Journal of Accounting and Economics 75 (2023) 101568

Contents lists available at ScienceDirect

Journal of Accounting and Economics

journal homepage: www.journals.elsevier.com/journal-of-accounting-and-economics

Tax and tariff planning through transfer prices: The role of the head office and business unit☆

Saskia Kohlhase [a,*], Jacco L. Wielhouwer [b]

[a] Erasmus University Rotterdam Rotterdam School of Management, Netherlands
[b] Vrije Universiteit Amsterdam School of Business and Economics, Netherlands

ARTICLE INFO

Article history:
Received 22 April 2021
Received in revised form 17 October 2022
Accepted 8 November 2022
Available online 13 November 2022

JEL classification:
D22
D23
H26
L21
M41

Keywords:
Tax optimization
Tariff optimization
Multinational corporations
Transfer price
Incoterms

ABSTRACT

We study the roles of the head office (HO) and the business units (BUs) of a multinational corporation (MNC) in reducing income tax and tariff payments through internal transfer prices in international trades. Using confidential transfer price data of a large MNC, we analyze how the different elements of internal transfer prices set by the HO and BUs vary differently from external prices with income tax rates, tariff rates, and the tradeoff between the two. Absent severe agency conflicts, we find that the BUs contribute more to tax planning than the HO, despite that explicit incentives to do so are not included in the compensation schemes. The roles of the HO and BUs vary with product market competition, the risk of conflicts with tax and customs authorities, and agency problems within the firm. Moreover, we provide evidence of strategic trade cost allocations among BUs to reduce income taxes.

1. Introduction

We investigate how the different elements of transfer prices set by either the head office (HO) or the business unit (BU) for cross-border trades within multinational corporations (MNCs) reflect corporate tax and tariff planning. International trade, tax avoidance, and import tariffs are extensively discussed in the media, politics, and academia. MNCs are at the core of these discussions. On the one hand, MNCs' trades make goods and services available around the globe. On the other hand, MNCs use transfer prices charged in intrafirm trades to shift profits across countries and avoid taxes internationally (Huizinga and Laeven, 2008; Dischinger and Riedel, 2011; De Simone, 2016; Klassen and Laplante, 2012; Cristea and Nguyen, 2016;

☆ We greatly appreciate helpful comments from the editor (Joanna Wu), an anonymous reviewer, Harald Amberger, Tobias Bornemann, Vanessa Flagmaier, Ken Klassen, Regina Ortmann, Mariana Sailer, Richard Sansing, Cinthia Valle Ruiz, Milda Tylaite (discussant), Jesse van der Geest (discussant), Johannes Voget, participants of the Dutch Workshop on Corporate Taxation 2019, the Finance and Accounting Research Seminar at WHU Otto Beisheim School of Management, the Accounting Seminar Series of Graz University, the Accounting Seminar at Erasmus University Rotterdam, the European Accounting Symposium for Young Scholars (EASYS), the Dutch Junior Accounting Meeting, and the 43rd Annual Congress of the European Accounting Association.

* Corresponding author. Rotterdam School of Management, Erasmus University, Postbus 1738, 3000 DR Rotterdam, Netherlands.
E-mail addresses: kohlhase@rsm.nl (S. Kohlhase), j.l.wielhouwer@vu.nl (J.L. Wielhouwer).

https://doi.org/10.1016/j.jacceco.2022.101568

Davies et al., 2018). Intrafirm trade is an important portion of international trade, accounting for 46%−53% of U.S. imports and 33% of U.S. exports (Bernard et al., 2010; Irarrazabal et al., 2013). Transfer pricing in intrafirm trades is one of the main means for profit shifting (Heckemeyer and Overesch, 2017). However, evidence on how the firm adjusts its transfer prices is limited, as researchers are mostly unable to observe the types, quantities, and transfer pricing elements of traded goods.

Transfer prices are relevant not only for internal profit allocation and taxation but also for tariff payments levied on cross-border shipments of goods. Due to the limited availability of data on actual transfer prices, most profit shifting literature has focused on the relation of profit levels with tax rates and occasionally also tariffs (Blouin et al., 2018; De Simone et al., 2017; Heckemeyer and Overesch, 2017; Hines and Rice, 1994; Huizinga and Laeven, 2008). Some studies investigate the influence of taxes or tariffs on (transfer) prices (Bernard et al., 2006; Clausing, 2003; Cristea and Nguyen, 2016; Davies et al., 2018; Swenson, 2001). Using detailed confidential trade and transfer pricing data for a large German MNC, we analyze how taxes and tariffs relate to the different elements of transfer prices set by the HO and BUs. Elements of these transfer prices are the cooperatively determined unit cost, the markups set by the HO, and the final price adjustment made by the BU. In this way, we demonstrate the extent to which the HO and local BUs contribute to tax cost reduction at the MNC level.

Investigating the roles of the HO and BUs is particularly interesting because tax burden minimization is a typical agency conflict. BUs have superior information on how to set transfer prices that lower the MNC's tax burden, but BUs' incentives to maximize local profits may conflict with the HO's tax optimization objective. However, there are several reasons why BUs may act in line with MNC objectives instead of maximizing local profits. The long-term relationship between the BU and HO implies that future expected payoffs are included in current decisions. Implicit incentives such as possible (cross-border) promotions and training may stimulate BU managers to act in the MNC's interest (Ederhof, 2011). Moreover, less calculative aspects such as justice, trust, or socially derived interests may also play an important role in BU managers' incentives (Kim and Mauborgne, 1993; Wiseman et al., 2012). Examining whether and under what conditions BU managers engage in tax planning, although this may lower their local profit, provides relevant insights into this agency problem.

A unique feature of our study is that we can investigate the MNC's internal and external prices and the separate price elements charged by the HO and the BUs for all goods exported from European Union countries to any other country in the world. Our focal firm uses one set of books, which means that the MNC uses transfer prices to determine BUs' incentive compensation, tax transfer pricing, and tariff payments. We note that this is quite representative of common practice, as 80% of firms use one set of books (Baersch et al., 2019b; EY, 2003).[1] Our firm also follows common practice by using a cost-plus pricing method (Baersch et al., 2019a; EY, 2010), which implies that it sets transfer prices such that a product's unit cost is determined first, after which markups are set relative to these unit costs. We can differentiate between the unit cost per product, markups set by the HO, and BUs' subsequent discretionary price adjustments. In addition, our data show the countries involved, the final tariff rate of a product, and the incoterms chosen for each trade. The incoterms are the "international commercial terms" that determine the allocation of trading costs between two trading partners.

We conduct our analyses along two main lines. Our first set of analyses shows how unit costs, HO markups, and BU price adjustments relate to tax rate differentials between importing and exporting countries and import tariffs. Differences between these relations for internal and external transactions indicate income tax and tariff planning. We find evidence of tariff but not income tax planning in the unit cost component of a transfer price that is set cooperatively by the BU and the HO. The HO markups reveal income tax but not tariff planning. The BUs' price adjustments lower both income taxes and tariff payments. The informational advantage of the BU may explain the difference between the HO and BUs. While HO markups are set at an early stage based on aggregated expected product trade levels, the price adjustments of the BU are made per trade when all relevant tax variables are known.

In additional analyses, we show how the HO and BUs differ in tax (i.e., income tax and tariff) planning depending on the product market, risk of conflicts with regulators, and agency issues within the firm. The MNC engages in less tax planning in highly competitive markets than in those where the MNC is a product market leader and can set stable prices. Tax planning in competitive markets primarily occurs via BU price adjustments rather than already being present in the unit cost. This pattern may arise because competitive pressure limits the opportunities for tax planning in components of the transfer price set early in the price-setting process (unit cost and HO markup), and the MNC needs to rely on the BUs' superior information. We also find that the HO elements of the transfer price reflect the risk of conflicts with tax authorities, while the BU elements reflect the risk of conflicts with customs authorities. This finding is intuitive because in the focal MNC, the HO primarily deals with tax disputes, which generally occur on an annual basis, whereas BUs address conflicts with customs authorities, which are more operational on a day-to-day basis. Finally, BUs engage in less tax planning in countries for which the HO indicated that it is more difficult to motivate BUs to act in the MNC's interest. For these countries, tax planning is greater in those elements of the transfer price for which the HO is responsible.

In our second set of analyses, we analyze whether BUs use the incoterms to strategically allocate trade costs to lower the income tax burden. Incoterms are the "world's essential terms of trade for the sale of goods" (International Chamber of Commerce, 2020) and define whether the buyer or the seller bears the costs of transportation, shipment, insurance, and tariff payments. Thus, incoterms define whether these costs arise in the importing or the exporting country. We find that for

[1] Narayanan and Smith (2000) indicate that compliance with tax regulations discourages the use of multiple sets of books. The findings in Baersch et al. (2019b) are based on a survey of MNCs with affiliates in German-speaking countries; the EY (2003) report presents results based on a survey in 22 and interviews in 44 countries from different regions around the world.

internal trades, the BUs allocate more costs of trade to the country with higher tax rates. In addition, internal transfer prices do not reflect these cost allocations, whereas external prices do. Together, this implies that the higher the tax rate of the exporting country, the more costs the BU in this country bears *without* charging its trading partner, which indicates that this cost allocation is used to reduce the income tax burden.

We contribute to the literature in three ways. First, we provide insight into *how* and *where* in the organization income tax and tariff planning through transfer pricing takes place. Although Hanlon and Heitzman (2010) identified transfer pricing as a key research area over ten years ago, detailed analysis remains scarce. While research has argued that central tax planning departments do the tax planning (Baldenius et al., 2004; Chen et al., 2015) and coordination between the HO and the BU may contribute to tax planning (Blouin at el., 2018),[2] we provide insight into (i) which components of the transfer price are adjusted and (ii) what the roles of the HO and BU are. We find that many tax benefits associated with internal transfer prices are realized at the BU level in the MNC we study. This finding challenges conventional ideas about tax planning throughout the organizational hierarchy, calls for more research in this area, informs firms about how to reduce the tax burden, and informs regulators about how to supervise tax transfer pricing. Contrary to the general patterns demonstrated by large-scale data for many firms (e.g., Bernard et al., 2006; Blouin et al., 2018; Swenson, 2001), our detailed data provide greater insight into processes and practices within a firm.

Second, we contribute to research on the benefits of delegation versus centralization of decision rights. Our in-depth firm analysis of BU decisions in a decentralized setting complements survey research on the delegation of decision rights (Chen et al., 2015; Graham et al., 2015) and archival research on factors associated with decision rights delegation (Robinson and Stocken, 2013). Our results indicate that decision-making at the BU level does not necessarily conflict with firm objectives. Instead, the finding that BUs contribute especially to tariff planning, for which they have more insight into the transactions and risks, provides empirical evidence for the theoretical prediction that delegating decision rights is beneficial if the information disadvantage of the principal is large (Dessein, 2002). Moreover, our finding that with severe agency conflicts, the HO incorporates tax and tariff planning in the unit cost it sets, using BU input, provides novel evidence that communication is preferred over delegation when incentive conflicts are large (Dessein, 2002).

Third, we add to the literature on how firms avoid taxes by strategically allocating costs. In addition to strategic allocation of interest rate costs (Heckemeyer and Overesch, 2017) and overhead costs or the location of physical activities (Hall and Lusch, 2018), we focus on trade costs. International trade costs are substantial cost components and amount to approximately 74% of production costs on average (Anderson and Van Wincoop, 2004). We provide empirical evidence of a thus far undocumented income-shifting channel, which allocates trade costs to the higher tax BU without adjusting the transfer price. Although trade costs should formally affect the arm's length price,[3] regulators cannot easily enforce this because products with similar face values may be traded under different unobservable trade terms (incoterms). This opens the way to strategically allocate trade costs without necessarily changing the transfer price.

2. Related literature and firm setting

2.1. Literature

Tax rates, tariffs and transfer prices - Almost 50 years ago, Horst (1971, p. 1061–1062) derived the marginal benefits of adjusting transfer prices: "Since effective tax rates have a tendency to converge to a common value, most firms would have an incentive to minimize transfer prices and save on tariff costs. […] Only in the unlikely case that the relative tax rate differential exceeded the tariff rate would a firm choose the maximal transfer price, take a beating on its tariff costs, but evade the high tax rate in the importing country." Since then, much research on income shifting has focused on the effect of the tax rate differential on profit levels (De Simone, 2016; De Simone et al., 2017; Grubert and Mutti, 1991; Hines and Rice, 1994; Heckemeyer and Overesch, 2017; Huizinga and Laeven, 2008) or prices (Clausing, 2003; Cristea and Nguyen, 2016; Davies et al., 2018). These studies provide strong evidence that firms shift profits to lower-tax jurisdictions. Only a few studies include the effect of tariffs on profit levels (Blouin et al., 2018) or prices (Swenson, 2001; Bernard et al., 2006).[4]

Blouin et al. (2018) demonstrate that tariffs are an important factor in explaining BU profit levels and may dominate the income tax effect when tariff and income tax incentives conflict. They find that coordination between income tax and customs authorities reduces the possibility of optimizing income taxes for MNCs. Bernard et al. (2006) show that prices for related party trades are lower than arm's length prices when tariffs are higher, although this result depends on incorporating product fixed effects. Swenson (2001) finds evidence of price adjustments based on the marginal benefits of altering transfer prices in response to the combined effect of tax rates and tariffs. Contrary to the above studies, we focus on the elements of the transfer price used to achieve income tax and tariff planning and the separate roles of the HO and BU in setting transfer prices.

[2] Blouin et al. (2018) use several proxies to measure the extent of coordination between customs and income tax functions, of which some relate to more expected alignment between HO and BU.

[3] The arm's length price is the price that would be charged to an unrelated party. Internal transfer prices should be at arm's length. The OECD transfer pricing guidelines describe several methods to determine arm's length prices (OECD, 2022).

[4] Grubert and Mutti (1991) also consider tariffs but study the effect on real investments of U.S. corporations.

Agency conflict and tax transfer pricing - The transfer pricing decision within MNCs can be seen as an agency conflict in which the HO seeks to maximize the MNC's profit, and the local BUs have superior information but optimize their local objectives (Hoenen and Kostova, 2015; Jensen and Meckling, 1976; Kostova et al., 2018). Several analytical studies have studied transfer pricing centralization from this perspective (Baldenius et al., 2004; Löffler, 2019). The only empirical studies on transfer pricing centralization that we are aware of are survey studies by Chen et al. (2015) and Baersch et al. (2019b). Chen et al. (2015) study what drives the delegation of transfer price decisions and show that delegation becomes less likely when tax rate differences increase. Baersch et al. (2019b) study how the centralization of transfer price decisions varies with perceptions of tax risk and internal coordination conflicts. Whereas these studies focus on whether to delegate transfer pricing decisions, we study the actual decisions made by the HO and BUs given the level of delegation.

While centralizing the transfer pricing decision solves the conflict between the HO's incentive to optimize taxes and BUs' incentives to maximize local profits, it ignores the BUs' superior information. Agency theory indicates that an MNC that delegates decision rights can align interests, for instance, by increasing compensation for BU managers tied to MNC incentives such as equity (e.g., Oxley and Pandher, 2016). In line with this relation between delegation and incentive compensation, Nagar (2002) finds that a retail bank's branch managers with greater authority have higher incentive-based compensation. In addition to the sensitivity to pay for performance, the relative importance of global compared to local performance measures increases with authority (Wulf, 2007). The degree of decision rights delegation depends on the quality of the measures available for contracting (Moers, 2006).[5]

The MNC we study uses profits and sales quantities rather than equity incentives as the basis for local BU manager bonuses. However, assuming that local BUs therefore only optimize their profit-based incentives in each period ignores that local BUs may care about their relationship with the HO. The fact that BUs will repeatedly interact with the HO in the future implies that future expected payoffs are included in the expected utility of current decisions. Promotion possibilities generate implicit incentives that could incentivize agents to act in the MNC's interest and serve as a substitute for explicit performance incentives (Ederhof, 2011). Additionally, a more social theory of agency (Wiseman et al., 2012) incorporates concepts such as trust, justice, and relationships that may affect the extent to which BUs act in the interest of the MNC (Kim and Mauborgne, 1993; Reilly et al., 2012). We investigate the extent to which the HO and the BU contribute to tax and tariff planning in a setting that can be characterized as rather decentralized, as evidenced by the fact that BUs face no explicit limitations to adjusting final prices.

Using transfer prices for incentives and taxation - Transfer prices within an MNC allocate taxable profits and provide incentives to BUs for operational decisions. Several studies investigate the tension between optimizing taxes and providing management incentives depending on whether these objectives are based on the same transfer prices (i.e., use one set of books) or not (i.e., use two sets of books). Baldenius et al. (2004) suggest that using different books for internal compensation and taxation is preferable, as the optimal taxation price may not yield the preferred incentive outcomes. However, many strategic effects are studied in a one-set-of-books setting. For instance, Halperin and Srinidhi (1991) study the efficiency of resource allocation in a decentralized firm that uses the same transfer price for taxation and performance evaluation. Narayanan and Smith (2000) study tax optimization combined with the strategic effect of transfer prices on a competitor. Dürr and Göx (2011) show that strategic benefits may outweigh the benefits of using different books such that one set of books may be the preferred choice, which is in line with common practice.

2.2. Research setting and transfer pricing policy of the focal firm

The firm whose transfer prices we analyze — hereafter 'the MNC' — is a German publicly listed MNC that operates globally. The MNC uses one set of books (i.e., the same transfer prices for tax and internal compensation purposes) as is common in most firms (Baersch et al., 2019b; EY, 2003). In addition, the MNC uses the cost-plus method to set transfer prices, which most firms use for the pricing of tangible goods and service transactions (Baersch et al., 2019a; EY, 2010). The tax authorities have approved this method and continuously audit the firm.

Transfer price methodology - The actual transfer price applied to each trade is determined as depicted in Fig. 1. Each product has a basic cost price, which we refer to as the unit cost, determined based on the management information system. This system is the responsibility of the HO, but BU production managers provide input to the system. The HO determines two possible markups on these unit costs: a component for managerial incentive purposes (e.g., a cost component to motivate BUs to sell at higher prices) and a component to comply with the arm's length principle that is required for international transfer prices. The latter markup allocates costs not included in the basic unit cost, such as R&D, overhead, royalties, and marketing, and makes final price adjustments if prices do not comply with the arm's length standard after including all costs. The MNC indicates that it uses an understandable and transparent methodology that allows BUs to consider these markups in their production, sales, and pricing decisions. Therefore, HO markups are set based on expectations well before the actual trades occur. Finally, knowing the unit cost and HO markups, each local BU sets the final sales price at the moment of trade. BUs can add markups for transportation and other supply chain costs and provide discounts to an internal or external trading partner. This discretion at the BU level is essential in highly competitive product markets.

[5] Apart from providing explicit incentives, Duchin and Sosyura (2013) document that connections between divisional managers and the CEO may help the CEO in mitigating information asymmetry to enhance firm value.

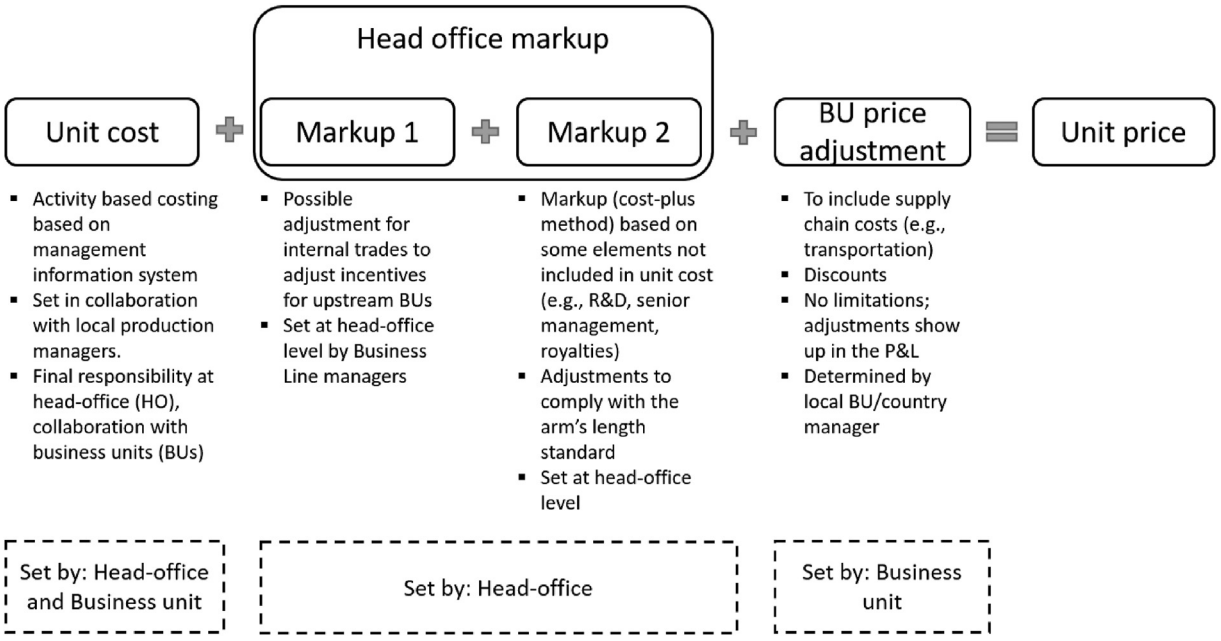

Fig. 1. Transfer pricing system of the MNC.

In sum, the transfer price, *P*, consists of the following components:

$$P = Cost + MUHO + DPBU$$

where *Cost* is the unit cost determined in collaboration by the HO and BU, *MUHO* is the markup of the HO, and *DPBU* is the discretionary price adjustment of the BU.

Performance evaluation of BU managers - BU managers receive cash bonuses based on BU profit and sales quantities. The BU's profit is calculated as the actual revenue minus the unit cost and HO markups. These profit-based bonuses may thus work against tax-reduction objectives at the MNC level, as profit shifting requires one of the BUs to lower its profits. The MNC rarely uses share-based remuneration to align responsible BU managers' objectives with MNC-level objectives. Where used, the MNC indicates that such remuneration is negligible compared to cash compensation. However, BU managers may also be motivated by implicit rewards. The MNC specifically highlights (cross-border) promotions or training possibilities that both expatriate and local BU managers may receive.

3. Optimizing taxes and research questions

3.1. The tax and tariff burden optimization problem

Following Horst (1971) and Blouin et al. (2018), we consider the effect of taxes and tariffs on MNC transfer prices and determine the marginal costs and benefits of increasing the transfer price by one unit. We denote the tax rate in importing country *M* as τ_M, the tax rate in exporting country *E* as τ_E, and the tariff rate as τ_d. When trading a product internationally, the applicable tariff rate between the importing country and the country of origin *O* applies, where the country of origin is not necessarily the same as the exporting country. For example, if a product is sold by country *O* to the exporting country and the added value in the exporting country is relatively low, country *O* remains the country of origin, and its tariff rate applies.

In our setting, transfer prices are used for allocating profits for tax reporting, for internal compensation, and as a basis for tariff payments. We ignore possible small deviations between the prices to determine (taxable) profits and tariff payments. We also assume that all BUs are profitable and thus taxable. Increasing the transfer price by one unit implies that costs of the BU in importing country *M* increase and thus profits decrease by one unit and revenues in exporting country *E* increase by one unit. Thus, the tax benefits of increasing the transfer price by one unit are equal to $\tau_M - \tau_E$. We refer to this difference as the tax rate differential in the sequel of this article. Furthermore, an increase in the transfer price increases the value of the product over which tariffs must be paid. This yields tax-deductible costs equal to τ_d in the country where the tariff payments are due. Following the official incoterms from the International Chamber of Commerce, the importer pays the tariff unless incoterm DDP (delivered duty paid) is used, in which case the exporter pays the tariff. Acknowledging the fact that tariff payments may be tax deductible in the exporting country is a deviation from the marginal costs derived by Horst (1971), Swenson (2001), and Blouin et al. (2018). Thus, the marginal benefits of increasing the transfer price by one unit equal the following:

$$MB = \begin{cases} \tau_M - \tau_E - \tau_d(1-\tau_M) \text{ if incoterm} \neq DDP \\ \tau_M - \tau_E - \tau_d(1-\tau_E) \text{ if incoterm} = DDP \end{cases}$$

where the tariff rate τ_d depends on the country of origin *O*. The marginal benefit applies to an individual trade when all parameters are known.

Optimizing the transfer price for tariffs *and* tax rate differentials is complex for three reasons. First, an MNC exports to multiple countries. When considering tax rate differentials only, all products shipped from country *E* to country *M* can be treated equally with respect to reducing or increasing the transfer price. Accounting for tariffs requires differentiation across products based on the applicable tariff, which also depends on the country of origin *O*. The variation in tariff rates implies that the decision to increase or decrease the transfer price is different for each product traded between country *M* and country *E*. By choosing incoterms, the firm can also decide whether the BU in country *M* or the BU in country *E* pays the tariff.

Second, while transfer prices for comparable products can be adjusted, there are limits on what is in line with the arm's length principle stipulated in the transfer pricing guidelines for MNCs and tax authorities (OECD, 2022).

Third, when using one set of books and requiring BUs to know the transfer price as an input for production and trade decisions, income tax and tariff optimization must be set early based on expected trade flows. Centralized transfer pricing decisions ensure that the MNC's interests are considered but are based on less information because the exact trade characteristics are only known later. Decentralized transfer pricing decisions bear the risk of local optimization rather than maximizing MNC objectives, while all information for global optimization is available in this later stage. We provide novel insight into MNCs' tax planning by investigating transfer price elements set by the HO in an early stage and the local BUs in a later stage.

3.2. Research questions

To increase our understanding of tax planning within an organization, we explore whether the elements of transfer prices for internal trades and external trades relate differently to tax rate differentials and tariffs between importing and exporting BUs. Prior evidence suggests that the overall transfer prices of products are higher when it is favorable for income taxes (Bernard et al., 2006; Clausing, 2003) and lower when tariff rates are higher (Bernard et al., 2006; Blouin et al., 2018). Determining the real economic price of a product is difficult (Eden, 1998; Diewert et al., 2005). Neither survey-based research (Al-Eryani et al., 1990; Baersch et al., 2019b; Tang, 1992) nor the OECD transfer pricing guidelines (OECD, 2022) differentiate among unit costs, HO markups, or BU price adjustments for setting transfer prices. Whether tax planning via transfer prices is visible only in the markups set by the HO or also in the cooperatively determined unit cost and the final price adjustments made by the BU is thus an empirical question that can only be addressed with internal company data. Therefore, our first research question is as follows:

RQ1: What is the role of the head office and the business units in income tax and tariff planning through transfer prices?

Based on the theory and our discussions with the MNC, we formulate expectations considering the following forces at play. First, the HO's incentive is to optimize the tax burden, while BUs' incentives are potentially misaligned. Second, the BUs have private information on expected costs, production, and trade flows. Third, the HO must set prices before the actual sales take place based on expectations, while the BU can adjust prices at the final stage when the sales take place and all parameters determining the marginal benefit of tax planning are known. The HO sets unit costs in consultation with and based on input from the BUs. This allows for information sharing to address information asymmetry and for aligning incentives between the HO and the BUs. The drawback is that unit costs must be set well in advance when sales are uncertain. In conversations, the MNC indicated that for important internal trade streams, tariffs may be considered when setting unit costs. Based on this premise, income tax and tariff planning may be observed in the unit cost.

The HO markups ensure that prices comply with the arm's length standard. The focus on the arm's length standard also implies that tax savings are incorporated if the adjustments are in line with the regulations. In conversations, the MNC indicated a focus on tax rates and not on tariffs. Markups are, however, determined when sales and trading partners are uncertain. Contrary to the HO, BU managers make price decisions based on known quantities and trading partners instead of expected averages. As a result, they know which countries are involved in each trade and, therefore, which tax rates and tariffs apply. However, local BUs may face conflicts between their own and the MNC's interests. As discussed in Section 2, BUs have longer-term or implicit incentives, which may cause them to act in the MNC's interest. Thus, income tax and tariff planning may occur in this final element of the transfer price. We investigate Research Question 1 by exploring whether unit costs (set cooperatively by the HO and the BUs), the HO markups, and the BUs' price adjustments for internal relative to external trades increase with the tax rate differential $(\tau_M - \tau_E)$ and decrease with the applicable tariff rate (τ_d).

After studying the effects of tax rates and tariffs on transfer pricing, we shift our attention to allocating trade costs for internal trades. To reduce their overall tax burden, MNCs may select incoterms to allocate trade costs to the country with the higher tax rate.[6] Trade costs are of substantial magnitude. Anderson and Van Wincoop (2004) estimate from U.S. data that

[6] The allocation of trade costs to the importing and exporting country varies from the incoterm "ex works", where the buyer in the importing country takes care of the complete delivery, to the incoterm "delivered duty paid", where the seller in the exporting country organizes and pays for the full delivery (Table 1 provides an overview).

total international trade costs amount to approximately 74% of production costs, of which approximately 21% are transportation costs and an additional 44% are trade barriers (0.74=1.21*1.44-1).[7] Since trade costs are not reflected in the face value of a product and incoterms are used for trading but are not linked to a product once a product is in the importing BU's inventory, it may be more difficult for tax inspectors to audit trade costs in relation to products' arm's length prices. The trade costs appear in the profit and loss statement under SG&A or, when capitalized in the inventory, under the cost of goods sold. To successfully lower income taxes, costs allocated to the exporting country via incoterms should not be included in the transfer price. Including them in the transfer price implies that the importing country still pays the trade costs. This possible income shifting channel has not been explored thus far and depends mainly on BUs' willingness to maximize MNC profits, possibly at the expense of their own profits. Thus, we phrase our second research question as follows:

RQ2: Do business units allocate trade costs to the country with the higher corporate income tax rate without including trade costs in the transfer price for internal trades?

4. Research design

For our first research question, we compare transfer prices and their elements for internal and external trades to determine whether and which transfer price elements are adjusted to lower income taxes and tariff payments. The basic regression equation for this analysis is:

$$DV = \alpha + \beta_1(\tau_M - \tau_E) + \beta_2\tau_d + \beta_3 D_{INT} + \beta_4 D_{INT}*(\tau_M - \tau_E) + \beta_5 D_{INT}*\tau_d + \beta_h Controls + \beta_i Product\ Fixed\ Effects + \beta_j Quarter\ Fixed\ Effects + \varepsilon \quad (1)$$

DV is the dependent variable for which we take the natural logarithm of the transfer price (*P*), the natural logarithm of the unit cost (*Cost*), the HO markup deflated by costs ($Rel\_MUHO = \frac{MUHO}{Cost}$), and the discretionary price adjustments by the BU deflated by costs plus HO markups ($Rel\_DPBU = \frac{DPBU}{Cost+MUHO}$) for each trade.[8] We deflate HO markups by unit costs because the MNC uses the cost-plus method, implying that markups are generally defined as a percentage of the unit cost. If we were not to deflate markups by unit cost, a relation between tax rates or tariffs and the markups could result from such relation in the unit cost because the MNC defines markups as a percentage of the unit cost. The price adjustment of the BU (*DPBU*) equals *P-Cost-MUHO*. To test whether tax optimization is present over and above the HO markup decisions, we deflate *DPBU* by the price before the BUs' price adjustment (*Cost + MUHO)*. The latter allows us to evaluate the contribution of the BU relative to the situation where it would have made no price adjustments. *Cost + MUHO* is also the cost price used for determining BU profits.

The independent variable $(\tau_M - \tau_E)$ is the difference between the (statutory) tax rates of the importing and the exporting country. The applicable tariff rate τ_d depends on the importing country and the country of origin. Our data include the applicable tariff rate per product considering possibly existing free trade agreements. The variable D_{int} is equal to one if a trade is internal and zero otherwise. Thus, β_1 and β_2 control for the structural relations of prices with tax and tariff rates (i.e., implicit taxes), respectively, while β_3 controls for the structural differences between internal and external prices.

The interactions between the tax incentives and the internal trade indicator, β_4 : $D_{INT}*(\tau_M - \tau_E)$ and β_5: $D_{INT}*\tau_d$, capture the extent to which the relation between the tax rate differentials and tariff rates differs for internal trades compared to external trades, respectively.[9] For the tax rate differential, the MNC's incentive is to increase the transfer price when the tax rate in the importing country increases relative to that in the exporting country. Hence, a positive coefficient for $D_{INT}*(\tau_M - \tau_E)$ provides evidence of income tax planning. A higher tariff rate provides an incentive to lower the transfer price so that a negative coefficient for $D_{INT}*\tau_d$ provides evidence of tariff planning.

Because optimizing income tax and tariff payments requires transfer pricing decisions in opposite directions in some instances but in the same direction in others, we construct a variable that provides the marginal benefit of increasing the transfer price by one unit at the individual trade level. In line with the marginal benefits explained in Section 3.1, we construct the variable *MB* as follows:

$$MB = \begin{cases} \tau_M - \tau_E - \tau_d(1-\tau_M)\ if\ incoterm \neq DDP \\ \tau_M - \tau_E - \tau_d(1-\tau_E)\ if\ incoterm = DDP \end{cases}$$

[7] Total international trade costs in Anderson and van Wincoop (2004) are calculated as a percentage added to the production costs. The 21% total transportation costs include direct freight, insurance, and transportation costs and an indirect 9% value loss for the transit time of goods (estimated based on willingness to pay for saved time). Similarly, the estimated 44% trade barriers consist of directly observable costs (e.g., tariffs) and indirect inferred costs to capture aspects such as policy, language, currency, and information cost barriers.

[8] Section 5 explains that one trade consists of the total amount traded for a product per quarter aggregated at the lowest possible aggregation level without yielding multiple observations per quarter. This implies that individual trades are only aggregated if the importing country, exporting country, country of origin, and tariff rate are the same. This aggregation is done separately for internal and external trades.

[9] We compare prices for internal and external trades of the same firm. The external price provides the best available comparable price. However, it is possible that the firm also manipulates external prices to affect the benchmark that may be considered by tax authorities (Cristea and Nguyen, 2016). If this were the case, tax planning would be underestimated because the benchmark trade is already adjusted.

Table 1
Incoterms.

Panel A: Definition of Incoterms

Incoterm	Full Name	Explanation	Value variable INCO
EXW	Ex Works	All costs and risks of transport from leaving the seller's factory are for the buyer.	0
FCA	Free Carrier	Goods are delivered to a carrier decided upon by the buyer. Once delivered and loaded to the carrier all risks and costs are for the buyer.	1
FAS	Free Alongside Ship	Specifically for waterway transport. The goods are delivered alongside the ship decided upon by the buyer. Risks and costs from there are for the buyer.	2
FOB	Free on Board	Specifically for waterway transport. Seller ensures goods are loaded on the ship and cleared for export. Other costs and risks are for the buyer.	3
CPT	Carriage Paid To	Seller takes care of costs and risks until delivery at a carrier at a place of destination chosen by the buyer. The seller takes care of export clearance and freight costs to this place of destination. Buyer bears all transport risks.	4
CFR	Cost and Freight	Specifically for waterway transport. Seller delivers goods at the port of destination and pays freight costs and export clearance. Buyer bears transport risks.	5
CIF	Cost, Insurance, and Freight	Like CFR for waterway transport. In addition, seller must insure against loss or damage during transport.	6
CIP	Carriage and Insurance Paid To	Similar to CIF, but for all modes of transport. Seller bears cost of freight and insurance against damage or loss.	7
DAT	Delivered at Terminal	Goods are delivered at a given place of destination capable of receiving the shipment. Seller bears all costs and risks of transport and unloading (including delay). Since 2020 this code has been replaced by DPU (delivered at place unloaded).	8
DAP	Delivered at Place	Goods are delivered at a destination possibly beyond the terminal. Only costs of unloading and import formalities such as duties in the importing country are for the buyer.	9
DDP	Delivered Duty Paid	All risk and costs are for the seller until delivered at the destination chosen. Seller bears all transport costs and risk including duties and taxes in the country of import.	10

Panel B: Distribution of incoterms for external and internal trades

	$D_{int}=0$			$D_{int}=1$		
	Freq.	Percent	Cum.	Freq.	Percent	Cum.
Ex Works (EXW)	103	0.10%	0.10%	103	0.06%	0.06%
Free Carrier (FCA)	60,928	59.13%	59.23%	1657	0.98%	1.04%
Free on Board (FOB)	671	0.65%	59.88%	149	0.09%	1.13%
Carriage Paid TO (CPT)	12,406	12.04%	71.92%	46,347	27.48%	28.61%
Cost and Freight (CFR)	10,033	9.74%	81.65%	36,149	21.43%	50.05%
Cost Insurance Freight (CIF)	4273	4.15%	85.80%	22,927	13.59%	63.64%
Carriage Insurance Paid (CIP)	9183	8.91%	94.71%	27,289	16.18%	79.82%
Delivered at Terminal (DAT)	51	0.05%	94.76%	1676	0.99%	80.82%
Delivered at Place (DAP)	5381	5.22%	99.98%	16,144	9.57%	90.39%
Delivered Duties Paid (DDP)	16	0.02%	100.00%	16,206	9.61%	100.00%
Sum	103,045			168,647		

Note: Panel A presents a description and short explanation of the incoterms that are used to allocate trade costs in international trade. The ordering based on *INCO* is an indication of when more costs are allocated to the exporting country. Note that the terms FAS, FOB, CFR, and CIF apply specifically to waterway transport. For detailed information on incoterms, please visit https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-rules-2010/.
Note: Panel B provides descriptive statistics for the incoterms observed in our sample (captured in variable *INCO*) for external and internal trades.

We then run regression (1) for our dependent variables (i.e., *P*, *Cost*, *Rel_MUHO*, and *Rel_DPBU*) with the separate tax rate differential and tariff rate replaced by the combined variable *MB*. This regression captures the extent to which the HO and BU contribute to the overall decrease in the tax burden.

Our second research question concerns tax planning by allocating the trading costs to the country with the higher tax rate. MNCs can reduce their overall tax payments by having the high-tax trading partner pay the trading costs without adjusting the transfer price for these costs. For all trades in our dataset, we have access to the incoterms under which the trades took place. We ordered the incoterms such that increasing incoterms reflect higher risks and costs for the seller (i.e., the exporter) and defined the variable *INCO* as a numeric variable with scores from 0 to 10. We provide a brief explanation of the incoterms, their meaning, and the values of our variable *INCO* in Table 1 Panel A.[10]

[10] Some terms apply specifically to waterway transport (e.g., CIF and CPT). Possibly, CIF and CPT could be reversed in order with the equivalents used for land transport. Changing the order of waterway and land transport does not change the results. We also run a median split analysis in which the order of land and waterway alternatives have no effect because the alternatives fall together in the high or low group.

To test whether the choice of incoterms for internal trades depends on the tax rate differential between the importing and exporting country, we run (ordered) logit regressions for the internal trades in which we explain the incoterm chosen as a function of the tax rate differential ($\tau_M - \tau_E$).[11] A lower incoterm implies that the importer bears more costs. As this is preferable when the tax rate of the importer increases, a negative coefficient for $\tau_M - \tau_E$ supports the allocation of trade costs to the country with higher taxes. Nevertheless, it is not always optimal to choose the highest or lowest incoterm, as some aspects of transport are most efficiently addressed by one of the trading partners. The tax benefits of changing the incoterm should outweigh the efficiency loss compared to the optimal choice in the absence of taxes.

However, the incoterm choice is insufficient to demonstrate successful tax planning. If the exporting BU chooses a higher incoterm because it is the higher tax country but charges a higher transfer price to the importing BU due to these costs, the exporting BU still pays taxes as the higher margin offsets the trade costs. Thus, we analyze whether the choice for a higher incoterm is reflected in the transfer price. We add the variables *INCO* and *INCO*$*D_{INT}$ to Equation (1) with the transfer price (*P*) as the dependent variable. Higher incoterms should yield higher transfer prices for external trades (i.e., a positive coefficient for *INCO*) but less so or not at all for internal trades if the choice for a higher incoterm is partly motivated by tax planning (i.e., a negative coefficient for *INCO*$*D_{INT}$).

Control variables – We control for several variables that may affect prices, markups, or the choice of incoterms. To control for the effects of economies of scale on the price elements, we include *Quantity,* the natural logarithm of the quantity sold per product per quarter. To control for differences in the production costs of products, we include *GDPOrigin,* the logarithm of the GDP per capita of the country of origin (i.e., the country where the product is primarily produced). We control for the currency exchange rate between the importing and the exporting country (*Exrate*) and its interaction with $D_{INT,}$ as the HO indicated that exchange rates are more relevant for external clients than for internal clients. For internal trades, the exchange rate risk always resides in the MNC, while it may shift to another firm for external trades. We also control for whether the producing and importing countries are both OECD trading partners (*OECDtrade*), as trade and product requirements may differ between OECD and non-OECD countries. Finally, we control for the distance between the trading partners using the variable *ImExDist*, measured as the natural logarithm of the distance between the capitals of the importing and the exporting country, as a proxy for transportation costs. We do not include this variable when *Cost* is the dependent variable as the unit cost is set before the trading partner is known and transportation costs should only affect markups and price adjustments. We include product and quarter fixed effects in our regressions to control for the average effect per product and quarter on the MNC's transfer prices.

5. Results

5.1. Data and descriptive statistics

We observe product-level exports from European countries to other countries predominantly outside Europe that the MNC has trade relations with in 2017 and 2018. The exports come from 52 countries of origin, depart from 23 countries within the European Union (EU) and are shipped to 110 countries predominantly outside the EU, indicating our data's broad geographical coverage. Similar exports (i.e., trades of the same product between the same countries with the same tariff) are aggregated per quarter for internal and external trades separately, providing us with export trade data for eight quarters in a row. We have data on the billing price, the unit cost, HO markups, BU price adjustments, and the quantity shipped for all trades. The MNC multiplied all prices by a positive number unknown to us. Knowing the exact quantities shipped allows us to determine all variables at the unit level. After merging the dataset with data on tax rates, distances between the importing and exporting countries, and GDP per capita of the countries of origin, we have 271,679 observations.

Table 2 provides descriptive statistics of our dependent and control variables. Panel A displays the descriptive statistics without log transformation, Panel B does so after log transformation, and Panel C reports these statistics for the internal and external trades separately. The transfer price multiplied by the unknown number amounts to €15.58, on average, and ranges between €0.053 and €499.9. The HO markup deflated by *Cost* (*Rel_MUHO*) amounts to 23%, on average, and ranges between 0% and 80%. The price adjustment of the BU as a percentage of the unit cost plus the HO markup (*Rel_DPBU*) has a mean of 2.3% and ranges from −60% to 62.8%. The negative values for *Rel_DPBU* arise from discounts given by the local BUs. D_{INT} shows that 62.1% of all trades (i.e., 168,647) are internal trades. Comparing the price elements between the internal and external trades (Panel C) reveals that internal prices are higher, on average, while the unit costs are lower. Unit costs may be lower for internal trades because tariffs on internal trades pose costs to the MNC, which provides an incentive to reduce unit costs, while tariff costs are borne by importers for external trades. Internal prices are, on average, higher than external prices because some of the HO markups are only relevant for internal trades (e.g., markups to comply with the arm's length standard). BU price adjustments are, on average, negative for external trades and positive for internal trades. These differences can be due to stronger price competition resulting in external trading partners requiring discounts or due to tax planning.

[11] While tax authorities require prices to be comparable based on the arm's length standard, there is no arm's length standard available for the terms of trade choice. Thus, comparing internal and external trades is appropriate when exploring tax planning by price levels, but this is not appropriate for the choice of incoterms. Internal and external trades may show the same pattern regarding the terms of trade choice, but the main question is whether the costs are included in the transfer price. We investigate this by estimating Equation (1) again while controlling for the terms of trade for internal and external transactions.

Table 2
Descriptive statistics.

Panel A: Skewed variables without log transformation

	N	mean	sd	min	max
P_nolog	271,697	15.58	65.08	0.05	499.90
Cost_nolog	271,697	12.60	53.06	0.04	415.93
Quantity_nolog	271,697	18,159	65,247	5	489,456
GDPOrigin_nolog	271,697	40,897	14,163	6651	77,450
ImExDist_nolog	271,697	3969	4318	180	18,132

Panel B: Descriptive statistics full sample

	N	mean	sd	min	max
Dependent variables					
P	271,697	−0.048	2.023	−2.763	6.214
Cost	271,697	−0.225	2.071	−3.046	6.031
Rel_MUHO	271,697	0.230	0.244	0.000	0.803
Rel_DPBU	271,697	0.023	0.196	−0.600	0.628
INCO	271,692	4.856	2.714	0.000	10.000
HighINCO	271,692	0.380	0.485	0.000	1.000
DDP	271,692	0.060	0.237	0.000	1.000
Independent variables					
$(\tau_M\text{-}\tau_E)$	271,697	−0.040	0.085	−0.190	0.252
τ_d	271,697	0.076	0.068	0.000	0.350
D_{int}	271,697	0.621	0.485	0.000	1.000
MB	271,697	−0.099	0.102	−0.340	0.230
Quantity	271,697	6.870	2.582	1.609	13.117
ImExDist	271,697	7.623	1.216	5.193	9.805
GDPOrigin	271,697	10.530	0.474	8.803	11.257
Exrate	271,697	1.228	1.094	0.879	9.808
OECDtrade	271,697	0.305	0.460	0.000	1.000
Stable	271,697	0.279	0.448	0.000	1.000
RiskTax	271,584	0.320	0.447	0.000	1.000
RiskTarriff	271,584	0.127	0.316	0.000	1.000
Germany	271,697	0.569	0.495	0.000	1.000
Agency	271,697	0.105	0.307	0.000	1.000
Delta$(\tau_M\text{-}\tau_E)$	271,697	0.004	0.031	−0.133	0.204

Panel C: Descriptive statistics split according to external and internal trades

	$D_{int}=0$					$D_{int}=1$				
	N	mean	sd	min	max	N	mean	sd	min	max
Dependent variables										
P	103,050	−0.080	1.485	−2.763	6.214	168,647	−0.029	2.291	−2.763	6.214
Cost	103,050	0.046	1.470	−3.046	6.031	168,647	−0.391	2.349	−3.046	6.031
Rel_MUHO	103,050	0.017	0.084	0.000	0.650	168,647	0.361	0.216	0.000	0.803
Rel_DPBU	103,050	−0.105	0.160	−0.600	0.628	168,647	0.102	0.173	−0.600	0.628
INCO	103,045	2.927	2.565	0.000	10.000	168,647	6.034	2.047	0.000	10.000
HighINCO	103,045	0.183	0.387	0.000	1.000	168,647	0.500	0.500	0.000	1.000
DDP	103,045	0.000	0.012	0.000	1.000	168,647	0.096	0.295	0.000	1.000
Independent variables										
$(\tau_M\text{-}\tau_E)$	103,050	−0.030	0.081	−0.190	0.252	168,647	−0.046	0.087	−0.190	0.252
τ_d	103,050	0.082	0.077	0.000	0.350	168,647	0.073	0.062	0.000	0.350
MB	103,050	−0.096	0.104	−0.340	0.230	168,647	−0.101	0.101	−0.340	0.230
Quantity	103,050	6.234	2.023	1.609	13.117	168,647	7.258	2.800	1.609	13.117
ImExDist	103,050	7.119	1.126	5.193	9.805	168,647	7.932	1.165	5.700	9.805
GDPOrigin	103,050	10.479	0.494	8.803	11.257	168,647	10.561	0.458	8.803	11.257
Exrate	103,050	1.305	1.547	0.879	9.808	168,647	1.181	0.679	1.000	9.808
OECDtrade	103,050	0.147	0.354	0.000	1.000	168,647	0.402	0.490	0.000	1.000
Stable	103,050	0.114	0.318	0.000	1.000	168,647	0.379	0.485	0.000	1.000
RiskTax	103,047	0.150	0.331	0.000	1.000	168,537	0.425	0.475	0.000	1.000
RiskTarriff	103,047	0.031	0.159	0.000	1.000	168,537	0.186	0.369	0.000	1.000
Germany	103,050	0.255	0.436	0.000	1.000	168,647	0.761	0.427	0.000	1.000
Agency	103,050	0.026	0.159	0.000	1.000	168,647	0.153	0.360	0.000	1.000
Delta$(\tau_M\text{-}\tau_E)$	103,050	0.011	0.034	−0.133	0.120	168,647	0.000	0.028	−0.133	0.204

Note: This table reports descriptive statistics without log-transformation (Panel A), descriptive statistics for our full dataset after log-transforming P, Cost, Quantity, GDPOrigin, and ImExDist (Panel B), and descriptive statistics for the dependent and independent variables split according to internal and external trade flows (Panel C). All prices are multiplied by a positive number that is only known by the studied MNC. Note that P and Cost are reported on a logarithmic scale in this table. Refer to the appendix for variable definitions.

We observe variation in the choice of incoterms for both internal and external trades, as *INCO* varies from zero to ten. We construct two additional variables. First, we define *HighINCO* as taking value one if *INCO* is greater than five (i.e., equivalent to incoterm “Cost Insurance Freight (CIF)” or “higher”, resulting in a median split for internal transactions) and zero otherwise.

The mean shows that BUs use the incoterms "Cost Insurance Freight (CIF)" or "higher" for 38% of the trades, but BUs use these terms for 18.3% of the external trades and 50.0% of the internal trades. This observation suggests that external partners prefer lower incoterms to increase control over transportation and reduce costs. We also define the indicator variable *DDP* as one if the incoterm is "Delivered Duty Paid" so that the exporter pays the tariffs. Table 2, Panel C shows that the incoterm "Delivered Duty Paid" (variable *DDP*) is rarely chosen for external trades (0.02%) but is chosen for 9.61% of the internal trades. Table 1, Panel B shows the frequency of all incoterms for internal and external trades.

The tax rate differential $(\tau_M - \tau_E)$ ranges from −0.190 to 0.252. The average of −0.040 indicates that the statutory tax rate in the exporting country is, on average, four percentage points higher than the statutory tax rate in the importing country. Panel C reports that this difference is more negative for internal trades, on average, while the minimum and maximum differences indicate similar ranges. The tariff rate τ_d varies between 0 and 0.35 with a mean of 0.076, indicating that the tariff payments amount to 7.6% of the transfer price on average. The combined income tax and tariff incentive captured by the *MB* variable indicates that, on average, a trade brings a tax and tariff burden of 10% to the MNC. The marginal benefit *MB* is similar for internal and external transactions. Turning to our control variables, we find the descriptive statistics to be comparable for internal and external trades. However, the average quantity of internal trades is slightly higher, and internal trades are conducted more often between OECD countries.

5.2. Results for RQ1: the role of HO and BU in tax and tariff planning through transfer prices

We present our results for Research Question 1 in Table 3. Columns 1–4 present the results for the full sample, with *P*, *Cost*, *Rel_MUHO*, and *Rel_DPBU* as the respective dependent variables.[12] Columns 5–8 report the results for a reduced sample of matched pairs of internal and external trades from the same quarter, with the same eight-digit harmonized system classification code, and delivered to the same importing country.[13]

We find a positive and significant coefficient for $D_{INT}*(\tau_M - \tau_E)$ in Column 1, suggesting that transfer prices of internal trades increase more with the tax rate differential between the importing and exporting country than the prices of external trades. The magnitude of the coefficient suggests that compared to external trades, the transfer price of internal trades increases, on average, by 0.745% if the tax rate differential $(\tau_M - \tau_E)$ increases by one percentage point. We find a negative coefficient for $D_{INT}*\tau_d$, implying that internal trades' transfer price *P* decreases compared to external prices by 0.599%, on average, if the tariff rate increases by one percentage point. These results are even stronger, especially for $D_{INT}*\tau_d$, when matching comparable internal and external trades as explained above (Column 5). We note that the main effect of $(\tau_M - \tau_E)$ is negative and significant, contrary to the interaction. The main effect captures the effect of implicit taxes, which is generally the opposite of that of income shifting. Thus, income shifting can only be investigated by controlling for the main effect of taxation on profits and prices (Markle et al., 2020), as we do in our regressions.[14] The positive main effect of the tariff on the price of external trades may result from the fact that tariffs are generally imposed when domestic markets cannot compete with foreign markets. Firms can often pass on tariffs to buyers when there is less competition within an industry, allowing them to set higher prices (Feenstra, 1989).

In Research Question 1, we are mainly interested in the contribution of the HO and BU to tax planning via transfer pricing. Thus, we examine whether the effects of the tax rate differentials and tariffs on transfer prices can also be observed for the individual transfer price components, *Cost, Rel_MUHO,* and *Rel_DPBU*. We find that unit costs of internal compared to external trades are negatively related to the tax rate differential (−0.156, p value = 0.019 in Column 2) but positively related in the matched sample (0.253, p value = 0.016 in Column 6).[15] For tariff rates, we consistently find that changes in internal compared to external unit costs are lower when tariff rates increase (−0.689, p value < 0.001 in Column 2 and -1.209, p value < 0.001 in Column 6). The results provide strong evidence of tariff planning in the unit cost.

Columns 3 and 4 (7 and 8) of Table 3 present the results for the HO markups and the BU price adjustments in the full sample (matched sample), respectively. As expected, the HO markups of internal relative to external trades increase if the difference between the importing and the exporting countries' tax rates increases (Columns 3 and 7). If the tax differential increases by one percentage point, the internal compared to the external HO markups increase by 0.36% of the unit costs. HO markups, however, seem to work against optimizing the tariff burden. Compared to external trades, HO markups on internal trades increase when the tariff rates increase. We will provide more intuition on this result when discussing the

[12] We cluster standard errors at the product level. Clustering and simultaneously adjusting for correlated errors across the four regressions yields computational problems given the more than 20,000 product fixed effects. Clustering yields more conservative estimates than seemingly unrelated regression without clustering.

[13] We do not condition this reduced sample on the exporting country because we study EU exports. Since the EU is a free trade area with unified tariff rates for trades with third countries, tariffs do not vary by EU exporting country.

[14] The main effect of the tax rate differential can be understood as follows. If the tax rate in the importing country increases, importers will face decreased after-tax profitability and possibly increased costs. As a result, they may put pressure on the prices of the goods imported from the MNC to maintain after-tax profitability. Similarly, if the MNC faces increased tax rates in the exporting country, it may attempt to increase prices to reduce the negative effect on its after-tax profitability and compensate for possible cost increases due to increased tax rates. This may be reflected in all price components (costs and markups).

[15] The full sample is more than twice as large as the matched sample. The additional variation in the full sample yields the negative coefficient for this sample.

Table 3
Results for research question 1, tax rate differential and tariff separate.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Main Sample				Internal & external trades per product group			
	Pred.	P	Cost	Rel_MUHO	Rel_DPBU	P	Cost	Rel_MUHO	Rel_DPBU
$(\tau_M\text{-}\tau_E)$		−0.564***	−0.223***	−0.041***	−0.271***	−1.004***	−0.729***	−0.013	−0.279***
		(0.051)	(0.051)	(0.007)	(0.011)	(0.081)	(0.083)	(0.009)	(0.011)
τ_d		0.864***	0.627***	0.073***	0.088***	1.520***	0.973***	0.172***	0.213***
		(0.048)	(0.049)	(0.009)	(0.012)	(0.149)	(0.145)	(0.020)	(0.018)
D_{int}		−0.648***	−1.129***	0.359***	0.187***	−0.473***	−0.914***	0.322***	0.219***
		(0.015)	(0.017)	(0.004)	(0.003)	(0.023)	(0.025)	(0.004)	(0.004)
$D_{int}*(\tau_M\text{-}\tau_E)$	(+)	0.745***	−0.156**	0.361***	0.577***	0.880***	0.253**	0.661***	0.439***
		(0.064)	(0.066)	(0.012)	(0.016)	(0.101)	(0.105)	(0.018)	(0.017)
$D_{int}*\tau_d$	(−)	−0.599***	−0.689***	0.374***	−0.073***	−1.475***	−1.209***	0.978***	−0.396***
		(0.057)	(0.059)	(0.017)	(0.014)	(0.164)	(0.158)	(0.034)	(0.023)
Quantity		−0.123***	−0.124***	−0.001***	−0.000	−0.145***	−0.138***	−0.009***	0.001***
		(0.003)	(0.003)	(0.000)	(0.000)	(0.006)	(0.006)	(0.000)	(0.000)
ImExDist		−0.003		0.003**	0.024***	0.078***		−0.022***	0.024***
		(0.003)		(0.001)	(0.001)	(0.006)		(0.001)	(0.001)
GDPOrigin		0.047	0.049	−0.013***	0.005	0.173*	0.185**	−0.029***	0.017*
		(0.045)	(0.044)	(0.005)	(0.005)	(0.095)	(0.093)	(0.010)	(0.009)
Exrate		−0.045***	−0.043***	0.010***	−0.010***	−0.003	0.008	0.022***	−0.016***
		(0.006)	(0.007)	(0.001)	(0.001)	(0.006)	(0.006)	(0.001)	(0.001)
*Dint*Exrate*		0.001	−0.027***	0.001	0.027***	−0.047***	−0.085***	−0.019***	0.050***
		(0.007)	(0.008)	(0.001)	(0.001)	(0.007)	(0.007)	(0.002)	(0.001)
OECDtrade		0.165***	0.151***	0.122***	−0.066***	0.179***	0.153***	0.212***	−0.142***
		(0.007)	(0.007)	(0.002)	(0.002)	(0.012)	(0.012)	(0.003)	(0.002)
Constant		0.693	0.810*	0.073	−0.304***	−1.238	−0.711	0.459***	−0.449***
		(0.476)	(0.465)	(0.052)	(0.051)	(1.008)	(0.985)	(0.108)	(0.094)
N		271,697	271,697	271,697	271,697	126,475	126,475	126,475	126,475
Adj. R-squared		0.941	0.944	0.746	0.643	0.942	0.945	0.746	0.673
Quarter-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID

Note: This table reports the results for Research Question 1. In Columns (1)–(4), we report the results for the full sample. In Columns (5)–(8), we report the results for a sample where we include only product trades for which both internal and external trades with the same eight-digit harmonized system classification and the same importing country are available. The main variables of interest are the tax rate differential, the applicable tariff rate, and their interactions with D_{int}. The dependent variable in Columns (1) and (5) is P defined as the natural logarithm of the unit price. The dependent variables in Columns (2) and (6) are Cost defined as the natural logarithm of unit cost and the dependent variable in Columns (3) and (7) Rel_MUHO defined as the head office markup divided by the unit cost. The dependent variables in Columns (4) and (8) are Rel_DPBU defined as the business unit mark divided by the unit cost. Refer to the appendix for variable definitions of the independent variables. We present standard errors clustered at the product level in parentheses. ***, **, and* indicate significance at the 1%, 5%, and 10% level, respectively.

overall benefits of and conflicts between tax and tariff reductions. Columns 4 and 8 indicate that the BUs' adjustments contribute to optimizing the tax and tariff burden (i.e., positive coefficients for $D_{int}*(\tau_M - \tau_E)$ and negative coefficients for $D_{int}*\tau_d$). The negative coefficient for $D_{int}*\tau_d$ is equal to −0.073, suggesting that if the tariff rate increases by one percentage point, the BU lowers the internal relative to the external transfer price by 0.073% of the unit cost plus the HO markups, on average.[16]

To determine whether the *overall* price adjustments are positive or negative, we consider *MB*, the marginal benefit measure of the tax and tariff incentives combined, as discussed in Section 3. Table 4 shows the results of this analysis. For the transfer price (Columns 1 and 5), we find positive coefficients for $D_{int}*MB$, confirming our earlier finding that internal compared to external transfer prices are positively associated with tax rate differentials and negatively associated with tariffs, lowering the tax and tariff burden, respectively. The positive coefficient for $D_{int}*MB$ in Column 2 shows that internal compared to external unit costs increase with the marginal benefit of tax and tariff incentives. Thus, the unit cost's possible tax-increasing effect (Table 3, Column 2) is more than offset by its tariff-reducing effect. Similarly, the positive contribution of HO markups to income tax optimization outweighs their earlier observed detrimental effect on tariff payments, as indicated by a positive coefficient for $D_{int}*MB$ in Columns 3 and 7. For the BUs' decisions, price adjustments are in line with tax and tariff optimization. The large positive coefficient for $D_{int}*MB$ underlines the important role of the BUs in lowering the MNC's tax burden (Columns 4 and 8). We compare the relative contributions of unit cost, HO markups, and BU price adjustments to tax and tariff planning in Section 5.4.

[16] The results for the matched sample are stronger. To be conservative, we consider the full sample as our main test given that product fixed effects should already control for the fact that some products may only be traded internally or externally.

Table 4
Results for research questions 1, marginal benefit (MB) captures tax and tariff incentives.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Main sample				Internal & external trades per product group			
	Pred.	P	Cost	Rel_MUHO	Rel_DPBU	P	Cost	Rel_MUHO	Rel_DPBU
MB		−0.691***	−0.373***	−0.055***	−0.230***	−1.105***	−0.755***	−0.006	−0.285***
		(0.041)	(0.041)	(0.006)	(0.009)	(0.076)	(0.077)	(0.009)	(0.011)
D_{int}		−0.650***	−1.164***	0.388***	0.201***	−0.517***	−0.971***	0.390***	0.216***
		(0.016)	(0.018)	(0.003)	(0.004)	(0.021)	(0.023)	(0.004)	(0.004)
D_{int}*MB	(+)	0.739***	0.104**	0.165***	0.444***	0.993***	0.390***	0.319***	0.452***
		(0.050)	(0.052)	(0.010)	(0.012)	(0.090)	(0.092)	(0.014)	(0.013)
Quantity		−0.122***	−0.125***	−0.000	0.000	−0.145***	−0.137***	−0.011***	0.002***
		(0.003)	(0.003)	(0.000)	(0.000)	(0.006)	(0.006)	(0.001)	(0.000)
ImExDist		0.001		0.007***	0.026***	0.076***		−0.005***	0.024***
		(0.003)		(0.001)	(0.001)	(0.006)		(0.001)	(0.001)
GDPOrigin		0.045	0.047	−0.013***	0.005	0.172*	0.185**	−0.034***	0.017*
		(0.045)	(0.044)	(0.005)	(0.005)	(0.096)	(0.094)	(0.009)	(0.009)
Exrate		−0.044***	−0.043***	0.012***	−0.010***	−0.001	0.010*	0.020***	−0.016***
		(0.006)	(0.007)	(0.001)	(0.001)	(0.005)	(0.006)	(0.001)	(0.001)
*Dint*Exrate*		0.003	−0.029***	0.004**	0.028***	−0.048***	−0.095***	0.008***	0.049***
		(0.007)	(0.008)	(0.002)	(0.001)	(0.007)	(0.007)	(0.001)	(0.001)
OECDtrade		0.147***	0.157***	0.098***	−0.072***	0.172***	0.173***	0.150***	−0.139***
		(0.006)	(0.006)	(0.002)	(0.002)	(0.011)	(0.010)	(0.003)	(0.002)
Constant		0.695	0.860*	0.028	−0.333***	−1.168	−0.689	0.413***	−0.450***
		(0.475)	(0.467)	(0.052)	(0.051)	(1.014)	(0.995)	(0.094)	(0.094)
N		271,697	271,697	271,697	271,697	126,475	126,475	126,475	126,475
Adj. R-squared		0.941	0.944	0.736	0.640	0.942	0.944	0.717	0.674
Quarter-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID

Note: This table reports the results for Research Question 1. In Columns (1)–(4), we report the results for the full sample. In Columns (5)–(8), we report the results for a sample where we include only product trades for which both internal and external trades with the same eight-digit harmonized system classification and the same importing country are available. The main variable of interest is the marginal benefit and its interactions with D_{int}. The dependent variable in Columns (1) and (5) is P defined as the natural logarithm of the unit price. The dependent variables in Columns (2) and (6) are Cost defined as the natural logarithm of unit cost and the dependent variable in Columns (3) and (7) Rel_MUHO defined as the head office markup divided by the unit cost. The dependent variables in Columns (4) and (8) are Rel_DPBU defined as the business unit mark divided by the unit cost. Refer to the appendix for variable definitions of the independent variables. We present standard errors clustered at the product level in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

5.3. Results for RQ2: allocation of trade costs to lower the MNC's tax burden

Table 5 reports the results for the following analyses of internal trades' incoterms: 1) an ordered logistic regression of the incoterm choice *INCO* on the tax rate differential, 2) a logistic regression where the dependent variable *HighINCO* takes the value one if *INCO* is greater than five and zero otherwise, and 3) a logistic regression where the dependent variable *DDP* takes the value one if the exporting BU pays the tariffs (equivalent to incoterm "Delivered Duty Paid") and zero otherwise.[17]

The results indicate that when $(\tau_M - \tau_E)$ increases, the MNC chooses lower incoterms and selects the incoterm *DDP* less frequently for internal trades. If the tax rate of the importing country increases relative to that of the exporting country, a lower incoterm allocates more costs to the importing country and reduces the tax base there. Similarly, the MNC allocates more trade costs to the exporting country by choosing a higher incoterm if the tax rate in the exporting country increases relative to the tax rate of the importing country. We note that we find a similar pattern for external trades, despite less variation in incoterms (untabulated). Even when negotiating with external trading partners, it may be optimal to allocate trade costs to the BU in the high-tax country because tax deductibility ensures that the after-tax costs are lower. This pattern may thus be efficient even without tax planning. Therefore, it is crucial to consider whether the allocation of trade costs (choice of incoterms) is reflected in the transfer price.

Tax planning through trade cost allocation would not be successful if the costs of choosing higher incoterms in response to high tax rates in the exporting country were recouped through the internal transfer price. For external trades, we expect the BU to charge the counterpart for additional trade costs via a higher price. To complete the evidence that incoterm choices for internal trades contribute to tax planning, we re-estimate our first regression from Table 3, Column 1 after including the variable *INCO* and its interaction with D_{INT}. The last column of Table 5 shows the results of this analysis. As expected, higher

[17] Contrary to the specifications in our previous regressions, we include only product group fixed effects, defined at the first four digits of the harmonized system, in our trade cost analysis. Because we only investigate internal trades in Table 5, including product fixed effects in combination with quarter fixed effects leads to the loss of more than half the sample. This is because outcomes of the binary dependent variable are perfectly predicted in most cases when using product fixed effects together with quarter fixed effects.

Table 5
Results for research question 2 (main sample using product group fixed effects).

		(1)	(2)	(3)			(4)
	Pred.	INCO	HighINCO	DDP		Pred.	P
$(\tau_M-\tau_E)$	(−)	−2.326***	−2.121***	−12.334***	$(\tau_M-\tau_E)$		−0.445***
		(0.114)	(0.120)	(0.598)			(0.055)
Quantity		0.014***	0.036***	−0.523***	τ_d		0.847***
		(0.005)	(0.005)	(0.010)			(0.047)
Cost		−0.100***	−0.236***	−0.642***	D_{int}		−0.482***
		(0.013)	(0.013)	(0.029)			(0.027)
OECDtrade		0.403***	0.246***	2.649***	$D_{int}*(\tau_M-\tau_E)$		0.618***
		(0.019)	(0.025)	(0.044)			(0.066)
cut1		−6.789***			$D_{int}*\tau_d$		−0.605***
		(0.155)					(0.056)
cut2		−3.643***			*Quantity*		−0.124***
		(0.060)					(0.003)
cut3		−3.555***			*ImExDist*		−0.013***
		(0.059)					(0.003)
cut4		0.388***			*GDPOrigin*		0.047
		(0.037)					(0.045)
cut5		1.576***			*Exrate*		−0.041***
		(0.044)					(0.006)
cut6		2.274***			*Dint*Exrate*		−0.014*
		(0.050)					(0.007)
cut7		3.177***			*OECDtrade*		0.167***
		(0.053)					(0.007)
cut8		3.241***			*INCO*	(+)	0.015***
		(0.054)					(0.003)
cut9		4.076***			D_{int}*INCO	(−)	−0.030***
		(0.058)					(0.004)
Constant			0.530***	0.045	*Constant*		0.717
			(0.142)	(0.264)			(0.479)
N		168,647	167,986	159,057	N		271,692
Quarter-FE		Yes	Yes	Yes	Quarter-FE		Yes
ProductGroup-FE		Yes	Yes	Yes	ProductGroup-FE		Yes
Cluster		ProductID	ProductID	ProductID	Cluster		ProductID
Pseudo R-squared		0.0719	0.199	0.379	Adj. R-squared		0.941
Log likelihood		−282168	−93260	−32504	Log likelihood		−181656

Note: This table presents the results for Research Question 2. We use product group fixed effects defined at the first four digits of the harmonized system. Column (1) provides the results from an ordered logistic regression incoterm choice INCO as the dependent variable. The cut values report the cutoffs for the latent variable of the ordered categories in the dependent variable. Column (2) presents logistic regression results with HighINCO as the dependent variable taking a value of one if an incoterm of "Cost Insurance and Freight" or higher is chosen. Column (3) reports the logistic regression results with DDP as the dependent variable taking a value of one if the incoterm "Delivered Duties Paid" is chosen and zero otherwise. Column (4) repeats our baseline regression from Table 4, Column (1) with INCO and D_{int}*INCO as additional explanatory variables. Refer to the appendix for variable definitions. We use quarter and product group fixed effects defined at the first four digits of the harmonized system. Standard errors clustered at the product level are provided in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

incoterms generally increase the price of external trades (coefficient for *INCO* = 0.015). For internal trades, however, the higher trade costs are not recouped from the buyer through the transfer price, as evidenced by a statistically significant coefficient of −0.030 for *INCO*$*D_{INT}$, which more than offsets the main effect.[18]

The coefficient estimate for *INCO* allows us to estimate the size of the direct trade costs in our sample. An increase in the variable *INCO* by one implies that the price for external trades increases by 1.5%. The first nine steps thus account for a 13.5% price increase due to direct freight, insurance and transportation costs. This estimate is closely in line with the estimate of 11% provided by Anderson and Van Wincoop (2004).[19] Since the incoterm DDP is rarely used for external trades, the effect of paying for the tariff in the exporting country is not included in our incoterm-based estimate. By adding tariff payments of 7.5% on average, we estimate direct trade costs for the focal MNC to be around 21%.

5.4. Additional analyses on the relative contribution of the head office and business units

This section provides insight into factors that drive the relative importance of the HO and BU in tax planning and the stage of price setting in which tax planning occurs. We first explore the overall contribution of the HO and the BUs. We then investigate how the observed results depend on 1) product market competition, 2) the risk of conflicts with tax and customs authorities, and 3) agency conflicts. The latter two are exploratory based on assessments made by experts in the MNC.

[18] An F test for joint significance of the coefficients INCO and INCO*D_{int} suggests that they are significantly negative (p value < 0.001).

[19] The total transportation cost estimate in Anderson and Van Wincoop (2004) of 21% consists of 11% directly measured freight costs and 9% time value loss (1.11*1.09-1=0.21).

The relative importance of unit costs, HO markups, and BU price adjustments - To evaluate the HO's and BUs' contribution to total tax planning, we compare tax planning elasticities for *Cost, Cost + MUHO,* and *P.* In this analysis, we focus on the total tax planning benefit captured through D_{int}*MB. Because the three dependent variables are log-transformed, the coefficients are elasticities that indicate the percentage change in the dependent variable when the marginal tax planning benefit increases by one percentage point and can be compared.

Table 4 shows that when *P* is the dependent variable, the coefficient on D_{int}*MB equals 0.739, compared to coefficients of 0.104 and 0.249 (untabulated) when the unit cost and unit cost plus HO markups are the dependent variables, respectively. This implies that the HO's decisions increase the tax planning elasticity by 0.145 (=0.249-0.104) over the cooperatively set unit cost's elasticity of 0.104. The BU decisions, in turn, increase the elasticity by 0.49 (=0.739-0.249) to 0.739. Thus, the tax planning contribution made by the BUs is more than three times as large as the HO's contribution and constitutes the largest part of the tax planning benefit. The positive tax planning effect of BUs' information advantage seems to dominate agency conflict resolution through centralization.

Competition in the product markets – The possibility of transfer price optimization in an early stage likely depends on the competition in a product market. The MNC has business lines in distinct markets and with distinct market positionings. The MNC is a market leader in several business lines, where it can set stable prices. Other business lines are characterized by fierce competition from strong competitors. In these business lines, prices are more volatile, and margins are thinner. Our dataset identifies to which business line each product-trade belongs.

Product market power tends to be positively associated with tax avoidance (Kubick et al., 2015). More unique products provide more tax planning opportunities (Higgins et al., 2015) because arm's length transfer prices are more difficult to determine for such products. Their value also frequently depends on intangible assets that are associated with tax avoidance (Dischinger and Riedel, 2011; Grubert, 2003). Moreover, market power allows the MNC to set stable prices and adjust unit costs without immediately harming a BU's competitiveness. In addition to observing less tax avoidance in competitive markets, we thus expect that tax planning is less likely visible in the unit costs because fierce competition requires these to be set competitively. Instead, we expect the MNC to be more dependent on the BUs' tax planning in highly competitive markets since a BU can adjust prices when the market situation allows it to do so.

We estimate the main model including a three-way interaction of D_{int}*MB with an indicator for whether trades are in a business line with stable prices (*Stable*). Table 6, Panel A reports the results. All main effects and controls are included in the analyses, but we only report the coefficients for D_{int}*MB and D_{int}*MB*Stable. Tax planning is more pronounced for stable markets, as evidenced by the positive significant coefficient for D_{int}*MB*Stable when P is the dependent variable. For highly competitive markets (i.e., main effects), we find no tax planning in the unit cost, but we find it in the subsequent pricing stages, primarily at the BU level. For products in stable markets, we find that tax planning mainly takes place in the unit cost. We observe no tax planning in the HO markups or BU price adjustments, as the interaction effects approximately offset the main effects.[20]

The risk of conflicts with tax and customs authorities – Blouin et al. (2018) find that coordination between tax and customs authorities' enforcement reduces profit shifting. Thus, we expect firms to include their perceived risk of conflicts with tax and customs authorities in their transfer pricing decisions. More important, these risk perceptions may have different effects at the BU and HO levels. The MNC indicates that tax disputes require greater HO involvement, but disputes with customs authorities are more directly observed and addressed at the BU level. The reason is that tax disputes are generally dealt with following the annual tax audit, but customs duty affairs may occur on a day-to-day basis and require immediate solutions because transactions may be blocked.

We asked the MNC to indicate the risk of transfer pricing issues with tax and customs authorities for each country they export to (i.e., the importing countries). The risks of conflicts are ranked as low, medium, or high, which we translate to a variable taking the values of zero, 0.5, and one, respectively. The variable RiskTax measures the risk of conflicts with tax authorities, and RiskTariff measures the risk of conflicts with customs authorities. Descriptive statistics are included in Table 2. Of the 110 countries to which the MNC exports, 27 have a medium or high tax risk, and 16 have a medium or high tariff risk. Our main regression model includes the main effects and two- and three-way interactions with these risk indicators. The average tax rate differential of −4% shows that, on average, importing countries have lower tax rates than the exporting countries belonging to the EU.[21] More conflicts with the importing country's tax authority may prompt allocating more profits to the importing country to solve these conflicts. These conflicts may thus help the MNC justify a lower transfer price to the authority in a higher tax exporting country. Thus, we expect that the risk of conflicts with the importing country's tax authority enhances tax planning, on average. Solving conflicts with the importing countries' customs authorities, on the contrary, will lead to higher prices because this increases the importing country's tariff revenues by increasing the tariff base. Increased prices reduce tariff planning by the MNC.

In Panel B of Table 6, we report the main effects of the variables of interest and the interactions with the risk indicators. The results support the idea that tax planning is more pronounced for trades with importing countries with higher income tax risk, as this facilitates shifting profits to lower-tax countries (Column 1). Columns 2 and 3 suggest that the result in Column 1

[20] An F test for joint significance of D_{int}*MB and D_{int}*MB*Stable in Table 6 Panel A suggests that these coefficients are significantly positive in Columns 1 and 2 (p value < 0.001) and statistically insignificant in Columns 3 and 4.

[21] The distribution of the tax rate differences is comparable for each risk category.

Table 6
Panel A: Competitive position of the MNCs products (N=271,697).

	Pred.	(1) P	(2) Cost	(3) Rel_MUHO	(4) Rel_DPBU
D_{int}*MB	(+)	0.700***	0.035	0.192***	0.469***
		(0.034)	(0.035)	(0.009)	(0.013)
D_{int}*MB*Stable	(+)	1.961***	2.555***	−0.168***	−0.449***
		(0.429)	(0.410)	(0.044)	(0.041)
Adj. R-squared		0.943	0.947	0.753	0.642
Table 6 Panel B: Risk for conflicts with tax and customs authorities in the importing country (N=271,584)					
D_{int}*(τ_M-τ_E)	(+)	0.506***	−0.372***	0.295***	0.638***
		(0.057)	(0.058)	(0.012)	(0.017)
D_{int}*τ_d	(−)	−0.779***	−0.999***	0.584***	−0.124***
		(0.056)	(0.059)	(0.015)	(0.015)
D_{int}*(τ_M-τ_E)*RiskTax	(+)	2.191***	2.386***	0.636***	−0.439***
		(0.452)	(0.441)	(0.052)	(0.059)
D_{int}*τ_d*RiskTariff	(+/−)	1.327***	1.265***	0.064	0.504***
		(0.386)	(0.376)	(0.059)	(0.052)
Adj. R-squared		0.941	0.945	0.770	0.649
Table 6 Panel C: Risks for conflicts with tax authorities in Germany (N=271,697)					
D_{int}*(τ_M-τ_E)	(+)	0.763***	0.352	0.126***	0.211***
		(0.270)	(0.278)	(0.039)	(0.038)
D_{int}*(τ_M-τ_E)*Germany	(−)	−0.737***	−1.139***	0.251***	0.290***
		(0.273)	(0.281)	(0.043)	(0.040)
Adj. R-squared		0.941	0.945	0.748	0.649
Table 6 Panel D: Agency conflicts (N=271,697)					
D_{int}*MB	(+)	0.704***	0.093*	0.123***	0.455***
		(0.049)	(0.051)	(0.009)	(0.012)
D_{int}*MB*Agency	(+/−)	3.552***	2.458**	1.413***	−0.365***
		(1.327)	(1.240)	(0.124)	(0.135)
Adj. R-squared		0.941	0.945	0.752	0.642
For all analyses:					
Additional Controls		Yes	Yes	Yes	Yes
Quarter-FE		Yes	Yes	Yes	Yes
Product-FE		Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID

Note: This table presents the sample splits according to the competitive position of the MNC per the business line to which the products belong (Panel A), risks for conflicts with tax and customs authorities in the importing country (Panel B), risk of conflicts with the tax authority in the exporting home country (Panel C), and the MNC's assessment of agency conflicts with the business in non-EU importing countries (Panel D). The dependent variable in Column (1) is P defined as the natural logarithm of the unit price. The dependent variable in Column (2) is Cost defined as the natural logarithm of unit cost. The dependent variable in Column (3) is Rel_MUHO defined as the head office markup divided by the unit cost, while the dependent variable in Column (4) is Rel_DPBU defined as the business unit mark divided by the unit cost. Refer to the appendix for variable definitions of the independent variables. We present standard errors clustered at the product level in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

is due to increased tax planning in the unit cost and HO markup. However, tax planning in the BU adjustments (Column 4) is less. A possible explanation is that BUs partially reverse tax planning in unit cost and HO markups to reduce price differences between countries.[22] The results confirm that tax risk is largely considered at the HO level. When we consider the risk of conflicts with customs authorities, we find that tariff planning is present for the low-risk countries but less or even absent when the risk of conflicts is medium or high (i.e., the interaction is positive and offsets the main effect of the price).[23] Tariff risk is considered only in the transfer price elements that the BU helps determine (unit cost or BU price adjustment).

To corroborate our results, we also asked the MNC to assess the risks of conflicts with the tax authorities of the EU exporting countries. The MNC indicated having more conflicts in its home country (Germany) than in other EU exporting countries. Therefore, we also compare coefficients on D_{int}*(τ_M-τ_E) for exports from Germany versus other EU countries (see Panel C of Table 6). Since, on average, the German tax rate is higher than that of importing countries, there is an incentive to allocate less profits to Germany. Conflicts with the tax authority may constrain this behavior. We indeed find that tax planning is present for products exported from other EU countries (i.e., main effect 0.763) but absent for products exported from

[22] These estimated effects and their interpretation are based on the average negative tax rate differential in the sample, in which case tax risk in the importing country enhances profit shifting. However, when the tax rate in the importing country is higher than that in the exporting country, shifting profits to the high-tax, high-risk country reduces profit shifting. In addition to the different effect of risk in these cases, the higher tax rate in the importing country also yields a conflict between tax and tariff planning which we analyze in Table 9. Excluding the approximately 30,000 observations where the importing country exhibits medium or high tax risk and the tax rate in the importing country is higher than in the exporting country yields similar results. In line with the idea that these cases work against tax planning, the absolute value of the three-way interaction terms all slightly increase when we exclude these cases (untabulated).

[23] An F test for joint significance of the coefficients D_{int}*(τ_d) and D_{int}*(τ_d) *RiskTariff in Table 6, Panel B Column 1 indicates that the sum is statistically not significantly different from 0 (p value=0.1560).

Table 7
Difference-in-differences estimation research question 1.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Tax rate differential & tariff control: NO				Tax rate differential & tariff control: Yes			
	Pred.	P	Cost	Rel_MUHO	Rel_DPBU	P	Cost	Rel_MUHO	Rel_DPBU
$(\tau_M\text{-}\tau_E)$						−0.419***	−0.170***	−0.089***	−0.221***
						(0.044)	(0.044)	(0.008)	(0.011)
τ_d						0.777***	0.589***	0.107***	0.059***
						(0.052)	(0.054)	(0.010)	(0.012)
D_{int}		−0.741***	−1.175***	0.368***	0.143***	−0.667***	−1.138***	0.366***	0.181***
		(0.013)	(0.015)	(0.003)	(0.003)	(0.014)	(0.015)	(0.004)	(0.003)
$D_{int}*(\tau_M\text{-}\tau_E)$						0.614***	−0.192***	0.394***	0.531***
						(0.056)	(0.056)	(0.012)	(0.015)
$D_{int}*\tau_d$						−0.529***	−0.653***	0.336***	−0.051***
						(0.059)	(0.062)	(0.017)	(0.014)
$Delta(\tau_M\text{-}\tau_E)$		−1.580***	−0.740***	0.122***	−0.522***	−0.883***	−0.361**	0.261***	−0.295***
		(0.153)	(0.162)	(0.017)	(0.027)	(0.160)	(0.168)	(0.020)	(0.027)
$D_{int}*Delta(\tau_M\text{-}\tau_E)$	(+)	1.491***	0.025	0.646***	0.592***	0.761***	−0.165	0.383***	0.253***
		(0.273)	(0.291)	(0.047)	(0.036)	(0.278)	(0.297)	(0.047)	(0.036)
Constant		0.761	0.857*	0.004	−0.300***	0.663	0.769*	0.038	−0.292***
		(0.473)	(0.469)	(0.052)	(0.052)	(0.473)	(0.465)	(0.054)	(0.052)
N		270,335	270,335	270,335	270,335	270,335	270,335	270,335	270,335
Adj. R-squared		0.941	0.945	0.738	0.634	0.942	0.945	0.749	0.644
Additional controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product-FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID	ProductID

Note: This table reports the difference-in-differences estimation results for Research Question 1 using the cumulative change in (τM-τE) as the treatment variable. Columns (1)–(4) report the results excluding the control variables for the level of the tax rate differential and tariff, while Columns (5)–(8) report results including these control variables. The dependent variable in Columns (1) and (5) is the natural logarithm of the unit price (P). The dependent variable in Columns (2) and (6) is the natural logarithm of the unit cost (Cost). The dependent variable in Columns (3) and (7) is the head office markup divided by the unit cost (Rel_MUHO). The dependent variable in Columns (4) and (8) is the business unit mark divided by the unit cost (Rel_DPBU). Refer to the appendix for variable definitions. We present standard errors clustered at the product level in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively.

Germany (i.e., the interaction effect of −0.737 offsets the main effect).[24] This difference is largely due to unit cost adjustments in Germany that offset tax planning via HO markups and BU price adjustments.

Agency issues — The MNC's BUs are generally profit centers incentivized based on profit and sales quantities. We find that the BUs are willing to adjust prices in the interest of the MNC against the interests of one of the two BUs involved in a trade. Thus, we asked the HO to indicate whether BUs in certain countries are more difficult to motivate to act in line with the MNC's interest. The MNC indicated considerable variation at the BU level within countries but mentioned three countries with aggressive local authorities that execute pressure to act in line with governmental interests. Cultural values and ways of doing business make it important for the MNC to rely on local managers who are more susceptible to local pressures than expatriates.

Of the 271,697 trades, 28,541 involve a trading partner in one of the three countries with greater agency issues. Panel D of Table 6 reports coefficients for the interaction effects between an indicator for these countries and D_{int}*MB. For trades involving countries with greater agency issues, the interaction indicates that the HO engages in additional tax planning by adjusting both the unit cost and markups. The BU does not contribute to reducing the tax and tariff burden in these countries.[25] Similar to the previous analysis on conflicts with tax and customs authorities, these results are based on subjective assessments of the MNC's management and are sensitive to the choice of countries. Nevertheless, they indicate that agency issues matter for realizing tax planning benefits at the BU level.

5.5. Difference-in-differences estimation, conflicting tax and tariff incentives, robustness tests

Difference-in-differences estimation — Although we included product and quarter fixed effects in our main analysis and ran a matched-sample analysis, we explore the effects of taxes on transfer prices using a difference-in-differences estimation with a continuous treatment variable defined as the change in the tax rate differential. Thus, we investigate how prices vary

[24] An F test for joint significance of the coefficients $D_{int}*(\tau_M\text{-}\tau_E)$ and $D_{int}*(\tau_M\text{-}\tau_E)$ *Germany in Column 1 shows that the combination is not significantly different from 0 (p value=0.5989).

[25] F tests show that the coefficients D_{int}*MB and D_{int}*MB*Agency in Columns 1, 2, and 3 of Table 6 Panel D are jointly statistically significantly positive (p values < 0.05), while the coefficients in Column 4 of Table 6 Panel D are jointly not statistically significant different from 0 (p value=0.5068).

Table 8
Difference-in-differences estimation research question 2 (internal transactions from the main sample).

		(1)	(2)	(3)	(4)	(5)	(6)
		Tax rate differential control: NO			Tax rate differential control: YES		
	Pred.	INCO	HighINCO	DDP	INCO	HighINCO	DDP
$(\tau_M\text{-}\tau_E)$					−2.119***	−1.764***	−12.840***
					(0.114)	(0.116)	(0.605)
$Delta(\tau_M\text{-}\tau_E)$	(−)	−8.041***	−13.483***	−4.953***	−7.523***	−12.961***	−8.658***
		(0.335)	(0.448)	(0.498)	(0.346)	(0.449)	(0.555)
cut1		−9.982***			−9.769***		
		(0.150)			(0.150)		
cut2		−6.883***			−6.669***		
		(0.075)			(0.076)		
cut3		−6.795***			−6.580***		
		(0.074)			(0.075)		
cut4		−2.815***			−2.609***		
		(0.052)			(0.053)		
cut5		−1.612***			−1.408***		
		(0.054)			(0.055)		
cut6		−0.916***			−0.699***		
		(0.056)			(0.058)		
cut7		−0.017			0.215***		
		(0.058)			(0.060)		
cut8		0.047			0.281***		
		(0.058)			(0.061)		
cut9		0.876***			1.115***		
		(0.062)			(0.064)		
Constant			1.825***	1.230***		1.645***	0.012
			(0.060)	(0.142)		(0.060)	(0.268)
N		167,742	167,218	158,822	167,742	167,218	158,822
Additional controls		Yes	Yes	Yes	Yes	Yes	Yes
Quarter-FE		Yes	Yes	Yes	Yes	Yes	Yes
ProductGroup-FE		Yes	Yes	Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID	ProductID	ProductID
Pseudo R-squared		0.0709	0.210	0.339	0.0737	0.213	0.382

Note: This table reports the difference-in-differences estimation results for Research Question 2 using the cumulative change in (τM-τE) as the treatment variable. Columns (1)–(3) report results excluding a control variable for the level of the tax rate differential, while Columns (4)–(6) report results including this control variable. The dependent variable in Columns (1) and (4) is the incoterm choice INCO. The dependent variable in Columns (2) and (5) is HighINCO, which takes a value of one if an incoterm of "Cost Insurance and Freight" or higher is chosen. The dependent variable in Columns (3) and (6) is DDP, which takes a value of one if the incoterm "Delivered Duties Paid" is chosen and zero otherwise. We use product group fixed effects defined at the first four digits of the harmonized system in Columns (1)–(6). Standard errors clustered at the product level are provided in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

with exogenous changes in tax rates. We cannot investigate the effects of changes in tariffs, as there are insufficient changes to perform a reliable change analysis.[26] We use tariff levels as a control variable.

The variable Delta(τ_M-τ_E) measures the cumulative change in the tax rate differential between the importing and exporting country over the quarters. Associations of prices with these cumulative changes capture structural and possibly delayed price adjustments following a tax rate change. Over our two sample years, we observe tax rate changes in 24 importing countries and 10 exporting countries, which result in 568 changes in the tax rate differential for 382 importing-exporting country combinations. As a result, 77.55% of our trades occur after a tax rate change. The descriptive statistics in Table 2, Panel A indicate that the change in the tax rate differential varies from −0.133 to 0.204. As in our main analysis, we include the continuous treatment variable and its interaction with D_{INT}. Again, because tax rate changes also affect the costs and price levels for external trades through implicit taxes, income tax planning is only seen by comparing the difference between the internal and external trades (i.e., the interaction effect). Table 7 reports the results of the difference-in-differences analysis for RQ1.

Columns 1, 3, and 4 report that total prices, HO markups, and BU price adjustments of internal relative to external trades increase when the tax rate differential increases, which is optimal for reducing the income tax burden. However, the unit cost is unaffected (Column 2), which is in line with our main results. In Columns 5–8, we include the level of the tax differential and its interaction with internal trades as control variables. We find that following increases in the tax rate differential, HO markups, BU price adjustments, and the ultimate price of internal trades increase over and above the already observed tax planning pattern.

[26] To be more precise, for products sold in several quarters, among external trades, only one product faces a tariff increase and only two products face a tariff decrease.

Table 9
Sample Splits According to Tax Rate Differential sand Marginal Benefits (Dependent Variable=P).

		(1)	(2)	(3)	(4)
		Conflict	No Conflict	Conflict&MB > 0	Conflict&MB < 0
	Pred.	$(\tau_M-\tau_E)>0$	$(\tau_M-\tau_E) \leq 0$	$(\tau_M-\tau_E)>0$&MB > 0	$(\tau_M-\tau_E)>0$&MB $\leq$ 0
$(\tau_M-\tau_E)$		0.709***	−1.389***	−0.489**	5.445***
		(0.085)	(0.087)	(0.197)	(0.829)
τ_d		2.338***	1.032***	1.871***	2.564***
		(0.143)	(0.043)	(0.366)	(0.199)
D_{int}		−0.380***	−0.723***	−0.390**	−0.135**
		(0.053)	(0.030)	(0.186)	(0.053)
$D_{int}*(\tau_M-\tau_E)$	(+)	−0.554***	1.903***	0.197	−3.467***
		(0.142)	(0.123)	(0.735)	(1.019)
$D_{int}*\tau_d$	(−)	−2.350***	−0.771***	0.265	−3.621***
		(0.210)	(0.049)	(0.924)	(0.322)
Quantity		−0.149***	−0.102***	−0.166***	−0.141***
		(0.007)	(0.003)	(0.012)	(0.010)
ImExDist		0.056***	−0.035***	0.270***	0.015***
		(0.007)	(0.003)	(0.043)	(0.004)
GDPOrigin		−0.090**	−0.002	−0.284***	0.082
		(0.044)	(0.030)	(0.053)	(0.093)
Exrate		0.020***	−0.209***	0.159***	0.024***
		(0.007)	(0.023)	(0.031)	(0.006)
*Dint*Exrate*		−0.050***	0.161***	−0.232***	−0.023
		(0.011)	(0.023)	(0.034)	(0.015)
OECDtrade		0.044***	0.197***	0.290***	−0.080***
		(0.013)	(0.007)	(0.028)	(0.012)
Constant		1.420***	1.472***	2.079***	−0.539
		(0.467)	(0.319)	(0.720)	(0.960)
N		74,657	194,579	32,483	41,041
Adj. R-squared		0.930	0.953	0.927	0.942
Quarter-FE		Yes	Yes	Yes	Yes
Product-FE		Yes	Yes	Yes	Yes
Cluster		ProductID	ProductID	ProductID	ProductID

Note: This table presents additional results for the sample splits according to positive and negative tax rate differentials, as well as positive and negative marginal benefits. The dependent variable for all of the regressions in this table is P. Column (1) reports the results for the subsample with a tax rate differential greater than zero, while Column (2) provides results for the subsample with a tax rate differential smaller or equal to zero. Column (3) provides the results for observations with a positive tax rate differential and a positive MB, while Column (4) presents the results for observations with a positive tax rate differential and a MB smaller or equal to zero. All regressions use quarter and product fixed effects. We present standard errors clustered at the product level in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

We also conduct a difference-in-differences analysis for our second research question to determine whether changes in the tax rate differential affect the incoterm choices for internal trades. Table 8 reports the results for changes in the tax rate differential without (Columns 1–3) and with controlling for the tax rate differential (Columns 4–6). The latter are effects over and above the structural pattern of strategic incoterm choice. The results support the idea that a change in the tax rate differential affects the incoterm choice such that higher costs are allocated to the high-tax country. We illustrated in Table 5 that these costs are recouped from the buyer through a higher transfer price.

Conflicting tax and tariff incentives – While Blouin et al. (2018) illustrate the effect of conflicting tax and tariff incentives on profit levels in a larger sample, we illustrate the effects of conflicting tax and tariff incentives on product price levels within an MNC. We repeat our analyses from Table 2, with P as the dependent variable, for subsamples with positive and negative tax rate differentials in Table 9.

In the subsample with positive tax rate differentials (Column 1), there is a conflict between reducing corporate income tax payments and tariff payments. A positive tax rate differential encourages shifting profit to the lower tax exporting country through a higher transfer price, but such a higher price also increases tariff payments. We find that with a positive tax rate differential, the coefficients for $D_{INT}*(\tau_M-\tau_E)$ and $D_{INT}*\tau_d$ are negative (−0.554 and −2.350, respectively). This result suggests that with conflicting incentives, the MNC optimizes tariff payments even if doing so increases corporate income tax payments. This result is in line with Blouin et al. (2018), who demonstrate that the income tax incentive in conflict situations is not related to the transfer price as expected.

When the tax rate differential is negative or zero (Column 2), tariff and corporate income tax planning incentives are aligned. Charging a lower transfer price is optimal, as it allocates more profit to the lower tax importing country and reduces the price to which the tariff rate applies. In line with this notion, we find a positive coefficient for $D_{INT}*(\tau_M-\tau_E)$ and a negative coefficient for $D_{INT}*\tau_d$ (1.903 and −0.771, respectively).

To further explore what drives the negative effect of the tax rate differential in Table 9, Column 1, we split the subsample with conflicting tax and tariff incentives into two subsamples where either tax planning benefits dominate (MB > 0) or tariff

planning benefits dominate (MB $\leq$ 0). The negative sign for $D_{INT}*(\tau_M - \tau_E)$ in Column 1 is driven by the subsample where tariffs dominate (Table 9, Column 4). The MNC lowers transfer prices to lower tariff payments despite an income tax increasing effect. When the tax rate differential dominates (MB > 0 in Table 9, Column 3), we no longer observe a negative sign for $D_{INT}*(\tau_M - \tau_E)$.

Robustness tests — To further test the robustness of our results, we repeat our main analyses using product group fixed effects defined at the first two digits of the harmonized system (untabulated). In addition, we rerun our analyses with standard errors clustered in two ways, at the importing-exporting country combination and the combination of importing country, country of origin, and eight-digit harmonized system product code (untabulated). Our conclusions remain unchanged. In our analysis regarding incoterm choice, as reported in Table 5, we would lose most of our observations when using quarter and product fixed effects. Thus, we include quarter fixed effects but drop product fixed effects and instead run this analysis on a subsample of internal trades that are unique along the following dimensions: product key, tax rate differential, applicable tariff rates, and the combination of country of origin, importing and exporting country (untabulated). The results are qualitatively the same as for the full sample of internal observations. This ensures that our results are not driven by the average effects that only apply to larger groups of specific products.

6. Conclusion

Multinational corporations (MNCs) adjust the transfer prices for internal transactions to realize important reductions in their income tax and tariff burden. We study the role of the head office (HO) and business units (BUs) in reducing tax and tariff payments, which is especially interesting in light of the agency conflict between HOs and BUs and provides insight into the benefits of delegating decision rights. While the HO has clear incentives to optimize the MNC's tax burden, it must determine elements of the transfer price early in the price-setting process based on expectations. BUs have superior information and can adjust prices when all information is available, but their incentives may be misaligned. We analyze a confidential dataset of internal trades of a large MNC that consists of quarterly product-level data for trade streams from 23 EU exporting countries to 110 importing countries. We study the extent to which the efforts to reduce the income tax and tariff burden are visible in the unit cost (set by the HO in collaboration with the BU), the markups set by the HO, and the final price adjustments made by the BU. We further examine whether BUs strategically allocate trade costs among trading partners to reduce the income tax burden.

Despite the absence of explicit incentives to minimize the MNC tax and tariff burden, the BUs contribute more to income tax and tariff planning than the HO. While Blouin et al. (2018) show that coordination between the HO and the BU is important in reducing the tax burden, we show that delegating the final price responsibility to the BUs can pay off. A long-term relationship with the HO and implicit incentives may make the BUs act in line with the HO's interest. The relative contributions of the HO and BU vary with product market competitiveness, risks of conflicts with tax and customs authorities, and the severity of agency problems in countries.

We also find strong evidence that the BUs further reduce the tax burden by choosing terms of trade (i.e., incoterms) to allocate trade costs strategically to the higher tax country without adjusting the transfer price accordingly. Tax savings from allocating trade costs to higher tax countries can be significant because trade costs account for more than 20% of the product price, on average. These results may lead to questions regarding whether the prices are in line with the arm's length principle. Arm's length prices are often not readily available, as many specific details can justify noncomparable prices for individual trades. Enforcing the arm's length principle for trade costs is even more difficult because trade costs are not reflected in a product's face value.

While the unique data allow us to contribute novel empirical evidence on the agency issues related to tax planning, our study is subject to some limitations. First, our detailed focus on one firm may limit generalizability across firms. However, the transfer pricing system in the studied MNC (the cost-plus method with one set of books) is most common. Additionally, we see no reason to expect that other transaction-based transfer pricing systems (e.g., the comparable uncontrolled price and the resale price methods) exhibit different patterns. Second, while we control for many factors by comparing internal and external trades, incorporating fixed effects, analyzing the results in a sample of comparable internal and external trades, and adding an analysis of responses to changes in tax rates, we cannot fully rule out that endogenous variables partly drive associations. Third, we do not have access to the actual profit levels of BUs, implying that we must rely on statutory instead of marginal tax rates. This may under- or overestimate the MNC's efforts to reduce its income tax burden. Finally, we cannot distinguish the actual BUs in each country, limiting the possibility of investigating the role of agency problems in BUs' corporate tax planning contribution in greater detail. This is an avenue for future research.

Overall, we provide new insight into the roles of the HO and BU in optimizing income taxes and tariff payments through transfer prices, which is relevant for firms to optimize their tax planning. In addition, our results yield important insights for the OECD, tax authorities, and customs officials in their struggle against base erosion and profit shifting by providing more details regarding where and how profit shifting and strategic cost allocation take place (OECD, 2013; OECD, 2019).

Appendix. Variable Definitions

Dependent variables	
P	Natural logarithm of the observed transfer price.
Cost	Natural logarithm of the observed actual unit cost.
Rel_MUHO	Head office mark-up deflated by the unit cost.
Rel_DPBU	Business unit mark-up deflated by the unit cost plus the head office mark-up.
INCO	Numeric variable with scores from zero to ten where a higher score represents a higher incoterm and higher risks and costs for the seller (i.e., the exporter).
HighINCO	Indicator variable taking a value of one if the incoterm "Cost Insurance Freight" or "higher" is chosen and zero otherwise.
DDP	Indicator variable taking a value of one if the incoterm "Delivered Duties Paid" is chosen for a trade flow and zero otherwise.
Independent variables	
$(\tau_M\text{-}\tau_E)$	Tax rate differential between the importing and exporting country.
τ_d	Applicable tariff of the importing country given the product type and country of origin.
D_{int}	Indicator variable taking a value of one if the trade takes place within the MNC and zero otherwise.
$Delta(\tau_M\text{-}\tau_E)$	Sum of the changes in the tax rate differential over all quarters.
MB	Marginal benefit of increasing the transfer price by one unit arising from the combination of the tax rate differential and the applicable tariff.
Agency	Indicator variable taking a value of one if the MNC perceives the BU of a specific country as hard to motivate for the group-wide interests.
Exrate	Exchange rate between the importing country and the exporting country.
GDPOrigin	Natural logarithm of the GDP per capita of the country of origin.
Germany	Indicator variable taking a value of one if a product is exported from Germany and zero otherwise.
ImExDist	Natural logarithm of the distance between the capitals of the importing and the exporting country.
OECDtrade	Indicator variable taking a value of one if the country of origin and the importing country are OECD countries.
Quantity	Natural logarithm of the quantity sold of that product in the quarter.
RiskTariff	MNC's risk assessment for conflicts with customs authorities in the importing country (low, medium, high).
RiskTax	MNC's risk assessment for conflicts with tax authorities in the importing country (low, medium, high).
Stable	Dummy variable taking a value of one if the traded product belongs to the business line in which the MNC can set stable prices as it is a market leader.

References

Al-Eryani, M.F., Alam, P., Akhter, S.H., 1990. Transfer pricing determinants of U.S. Multinationals. J. Int. Bus. Stud. 21, 409–425.
Anderson, J.E., Van Wincoop, E., 2004. Trade costs. J. Econ. Lit. 42 (3), 691–751.
Baersch, S.-E., Ditz, X., Kluge, X., 2019a. Transfer pricing in business practice in the light of BEPS and digital transformation. Int. Transfer Pricing J. May/June 184–188.
Baersch, S.-E., Heckemeyer, J.H., Olbert, M., 2019b. Transfer pricing and the decision-making authority of the tax function in multinational companies. Access on July 15, 2021. https://ssrn.com/abstract=3271267.
Baldenius, T., Melumad, N.D., Reichelstein, S., 2004. Integrated managerial and tax objectives in transfer pricing. Account. Rev. 79 (3), 591–615.
Bernard, A.B., Jensen, J.B., Redding, S.J., Schott, P.K., 2010. Intrafirm trade and product contractability. Am. Econ. Rev.: Papers & Proceedings 100 (2), 444–448. Available at: https://www.nber.org/papers/w12493.
Bernard, A.B., Jensen, J.B., Schott, P.K., 2006. Transfer pricing by U.S. based multinational firms. NBER Working. Paper No. 12493.
Blouin, J.L., Robinson, L.A., Seidman, J.K., 2018. Conflicting transfer pricing incentives and the role of coordination. Contemp. Account. Res. 35 (1), 87–116.
Chen, C.X., Chen, S., Pan, F., Wang, Y., 2015. Determinants and consequences of transfer pricing autonomy: an empirical investigation. J. Manag. Account. Res. 27 (2), 225–259.
Clausing, K., 2003. Tax-motivated transfer pricing and U.S. intrafirm trade prices. J. Publ. Econ. 87 (9), 2207–2223.
Cristea, A.D., Nguyen, D.X., 2016. Transfer pricing by multinational firms: new evidence from foreign firm ownerships. Am. Econ. J. Econ. Pol. 8 (3), 170–202.
Davies, R.B., Martin, J., Parenti, M., Toubal, F., 2018. Knocking on tax haven's door: multinational firms and transfer pricing. Rev. Econ. Stat. 100 (1), 120–134.
De Simone, L., 2016. Does a common set of accounting standards affect tax-motivated income shifting for multinational firms? J. Account. Econ. 61 (1), 145–165.
De Simone, L., Klassen, K., Seidman, J., 2017. Unprofitable affiliates and income shifting behavior. Account. Rev. 92 (3), 113–136.
Dessein, W., 2002. Authority and communication in organizations. Rev. Econ. Stud. 69 (4), 811–831.
Diewert, W.E., Alterman, W., Eden, L., 2005. Transfer prices and import and export price indexes: theory and practice. Access on. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=734883. (Accessed 11 October 2021).
Dischinger, M., Riedel, N., 2011. Corporate taxes and the location of intangible assets within multinational firms. J. Publ. Econ. 95 (7–8), 691–707.
Duchin, R., Sosyura, D., 2013. Divisional managers and internal capital markets. J. Finance 68 (2), 387–429.
Dürr, O.F., Göx, R.F., 2011. Strategic incentives for keeping one set of books in international transfer pricing. J. Econ. Manag. Strat. 20 (1), 269–298.
EY, 2003. Transfer Pricing 2003 Global Survey, Ernst & Young. EYGM Limited, EYGM No. OO0372.
EY, 2010. Global Transfer Pricing Survey: Addressing the Challenges of Globalization, -Ernst & Young. EYGM Limited.
Eden, L., 1998. Taxing Multinationals: Transfer Pricing and Corporate Income Taxation in North America. University of Toronto Press Incorporated, Toronto.
Ederhof, M., 2011. Incentive compensation and promotion-based incentives of mid-level managers: evidence from a multinational corporation. Account. Rev. 86 (1), 131–153.
Feenstra, R.C., 1989. Symmetric pass-through of tariffs and exchange rates under imperfect competition: an empirical test. J. Int. Econ. 27 (1–2), 25–45.
Graham, J.R., Harvey, C.R., Puri, M., 2015. Capital allocation and delegation of decision-making authority within firms. J. Financ. Econ. 115 (3), 449–470.
Grubert, H., Mutti, J., 1991. Taxes, tariffs and transfer pricing in multinational corporate decision making. Rev. Econ. Stat. 73 (2), 285–293.
Hall, C.M., Lusch, S.J., 2018. Strategic cost shifting and state tax minimization. J. Manag. Account. Res. 30 (1), 55–72.
Halperin, R.M., Srinidhi, B., 1991. U.S. income tax transfer pricing rules and resource allocation: the case of decentralized multinational firms. Account. Rev. 66 (1), 141–157.
Hanlon, M., Heitzman, S., 2010. A review of tax research. J. Account. Econ. 50 (2–3), 127–178.

Heckemeyer, J.H., Overesch, M., 2017. Multinationals' profit response to tax differentials: effect size and shifting channels. Can. J. Econ. 50 (4), 965–994.
Higgins, D., Omer, T.C., Phillips, J.D., 2015. The influence of a firm's business strategy on its tax aggressiveness. Contemp. Account. Res. 32 (2), 674–702.
Hines Jr., J.R., Rice, E.M., 1994. Fiscal paradise: foreign tax havens and American business. Q. J. Econ. 109 (1), 149–182.
Hoenen, A., Kostova, T., 2015. Utilizing the broader agency perspective for studying headquarters–subsidiary relations in multinational companies. J. Int. Bus. Stud. 46, 104–113.
Horst, T., 1971. The theory of the multinational firm: optimal behavior under different tariff and tax rates. J. Polit. Econ. 79 (5), 1059–1072.
Huizinga, H., Laeven, L., 2008. International profit shifting within multinationals: a multi-country perspective. J. Publ. Econ. 92 (5–6), 1164–1182.
International Chamber of Commerce, 2020. Incoterms 2020. Available at: https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-2020/. (Accessed 10 March 2021).
Irarrazabal, A., Moxnes, A., Oromolla, L.D., 2013. The margins of multinational production and the role of intrafirm trade. J. Polit. Econ. 121 (1), 74–126.
Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. J. Financ. Econ. 3 (4), 305–360.
Klassen, K., Laplante, S., 2012. Are U.S. multinational corporations becoming more aggressive income shifters? J. Account. Res. 50 (5), 1245–1285.
Kim, W.C., Mauborgne, R.A., 1993. Procedural justice, attitudes, and subsidiary top management compliance with multinationals' corporate strategic decisions. Acad. Manag. J. 36 (3), 502–526.
Kostova, T., Nell, P.C., Hoenen, A.K., 2018. Understanding agency problems in headquarters-subsidiary relationships in multinational corporations: a contextualized model. J. Manag. 44 (7), 2611–2637.
Kubick, T.R., Lynch, D.P., Mayberry, M.A., Omer, T.C., 2015. Product market power and tax avoidance: market leaders, mimicking strategies, and stock returns. Account. Rev. 90 (2), 675–702.
Löffler, C., 2019. Divisionalization and domestic transfer pricing for tax considerations in the multinational enterprise. Manag. Account. Res. 45, 100646.
Markle, K.S., Mills, L.F., Williams, B., 2020. Implicit corporate taxes and income shifting. Account. Rev. 95 (3), 315–342.
Moers, F., 2006. Performance measure properties and delegation. Account. Rev. 81 (4), 897–924.
Nagar, V., 2002. Delegation and incentive compensation. Account. Rev. 77 (2), 379–395.
Narayanan, V.G., Smith, M., 2000. Impact of competition and taxes on responsibility center organization and transfer prices. Contemp. Account. Res. 17 (3), 497–529.
OECD, 2013. Addressing Base Erosion and Profit Shifting. OECD Publishing, Paris.
OECD, 2022. OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations 2022. OECD Publishing, Paris.
OECD, 2019. OECD/G20 Inclusive Framework on BEPS Progress Report July 2018 - May 2019. OECD Publishing, Paris.
Oxley, J., Pandher, G., 2016. Equity-based incentives and collaboration in the modern multibusiness firm. Strat. Manag. J. 37 (7), 1379–1394.
Reilly, M., Scott, P., Mangematin, V., 2012. Alignment or independence? Multinational subsidiaries and parent relations. J. Bus. Strat. 33 (2), 4–11.
Robinson, L.A., Stocken, P.C., 2013. Location of decision rights within multinational firms. J. Account. Res. 51 (5), 1261–1297.
Swenson, D.L., 2001. Tax reforms and evidence of transfer pricing. Natl. Tax J. 54 (1), 7–25.
Tang, R.Y.W., 1992. Transfer pricing in the 1990s. Manag. Account. 73 (8), 22–26.
Wiseman, R.M., Cuevas-Rodríguez, G., Gomez-Mejia, L.R., 2012. Towards a social theory of agency. J. Manag. Stud. 49 (1), 202–222.
Wulf, J., 2007. Authority, risk, and performance incentives: evidence from division manager positions inside firms. J. Ind. Econ. 55 (1), 169–196.