output* into *Output\_Pred* and *Output\_Resid*) method. The sales of output are more likely to rely on overseas (domestic) production when *Input* is high (low). Thus, H2 predicts a more positive association between *Output* (a proxy for sales of outputs in overseas markets) and cash ETR when *Input* (a proxy for overseas production) is higher. To evaluate the prediction, we partition the sample into

high and low *Input* groups based on the annual median value of *Input* and examine how the relation between *Output* and cash ETR varies between the firms with high and low *Input*.

The results are reported in Table OA-3. Panel A shows the results of the test of H2. Column 1 reports the results of the industry fixed effects regression. The coefficient on *Output*×*High Input* (0.008,  $t = 3.47$ ) is higher than that on *Output*×*Low Input* (0.002,  $t = 1.27$ ), and the difference is statistically significant ( $p$ -value = 0.042). Column 2 reports the results of firm fixed effects regression. The coefficient on *Output*×*High Input* (0.007,  $t = 2.41$ ) is also higher than that on *Output*×*Low Input* (0.004,  $t = 1.73$ ), though the difference is insignificant ( $p$ -value = 0.400).

Panel B repeats the tests of H3. The moderating effect of uncertainty of or shocks to the foreign markets mainly manifests in the high *Input* group. With one exception, the intensity of offshore output activities conducted in counterparty countries with high, medium, and low uncertainty are not significantly associated with cash ETR. The only exception is the coefficient on *Output with medium WUI* (0.003,  $t = 1.73$ ) reported in column 2. In contrast, for firms with high *Input*, the evidence suggests that the intensity of offshore output activities conducted in counterparty countries with higher uncertainty is more positively associated with cash ETR. Specifically, column 1 shows a significantly ( $p$ -value = 0.033) higher coefficient on *Output with High WUI*×*High Input* (0.008,  $t = 4.53$ ) than that on *Output with Low WUI*×*High Input* (0.002,  $t = 1.63$ ). The results of firm fixed effect regression, as reported in column 2, are similar. The coefficient on *Output with High WUI*×*High Input* (0.004,  $t = 2.61$ ) is also significantly higher ( $p$ -value = 0.073) than that on *Output with Low WUI*×*High Input* (0.000,  $t = 0.17$ ). Columns 3 and 4 report the results of measuring uncertainty by GDP growth. Column 3 finds that the coefficient on *Output with High GDP growth*×*High Input* (0.001,  $t = 0.61$ ) is significantly lower ( $p$ -value = 0.043) than that on *Output with Low GDP growth*×*High Input* (0.007,  $t = 3.75$ ). The results are

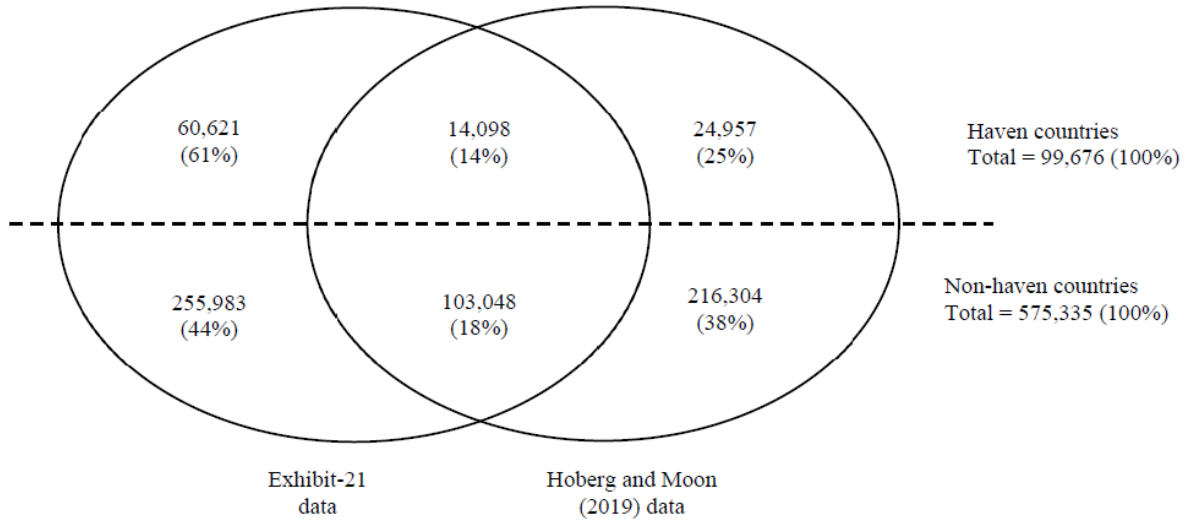
statistically weaker in the firm fixed effect regression reported in column 4. The coefficient on *Output with Low GDP growth*×*High Input* (0.003,  $t = 1.78$ ) is higher than that on *Output with High GDP growth*×*High Input* (0.000,  $t = 0.06$ ), though the difference is insignificant ( $p$ -value = 0.244).

Panel C shows the results of the tests of H4 (columns 1 and 2) and H5 (columns 3 and 4). The inferences are the same as those drawn from Tables 6 and 7. In particular, the coefficients on *Output*×*High Input*×*Z* ( $Z = \text{Market Power or Flexibility}$ ) are negative in all specifications and significant in three out of four specifications. In contrast, the coefficients on *Output*×*Low Input*×*Z* ( $Z = \text{Market Power or Flexibility}$ ) are insignificant in all specifications.

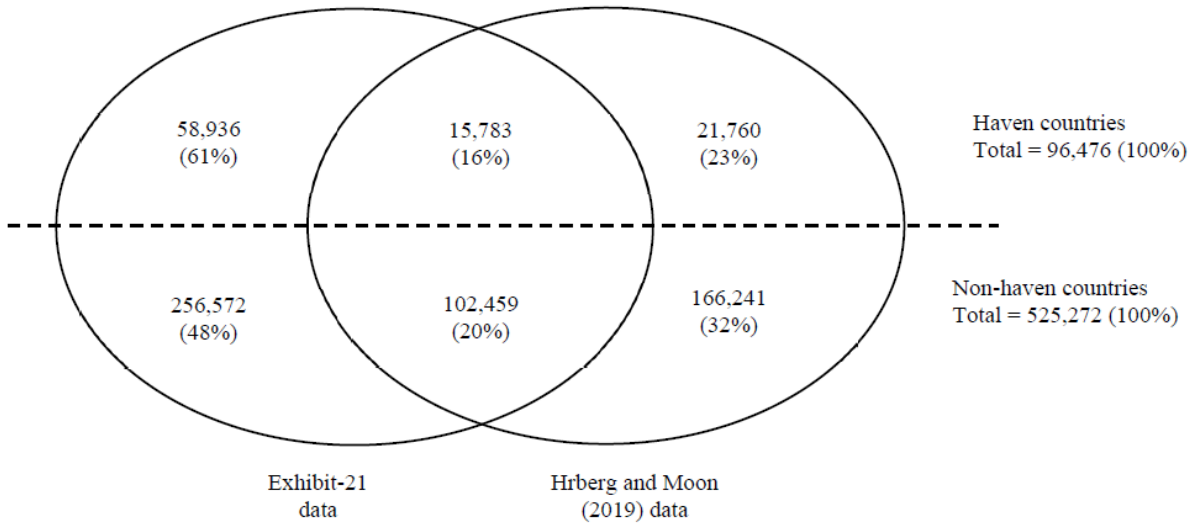
Overall, the results reported in Table OA-3 are similar to those reported in Tables 3, 5, 6, and 7. We conclude that the inferences are robust to alternative specifications.

## Figure OA-1. Overlap between Exhibit 21 and Hoberg and Moon (2019) Data

Panel A. Offshore Output Activities



Panel B. Offshore Input Activities



We include the *unique* firm-year-counterparty country observations that are (1) mentioned to have offshore activities (offshore output activities in Panel A and offshore input activities in Panel B) or (2) reported in Exhibit 21. We classify the counterparty countries as haven and non-haven countries. Figure 1 shows the number of *unique* firm-year-counterparty country observations that only appear in one of the datasets and appear in both. The percentage numbers in the parentheses are percentages of the number of observations in each group to the total observations for each type of counterparty countries. The sample period is limited to 1997-2014 because the Exhibit-21 data end in 2014.

**Table OA-1. Firm- and country-level determinants of offshore output and input activities***Panel A. Firm-level determinants*

Independent variable	Dependent variable is <i>Output</i>		Dependent variable is <i>Input</i>	
	(1)	(2)	(1)	(2)
<i>Cash ETR</i>	0.112 (1.54)	0.102 (1.38)		
<i>Std Cash ETR</i>	0.070 (0.44)	0.136 (0.80)		
<i>ROA</i>	-0.047 (-0.22)	-0.566*** (-2.68)		
<i>StdROA</i>	0.401 (1.55)	0.268 (0.97)		
LnMVE	0.029* (1.95)	0.031** (2.07)		
Firm age	-0.119*** (-4.06)	-0.095*** (-3.17)		
MTB	-0.015*** (-2.75)	-0.017*** (-3.18)		
Leverage	-0.035 (-0.39)	0.242*** (2.63)		
Cash	0.350*** (3.75)	0.310*** (3.11)		
Capex	1.608*** (4.20)	0.301 (0.76)		
RD	-0.792* (-1.89)	-0.948** (-2.14)		
PPE	-0.177* (-1.83)	0.470*** (5.20)		
Dividend Payer	-0.031 (-0.77)	-0.012 (-0.28)		
Organization Capital	0.436*** (3.10)	-0.544*** (-3.83)		
Capital to Labor	-0.004 (-0.14)	-0.038 (-1.24)		
Year FE	√	√		
Industry FE	√	√		
Observations	19,208	19,208		
Adjusted R <sup>2</sup>	0.121	0.287		

The unit of observation is firm-year. All independent variables are lagged by one year. *Std Cash ETR* and *StdROA* are calculated using the observations in the previous four years and have at least two years data. *Age* is defined as the log of one plus firm age based on first appearance in Compustat, *Organization Capital* is defined as Selling, general, and administrative (SG&A) expenses divided by total assets in the prior year, *Capital to Labor* is defined as the log ratio of gross property, plant, and equipment to number of employees, *Dividend Payer* is defined as one if the firm paid dividends in the given year. Other variables are defined in the Appendix of the paper. *t*-statistics in parentheses are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

*Panel B. Country-level determinants*

Independent variable	<i>Output (c,t)</i> (1)	<i>Input (c,t)</i> (2)
<i>Statutory Tax Rate (c,t-1)</i>	0.288 (0.39)	0.607 (0.72)
<i>ln(GDP (c,t-1))</i>	0.883*** (18.04)	0.868*** (19.49)
<i>ln(GDP per capita (c,t-1))</i>	0.057 (0.57)	0.007 (0.07)
<i>Distance to US (c,t-1)</i>	-0.434** (-2.59)	-0.413** (-2.40)
<i>Tariff Tax Rate (c,t-1)</i>	-0.008 (-0.62)	0.007 (0.51)
<i>Rule of Law (c,t-1)</i>	0.277** (2.29)	0.286** (2.32)
Year Fixed Effects	√	√
Adj. R <sup>2</sup>	0.775	0.745
Number of Obs.	2138	2138

The unit of observation is counterparty country-year. Subscript  $c$  and  $t$  refer to counterparty country and year respectively. The dependent variable *Output (c,t)* (*Input (c,t)*) is natural logarithm of the aggregate mentions of the output words related to counterparty country  $c$  in year  $t$  by all firms in our final sample. *Statutory tax rate* is obtained from the Tax Foundation website. *GDP (GDP per capita)* is total (per capita) gross domestic products, obtained from the World Bank. *Tariff tax rate* is the unweighted average of effectively applied rates for all products subject to tariffs calculated for all traded goods, also obtained from the World Bank. *Distance to US* is computed using the latitude and longitude information of the nation's capital city. *Rule of Law* is obtained from the World Bank and is a measure of perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.  $t$ -statistics in parentheses are based on standard errors adjusted for clustering at the country level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table OA-2. Offshore Activities and Foreign and Domestic Effective Tax Rates**

*Panel A: Summary Statistics*

Variable	N	Mean	Std	Q1	Median	Q3
Domestic ETR	14,764	0.292	0.185	0.155	0.300	0.390
Foreign ETR	18,489	0.281	0.185	0.157	0.264	0.369

*Foreign ETR* is defined as current foreign tax expense (#TXFO) scaled by foreign pretax income (#PIFO), constrained between zero and one. *Domestic ETR* is defined as current federal tax expense (#TXFED) scaled by domestic pretax income (#PIDOM), constrained between zero and one. Measuring Domestic ETR by federal tax expense (#TXFED) plus current state tax expense (#TXS, set to zero if missing) scaled by domestic pretax income (#PIDOM) (constrained between zero and one) generates similar results.

Panel B: The Average Effect

Independent Variable	Dependent Variable =							
	Foreign ETR				Domestic ETR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output	0.014*** (6.74)				0.002 (1.06)		0.003 (1.01)	
Output_Pred (1)		0.023*** (7.47)		0.006 (1.30)		0.001 (0.39)		0.004 (0.91)
Output_Resid (2)		0.011*** (4.47)		0.003 (1.05)		0.003 (1.21)		0.003 (1.11)
Input_Haven	-0.010*** (-4.65)	-0.014*** (-5.88)		-0.001 (-0.40)	0.003 (1.30)	0.003 (1.37)	0.003 (0.98)	0.003 (0.85)
Control Variables in Table 3	√	√		√	√	√	√	√
Industry fixed effects	√				√		√	
Year fixed effects	√	√		√	√	√	√	√
Firm fixed effects		√		√		√		√
Number of Obs	18,489	18,489		18,489	14,764	14,764	14,764	14,764
Adj. R <sup>2</sup>	0.114	0.116		0.380	0.116	0.116	0.337	0.337
p-value for (1) = (2)		0.000		0.527		0.647		0.932



Panel C: Moderating Effect of Uncertainty of and Shocks from the Counterparty Countries on the link between offshore activities and foreign ETR

Independent Variable		Dependent Variable = Foreign ETR							
		Zc = WUI				Zc = GDP growth			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output with High Zc	(1)	0.008*** (4.75)		0.002 (1.33)		0.002 (1.04)		-0.001 (-0.62)	
Output with Med Zc	(2)	0.007*** (4.78)		0.002 (1.51)		0.007*** (4.46)		0.002 (0.96)	
Output with Low Zc	(3)	0.004** (2.37)		-0.001 (-0.40)		0.009*** (5.20)		0.002 (1.05)	
Output_Pred with High Zc	(4)		0.013*** (6.03)		0.005* (1.92)		0.008*** (2.69)		0.001 (0.27)
Output_Pred with Med Zc	(5)		0.012*** (5.93)		0.004 (1.57)		0.013*** (5.81)		0.004 (1.63)
Output_Pred with Low Zc	(6)		0.010*** (4.38)		0.001 (0.33)		0.016*** (6.69)		0.004 (1.58)
Output_Resid with High Zc	(7)		0.005** (2.57)		0.001 (0.32)		0.001 (0.25)		-0.002 (-0.79)
Output_Resid with Med Zc	(8)		0.006*** (2.86)		0.002 (1.16)		0.005** (2.37)		0.001 (0.37)
Output_Resid with Low Zc	(9)		0.001 (0.72)		-0.001 (-0.35)		0.006*** (2.76)		0.001 (0.65)
Input_Haven		-0.010*** (-4.75)	-0.016*** (-6.65)	-0.000 (-0.16)	-0.002 (-0.69)	-0.010*** (-4.78)	-0.017*** (-6.99)	-0.000 (-0.08)	-0.002 (-0.78)
Control Variables in Table 3		√	√	√	√	√	√	√	√
Industry Fixed Effects		√	√			√	√		
Year Fixed Effects		√	√	√	√	√	√	√	√
Firm Fixed Effects				√	√			√	√
Number of Obs.		18489	18489	18489	18489	18489	18489	18489	18489
Adj. R <sup>2</sup>		0.116	0.119	0.380	0.380	0.115	0.119	0.380	0.380
<i>p</i> -value for									
(1) = (3)		0.104		0.221		0.021		0.261	
(4) = (6)			0.276		0.184		0.038		0.361
(7) = (9)			0.239		0.657		0.141		0.331

Panel D: Moderating Effect of Uncertainty of and Shocks from Counterparty Countries on the Link between Offshore Activities and Domestic ETR

Independent Variable		Dependent Variable = Domestic ETR							
		Zc = WUI				Zc = GDP growth			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output with High Zc	(1)	0.001 (0.87)		0.002 (0.82)		-0.002 (-0.86)		0.001 (0.48)	
Output with Med Zc	(2)	0.002 (1.24)		0.001 (0.54)		0.000 (0.23)		0.001 (0.41)	
Output with Low Zc	(3)	0.000 (0.13)		0.002 (1.13)		0.004** (2.18)		0.000 (0.05)	
Output_Pred with High Zc	(4)		0.002 (0.83)		0.003 (1.20)		-0.002 (-0.68)		0.003 (1.09)
Output_Pred with Med Zc	(5)		0.000 (0.15)		0.001 (0.43)		-0.001 (-0.37)		0.001 (0.30)
Output_Pred with Low Zc	(6)		-0.002 (-0.61)		0.003 (1.03)		0.003 (1.08)		0.000 (0.07)
Output_Resid with High Zc	(7)		0.001 (0.38)		0.001 (0.36)		-0.002 (-0.71)		0.000 (0.04)
Output_Resid with Med Zc	(8)		0.003 (1.39)		0.001 (0.66)		0.001 (0.59)		0.001 (0.62)
Output_Resid with Low Zc	(9)		0.001 (0.67)		0.002 (0.96)		0.005** (2.11)		0.000 (0.18)
Input_Haven		0.003 (1.29)	0.004 (1.60)	0.003 (0.92)	0.002 (0.67)	0.003 (1.39)	0.004* (1.67)	0.003 (1.05)	0.003 (0.79)
Control Variables in Table 3		√	√	√	√	√	√	√	√
Industry Fixed Effects		√	√			√	√		
Year Fixed Effects		√	√	√	√	√	√	√	√
Firm Fixed Effects				√	√			√	√
Number of Obs.		14764	14764	14764	14764	14764	14764	14764	14764
Adj. R <sup>2</sup>		0.116	0.116	0.337	0.337	0.116	0.116	0.337	0.337
<i>p</i> -value for									
(1) = (3)		0.631		0.867		0.064		0.760	
(4) = (6)			0.326		0.854		0.262		0.441
(7) = (9)			0.844		0.688		0.083		0.928

Panel E: Moderating effect of market power and flexibility in adjusting tax strategy on the link between offshore activities and foreign ETR

Independent variable	Dependent Variable = Foreign ETR							
	Z = Market Power				Z = Flexibility			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output	0.027*** (4.63)		0.012* (1.75)		0.027*** (3.06)		-0.001 (-0.07)	
Output × Z	-0.024** (-2.36)		-0.014 (-1.22)		-0.024 (-1.55)		0.007 (0.42)	
Output_Pred		0.036*** (5.00)		0.009 (0.94)		0.042*** (3.96)		-0.004 (-0.38)
Output_Pred × Z		-0.024** (-1.96)		-0.005 (-0.31)		-0.035* (-1.85)		0.016 (0.81)
Output_Resid		0.023*** (3.31)		0.011 (1.43)		0.014 (1.30)		0.002 (0.17)
Output_Resid × Z		-0.025* (-1.91)		-0.014 (-1.00)		-0.008 (-0.39)		0.001 (0.06)
Input_Haven	-0.011*** (-5.00)	-0.015*** (-6.26)	-0.000 (-0.03)	-0.001 (-0.21)	-0.010*** (-4.64)	-0.014*** (-5.91)	-0.000 (-0.06)	-0.001 (-0.27)
Z	0.085** (2.55)	0.084** (2.28)	0.017 (0.46)	-0.007 (-0.15)	0.167*** (3.13)	0.198*** (3.31)	0.062 (1.10)	0.036 (0.55)
Control Variables in Table 3	√	√	√	√	√	√	√	√
Industry Fixed Effects	√		√		√		√	
Firm fixed Effects		√		√		√		√
Year Fixed Effects	√	√	√	√	√	√	√	√
Number of Obs.	17,676	17,676	17,676	17,676	18,268	18,268	18,268	18,268
Adj. R <sup>2</sup>	0.115	0.117	0.379	0.379	0.116	0.118	0.379	0.379

Panel F: Moderating effect of market power and flexibility in adjusting tax strategy on the link between offshore activities and foreign ETR

Independent variable	Dependent Variable = Domestic ETR							
	Z = Market Power				Z = Flexibility			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Output	0.005 (0.81)		-0.000 (-0.07)		-0.011 (-1.24)		0.002 (0.19)	
Output × Z	-0.005 (-0.52)		0.005 (0.44)		0.024 (1.47)		0.001 (0.07)	
Output_Pred		0.015** (2.05)		0.006 (0.74)		-0.015 (-1.28)		-0.004 (-0.31)
Output_Pred × Z		-0.028** (-2.24)		-0.009 (-0.60)		0.029 (1.44)		0.014 (0.60)
Output_Resid		-0.004 (-0.52)		0.002 (0.21)		-0.005 (-0.50)		-0.000 (-0.03)
Output_Resid × Z		0.012 (0.98)		0.002 (0.17)		0.014 (0.71)		0.007 (0.32)
Input_Haven	0.002 (0.72)	0.002 (0.76)	0.002 (0.57)	0.002 (0.60)	0.003 (1.42)	0.004 (1.39)	0.003 (1.00)	0.003 (0.91)
Z	0.020 (0.58)	0.072* (1.93)	-0.015 (-0.36)	0.023 (0.51)	0.111* (1.90)	0.098 (1.48)	0.045 (0.65)	0.009 (0.12)
Control Variables in Table 3	√	√	√	√	√	√	√	√
Industry Fixed Effects	√		√		√		√	
Firm fixed Effects		√		√		√		√
Year Fixed Effects	√	√	√	√	√	√	√	√
Number of Obs.	14,094	14,094	14,094	14,094	14,573	14,573	14,573	14,573
Adj. R <sup>2</sup>	0.116	0.117	0.338	0.338	0.121	0.121	0.336	0.336

See the Appendix of the article and Table OA-1 for variable definitions. *t*-statistics (in parentheses) are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

**Table OA-3. Results based on Alternative Specifications***Panel A. The difference in the main effect*

		Dependent variable = Cash ETR	
Independent variable		(1)	(2)
Output× Low Input	(1)	0.002 (1.27)	0.004* (1.73)
Output× High Input	(2)	0.008*** (3.47)	0.007** (2.41)
High Input		-0.007 (-0.74)	-0.004 (-0.38)
Input_Haven		-0.006*** (-3.48)	0.001 (0.52)
Control Variables in Table 3		√	√
Industry Fixed Effects		√	
Firm Fixed Effects			√
Year Fixed Effects		√	√
Number of Obs		23,229	23,229
Adj. R <sup>2</sup>		0.088	0.295
<i>p</i> -value for (1) = (2)		0.042	0.400

Panel B. The difference in the moderating effect of counterparty country risks

Independent Variable		Dependent Variable = Cash ETR			
		Zc = WUI		Zc = GDP	
		(1)	(2)	(3)	(4)
Output with high Zc × Low Input	(1)	0.002 (1.40)	0.002 (1.18)	0.001 (0.40)	0.001 (0.49)
Output with medium Zc × Low Input	(2)	0.002 (1.09)	0.003* (1.73)	0.002 (1.01)	0.002 (1.36)
Output with low Zc × Low Input	(3)	-0.001 (-0.30)	0.000 (0.17)	0.002 (1.31)	0.002 (1.29)
Output with high Zc × High Input	(4)	0.008*** (4.53)	0.004*** (2.61)	0.001 (0.61)	0.000 (0.06)
Output with medium Zc × High Input	(5)	0.001 (0.73)	0.002 (0.99)	0.002 (1.20)	-0.000 (-0.05)
Output with low Zc × High Input	(6)	0.002 (1.63)	0.000 (0.17)	0.007*** (3.75)	0.003* (1.78)
High Input		-0.002 (-0.37)	0.004 (0.50)	0.000 (0.06)	0.009 (1.15)
Input_Haven		-0.007*** (-3.79)	0.001 (0.58)	-0.007*** (-3.77)	0.002 (0.73)
Control Variables in Table 3		√	√	√	√
Industry Fixed Effects		√		√	
Year Fixed Effects		√	√	√	√
Firm Fixed Effects			√		√
Number of Obs.		23229	23229	23229	23229
Adj. R <sup>2</sup>		0.089	0.295	0.089	0.295
<i>p</i> -value for					
(1) = (3)		0.261	0.485	0.654	0.691
(4) = (6)		0.033	0.073	0.043	0.244

Panel C. The difference in the moderating effect of market power and flexibility in adjusting tax strategy

Independent variable	Dependent Variable =Annual Cash ETR			
	Z = Market Power		Z = Flexibility	
	(1)	(2)	(3)	(4)
Output×Low Input	0.006 (1.08)	0.012 (1.56)	0.010 (1.10)	-0.006 (-0.59)
Output×Low Input×Z	-0.008 (-0.76)	-0.014 (-1.10)	-0.013 (-0.82)	0.018 (1.00)
Output×High Input	0.022*** (2.81)	0.007 (0.80)	0.026** (2.44)	0.025** (2.25)
Output×High Input×Z	-0.028** (-2.08)	-0.002 (-0.13)	-0.034* (-1.75)	-0.033* (-1.69)
High Input	-0.018 (-0.58)	0.034 (0.98)	-0.035 (-0.80)	-0.062 (-1.30)
High Input×Z	0.019 (0.36)	-0.067 (-1.20)	0.058 (0.75)	0.104 (1.26)
Z	0.029 (1.04)	-0.026 (-0.74)	-0.011 (-0.24)	-0.212*** (-3.75)
Input_Haven	-0.006*** (-3.60)	0.001 (0.40)	-0.006*** (-3.51)	0.002 (0.74)
Control Variables in Table 3	√	√	√	√
Industry Fixed Effects	√		√	
Firm Fixed Effects		√		√
Year Fixed Effects	√	√	√	√
Number of Obs.	21,934	21,934	22,934	22,934
Adj. R <sup>2</sup>	0.094	0.300	0.089	0.298

In each year, we partition the sample based on the annual median value of *Input* into the high (*High\_Input* = 1) and low (*Low\_Input* = 1) group. In Panel B, for each year, we partition the counterparty countries based on the measure of uncertainty (WUI for column 1 and GDP growth for column 2). We then compute *Output* within each group of counterparty countries as natural logarithm of one plus the total counts of output words associated with the counterparty countries in the group. See the Appendix of the paper for detailed variable definitions. *t*-statistics (in parentheses) and *p*-values are based on standard errors adjusted for clustering at the firm level. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

As the Editor and Reviewer will understand, it is not feasible to provide all the changes to the manuscript we have made in a document. We have made very extensive changes following reviewer comments and detail those in the **Response to Reviewer** document.