Do Taxes Influence the Organizational Boundaries of International Firms? An Income-Shifting Channel through Transfer Pricing

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Abstract

Firms importing intermediate goods choose between outsourcing and vertical integration. When corporate tax rates differ between the home country and the foreign country, the possibility of shifting income and reducing overall tax payments through transfer pricing makes integration more attractive than outsourcing. This paper develops an incomplete-contracting model in which an international firm chooses whether to internalize intermediate transactions, and if so, how much responsibility to delegate from the home headquarters to the foreign affiliate in order to establish the optimal tax-oriented transfer price. Empirical evidence verifies some of the observable predictions from the theory: larger cross-country differences in corporate tax rates, higher product intangibility, higher firm productivity and lower trade costs lead to a higher probability of integration as well as a larger percentage difference between the transfer price and the arm's-length price.

Keywords: *organizational mode, transfer pricing, incomplete contract, income shifting, tax*

JEL Classifications: *F23, H25, L22*

1 Introduction

The central question in this paper is, "How do corporate income taxes influence the boundaries of international firms?" Traditionally, studies of international corporate taxes examine the relationship between tax rates and the volume of foreign direct investment (FDI). This study, however, will examine the impact of corporate tax rate differentials on the ownership structure of international firms. Firms importing intermediate goods choose between two major organizational forms: outsourcing and vertical integration. For example, assuming that the home country has a higher corporate tax rate than the foreign country, then international firms based in the home country have a tax incentive to build their own affiliates rather than purchase intermediate goods from unrelated suppliers in the foreign country, since an integrated international firm can lower its tax bill by shifting income to the foreign country. Income is shifted by delegating more business responsibility to the foreign affiliate, which in turn yields a transfer price of intermediate goods that differs from the arm's-length price that would apply without integration.[1]

To fix ideas, suppose Intel Corporation assembles microchips in a wholly owned subsidiary in Malaysia. As an integrated multinational enterprise (MNE), Intel can reduce the global tax payment by shifting income to its Malaysian affiliate, given that the tax rate in Malaysia is lower than that in the U.S. To do so, Intel can manipulate the price of the intermediate goods sold by the Malaysian affiliate to the U.S. parent company, which is the transfer price. The degree to which it can do this is constrained by accounting practice, which establishes the transfer price based on the functions, risks and ownership of certain intangible properties shared by the two parties. To satisfy these constraints, for example, Intel can specify which party is responsible for the transportation and warehousing, which party is responsible for exchange rate risks, and which party owns the property of the technology involved in the internal transaction. If the Malaysian subsidiary undertakes more responsibility and controls more intangible properties, it is legal for the transfer price to be set higher than the market price of a similar unrelated-party transaction. At the other extreme, if Intel does not own the Malaysian supplier, the responsibility of the buyer and

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[1]The transfer price is the price that prevails for an internal transaction within an enterprise, while the arm's-length price is the price that prevails for a transaction between two unrelated parties. See Section 2 for more details.

the seller are fixed, and income cannot be shifted through transfer pricing. Therefore, integration generates an extra tax benefit which cannot be realized under outsourcing.

A key implication in this paper is that key factors related to the transfer pricing strategy are associated with the ownership structure of international firms. To my knowledge, this project is the first to theoretically and empirically stress the tax-motivated income-shifting mechanism as a force that influences the organizational mode of firms. In addition, I apply the incomplete-contracting framework to model transfer pricing, which distinguishes this research from the existing transfer pricing studies. Note that this research studies the economic incentives behind the optimal transfer price based on the allocation of responsibility rather than on any tax evasion by MNEs resulting from cheating on their accounting books.

The seminal incomplete-contracting models of firms in international trade and organizational boundaries include Antràs (2003) and Antràs and Helpman (2004). Antràs (2003) considers a world of incomplete contracts in which final good producers need to obtain specialized intermediate goods from their suppliers. Production of these intermediate goods requires a combination of non-contractible and relationship-specific investments. Following the property-rights approach of Grossman and Hart (1986), ownership of the suppliers entitles the final good producers to some residual rights of control under integration, thus improving the ex post bargaining position of the final good producers. Meanwhile, the party that controls more residual rights has the incentive to make more investment. Production efficiency dictates that residual rights should be controlled by the party whose investment contributes most to the production of intermediate goods. Antràs and Helpman (2004) further combine the within-sector heterogeneity of Melitz (2003) with the structure of Antràs (2003) and show that firm productivity and headquarter-input intensity jointly determine firms' sourcing decisions.

However, these models do not address the role of corporate tax rates in importers' organizational choices. When firms maximize after-tax profits and integrated firms can shift income through transfer pricing, the trade-off between production efficiency and tax minimization will change the outcome of the organizational boundaries that are also shaped by firm productivity

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and headquarter-input intensity. As an illustrative example, I use country-level trade data from the Census Bureau to construct the share of U.S. intrafirm imports in total imports to measure the integration level. Figure 1 shows the correlation between the share of intrafirm imports and the effective corporate tax rate.[2] As we can see, the integration level is negatively correlated with the corporate tax rate. This suggests that integrated firms may shift income out of the U.S. to countries with lower tax rates through transfer pricing and motivates the formal empirical work.

Extending Antràs and Helpman (2004), I assume that the final good producers, differing in productivity, are based in the home country, while the identical intermediate good producers are based in the foreign country, where the tax rate is lower. Further assuming that it is more difficult to find the comparable arm's-length price if the intermediate transactions involve a large amount of intangible properties, I show that, as the tax rate differential or product intangibility increases, integration becomes more attractive, and the percentage difference between the transfer price and the arm's-length price also rises. Integrated firms can also choose whether to enter an Advance Pricing Agreement (APA), a binding contract between the tax authority and the taxpayer by which the authority agrees not to seek a transfer pricing adjustment.[3] Assuming a higher fixed cost associated with integration than with outsourcing and considering the additional cost of establishing an APA conditional on integration, I show that the most productive firms enter an APA under integration, the least productive firms choose outsourcing, and the middle firms choose integration without entering an APA. This is because the more productive a firm is, the more worthwhile it is to incur higher fixed costs, and thus the higher the after-tax profit is due to the income-shifting benefit. Lower trade costs have effects similar to higher productivity.

I will test the predictions of the model using firm-level data of 1992-2005 from the U.S. Linked/Longitudinal Firm Trade Transaction Database (LFTTD). This data set links transaction-level trade data with the Census of Manufactures (CMF) and the Annual Survey of Manufactures (ASM) from the U.S. Census and Customs Bureaus. The import information in LFTTD is ex-

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[2]The effective corporate tax rate is calculated using data on foreign income taxes and total foreign revenue of U.S. multinational enterprises from the Bureau of Economic Analysis, which are available for 54-56 countries from 2002 to 2005. See Section 6 for more details.

[3]I will provide more information on the APA and transfer pricing adjustments in Section 2.

tremely rich, capturing all international import transactions across U.S. borders. For each transaction, it records the value and quantity shipped, the trade costs charged, the Harmonized System (HS) 10-digit product classification, the source country, whether the transaction takes place at "arm's length" or between "related parties", etc. The CMF and ASM contain annual plant information used to construct firm characteristics.

In the firm-level empirical analysis on the transfer price premium, I use a two-step Probit procedure to correct for selection bias which stems from the fact that the transfer price premium is observed only when the firm insources and outsources the same product from the same country at the same time, and that the premium per se is also an important determinant in whether the firm will insource the product. Although Bernard, Jensen and Schott (2006) use the same firm-level data to study transfer pricing, they do not deal with this selection problem. In addition, they focus on the transfer pricing behavior of exporting firms, while this paper studies U.S. importing firms and stresses the effects of product intangibility, firm productivity, trade costs and APA participation on transfer pricing.

Since my access to the confidential LFTTD is still in the approval process, I also conduct industry-level analysis using trade data from 2002 to 2005 available on the Census Bureau website. Total imports and related-party imports are available for each "industry by country" observation. Empirical evidence on country and industry characteristics shows that a lower corporate tax rate in the intermediate-goods producing country, lower trade costs and higher R&D intensity are associated with a higher share of intrafirm imports in total imports, which is consistent with the theoretical predictions from the model.

In sum, this paper links the incomplete-contracting literature on organizational forms and the transfer pricing literature in a theoretical and empirical investigation of the influence of corporate taxes. The remainder of the paper is structured as follows. In the next section, I provide background on transfer pricing. After reviewing the relevant literature in Section 3, I develop the incomplete-contracting model in Section 4. Section 5 discusses the estimation strategy and Section 6 describes data sources. Section 7 reports the industry-level empirical results. Section 8 concludes.

2 Background on Transfer Pricing

In this section, I provide useful information on transfer pricing, especially the aspects that will be built into the model.

The transfer price is the price that prevails for an internal transaction within an enterprise, while the arm's-length price is the price that prevails for a transaction between two unrelated parties. In international trade, given that corporate tax rates differ across countries, multinational enterprises (MNEs) may employ transfer pricing strategies to shift profits to low tax countries in order to minimize worldwide tax burdens. For example, if the tax rate is lower in the foreign country, MNEs want to set a higher transfer price for the internal imports from its foreign affiliate and shift profits to the low-tax country.

Most countries have adopted the arm's-length principle to ensure that transfer prices between companies of MNEs are established on a market value basis, which means that intrafirm transaction prices should be the same as they would have been had the parties to the transaction not been related to each other. In practice, however, the actual determination of the arm's-length price is notoriously difficult, which gives rises to tax avoidance. Recently, the U.S. government has paid increasing attention to international tax policy, calling for the elimination of benefits for companies that harbor cash in offshore accounts. The U.S. Department of the Treasury (March 1999) estimated the annual loss in U.S. income tax revenue due to transfer pricing manipulation at $2.8 billion with over half of the estimated loss from large corporations (see Eden, Juarez and Li, 2005). Furthermore, it is particularly difficult to find a comparable market price in industries (e.g. pharmaceuticals) whose intermediate transactions involve a large amount of intangible properties, such as patents and trademarks.

To demonstrate the income-shifting benefit, I discuss briefly the U.S. credit and deferral system. For profits realized in a foreign country, a U.S. MNE not only pays taxes to the foreign tax authority but also takes on a tax liability in the U.S. However, it receives a credit from the U.S. for the taxes paid abroad that can be subtracted from the tax liability. If the tax rate is lower in the foreign country, the credit will be smaller than the domestic tax liability, and the MNE has a "deficit

foreign tax credit". The MNE is still taxed by the "differenced rate" and the net taxes paid should be the same. In this case, there is no tax avoidance arising from shifting income to the foreign country. However, domestic taxes on foreign income can usually be deferred until the income is remitted in the form of dividends. Due to the time value of money, the income-shifting benefit arises from the deferral of the domestic tax payment. Taxes can sometimes be deferred indefinitely, or companies may be taxed at a lower rate during a tax holiday in the future. It is a general fact of taxation that when taxpayers can choose when to pay taxes, the total amount paid will likely be lower.

On the other hand, transfer pricing can also be costly and risky from the perspective of MNEs. Although MNEs annually hire accounting experts to prepare transfer pricing documentation, it is still possible that they will undergo income adjustments after a tax audit, which may result in double taxation.[4] Double taxation occurs when the domestic government believes that income has been shifted out of the country, and the company is then required to compensate for the tax underpayment by adjusting income, namely shifting income back from the foreign country. In principle, the tax overpayment to the foreign country should be refunded to the MNE after income adjustments. However, it may well not be possible after a tax liability in the foreign country has become final. If the foreign authority is not prepared to give relief, the shifted income will fully or partially be taxed twice.

To eliminate this risk, many MNEs apply for an Advance Pricing Agreement (APA) with tax authorities. This agreement sets out appropriate transfer pricing criteria in advance, and the authorities agree not to seek a transfer pricing adjustment. The transfer pricing criteria include the comparable arm's-length price, as well as the specific arrangement of the supply chain and functional services. There are three determinants in establishing a legal transfer pricing policy within an MNE: functions, risks and intangible assets. If the MNE shows evidence that the related party which receives more income provides more functions, bears more risks or owns more intangible as-

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[4]According to a global transfer pricing 2007-2008 survey, conducted by Ernst & Young, 52% of all respondents have undergone a transfer pricing examination since 2003, with 27% resulting in adjustments by tax authorities. See http://www.ey.com/Publication/vwLUAssets/Precision_under_pressure/$FILE/Precision_under_pressure.pdf

sets than an arm's-length counterpart, the transfer price can differ from the arm's-length price. For this reason, the advance discussion in APA is regarded as the only clear path to taxation certainty.[5]

Though beneficial, the APA involves high administrative burdens, including communicating and negotiating costs for both taxpayers and tax authorities. It is generally the largest and most sophisticated taxpayers that are economically profitable or qualified to apply for an APA. At the same time, international trade tends to be dominant by the relatively large firms. Bernard, Jensen and Schott (2005) report that 2,245 MNEs controlled 80.9 percent of international trade in the U.S in 2000. How many APA holders are in the economy? According to an APA report from the Internal Revenue Service (IRS), since its inception in 1991 through 2009, a total of 904 APA applications have been executed. Roughly speaking, more than one third of the "big guys" have an APA, which shows that the APA decision is essential in modeling transfer pricing.

The model developed in Section 4 will incorporate all the elements mentioned above, including the arm's-length price, industry intangibility, double taxation, tax deferral, determinants of transfer pricing policy within an MNE, and APA participation.

3   Literature Review

I divide the previous work into two parts: the incomplete-contracting literature on ownership structure and the transfer-pricing literature.

3.1   Ownership Structure

Antràs (2003) is the first to use an incomplete-contracting property-rights framework to study the boundaries of international firms. He assumes that the final good producer (F) in the home country provides capital and the intermediate good producer (M) in the foreign country provides labor in the production of intermediate goods. Under integration, F has partial claims over the residual rights of intermediate goods. The relationship-specific investments cannot be contracted ex ante. The key insight is that, to achieve efficient production, ownership should be assigned to the party

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[5]See *International Transfer Pricing 2009* published by *PricewaterhouseCoopers* for more information.

whose investment contributes most to the relationship. He concludes that intrafirm trade is heavily concentrated in capital intensive industries. Embedding the framework in a general-equilibrium model, he shows that intrafirm trade largely occurs between capital abundant countries.

Antràs and Helpman (2004) combine the within-sector heterogeneity of Melitz (2003) with the structure of Antràs (2003) and generalize the relationship-specific inputs into headquarter inputs and affiliate inputs. In this extended model, they assume that fixed costs are highest when firms insource intermediate goods abroad and lowest when firms outsource them at home, and it is more profitable for more productive firms to incur higher fixed costs. The key result is that, in sectors with a very low intensity of headquarter services, no firm integrates. In the headquarter-input intensive sectors, the most productive firms insource intermediate goods abroad, while the least productive firms outsource them at home. Adding corporate tax rates into Antràs and Helpman (2004) baseline model, I will study the interaction of taxes, firm productivity, and headquarter-input intensity in this incomplete-contracting framework.

Among industry-level empirical tests of the implications of Antràs-type incomplete-contracting models, Yeaple (2006) uses U.S. affiliate-level data from the Bureau of Economic Analysis (BEA). He finds that integration is more prevalent in capital intensive industries in capital scarce countries, while R&D intensity is associated with integration in skilled-labor abundant countries, and greater dispersion in productivity across firms within a single industry leads to more FDI. Nunn and Trefler (2007) use related-party import data from the U.S. Census Bureau, and their work strengthens the theoretical predictions on headquarter-input intensity and productivity in Antràs and Helpman (2004). Due to the lack of firm-level productivity data, both of the studies employ dispersion of productivity across firms within an industry to measure firm heterogeneity. My industry-level empirical analysis also employs the Census Bureau data as in Nunn and Trefler (2007).

Other recent studies further address this issue with firm-level data, as I will do. Defever and Toubal (2007) use French data and compute total factor productivity at the firm level. The results show that highly productive firms that use suppliers' inputs intensively in their production process are more likely to outsource. Corcos et al. (2009) also use French firm-level data and find that

highly productive, capital intensive, and skilled-labor intensive firms are more likely to engage in intrafirm trade. They emphasize that the correct unit of analysis for headquarter-input intensity is the firm but not the industry. Both studies capture the variation in contracting environments across countries using the "rule of law" variable from Kaufmann et al. (2006). In my firm-level empirical analysis, I will include firm-level capital intensity and skilled-labor intensity, as well as "rule of law" as control variables in the empirical analysis. I take "rule of law" as the measurement of MNEs' compliance with tax laws.

Using the U.S. firm-level data in the U.S. Linked/Longitudinal Firm Trade Transaction Database (LFTTD), Shlychkov (2009) estimates firm productivity and shows that higher productivity, higher headquarter-input share, and lower trade costs are associated with a higher share of intrafirm imports. The firm-level empirical work in this paper will leverage the LFTTD and other country-level and industry-level data to test the impact of the corporate tax rate, firm productivity, product intangibility, and trade costs on the ownership structure of U.S. international firms.

3.2 Transfer Pricing

The Antràs-type property-rights models overlook the policy environment of the foreign countries. One of the most important policies that attract FDI is the corporate tax rate. Prior studies of corporate taxes usually focus on empirically testing the negative correlation between the tax rate and the total amount of FDI in a country. However, Grubert and Mutti (1991) examine the relationship between the foreign tax rate and the total income of MNE affiliates in the foreign country. The negative relationship they find suggests another explanation for the larger volume of FDI in countries with lower tax rates; that is, the opportunity to shift income from high-tax countries to low-tax countries can create an incentive for MNEs to build their own affiliates in low-tax countries.

As one of the main channels of shifting income, transfer pricing has been studied in some theoretical models.Most closely related to this research, Baldenius, Melumad and Reichelstein (2003) impose an intra-company discount on the transfer price to differentiate it from the arm's-length price. The optimal discount is derived as a function of divisional tax rates such that firms

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can alleviate efficiency problems of scarce capacity and minimize tax payments. Their analysis takes divisional revenues and costs as given, and does not consider division-specific investments and the bargaining process as in an incomplete-contracting mechanism. Holmstrom and Tirole (1991) construct an incomplete-contracting model to study the interaction between transfer pricing and organizational form. However, they concentrate on the optimal degree of decentralization and the quality monitoring of relationship-specific investments induced by the transfer price rather than the tax-motivated income-shifting incentive.

Previous empirical tests of transfer pricing are mainly based on two data sources. Clausing (2003) uses 1997-1999 data on import and export product prices from the International Price Program in the Bureau of Labor Statistics and finds that higher corporate tax rates abroad are associated with higher related-party export prices and lower related-party import prices. Though controlling for industry fixed effects, she only includes the corporate tax rate and the exchange rate as the country characteristics. Desai, Foley and Hines (2005) use affiliate-level data from the BEA and find that larger, more international firms, and those with extensive intrafirm trade and high R&D intensities, are the most likely to use tax havens.[6] They focus on both the transfer pricing channel and the deferral nature of repatriation taxes of trade with tax havens, but they do not directly test transfer prices in their empirical work. Unlike the studies above, I will use the import data from the LFTTD to construct the firm-level transfer price and incorporate R&D intensity and various firm and country characteristics in the regressions.

Bernard, Jensen and Schott (2006) employ the export data in LFTTD and compare transfer prices and arm's-length prices within firms, products, destination countries, modes of transport, and month. They find that U.S. arm's-length export prices are larger than transfer prices, and that the price wedge is smaller for commodities than for differentiated goods, increasing in firm size and firm export share, and greater for goods sent to countries with lower corporate tax rates and higher tariffs. This paper differs from their work for the following reasons. First, this paper

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[6]Tax havens are low-tax jurisdictions that provide investors opportunities for tax avoidance. Examples of such tax havens include Ireland and Luxembourg in Europe, Hong Kong and Singapore in Asia, and various Caribbean island nations in the Americas.

links the transfer price with sourcing choices. In particular, I use a two-step Probit procedure to correct the potential selection bias as mentioned in the introduction. Second, this paper highlights the role of firm productivity, trade costs, and APA participation, which are absent in their studies. Last, this paper focuses on the import transactions, which may have different patterns from export transactions.

4 Model

I add income taxes into the incomplete-contracting framework of Antràs and Helpman (2004). I consider two cases: (1) firms choose between outsourcing and integration, provided that no firm shifts income under integration, and (2) integrated firms can shift income through transfer pricing and they choose whether or not to establish an Advance Pricing Agreement (APA) that leads to different transfer pricing strategies.

4.1 The No-Income-Shifting Case

I begin with a theoretical world where integrated firms cannot shift income across countries. This will demonstrate the gains to outsourcing versus integration due only to incomplete contracts and tax differentials.

4.1.1 Model Setup

Consider a world with two countries, the North and the South. Labor is the unique factor of production. Preferences of the representative consumer are represented by:

$$U = y_0 + \frac{1}{\mu} \sum_{k=1}^{K} Y_k^{\mu}, \qquad 0 < \mu < 1, \tag{1}$$

where y_0 is the consumption of a homogeneous good, and Y_k is an index of aggregate consumption in sector k. Letting $y_k(i)$ be the consumption of variety i from sector k, aggregate consumption Y_k is given by a CES function over a continuum of goods:

$$Y_k = \left(\int y_k(i)^{\alpha} di \right)^{\frac{1}{\alpha}}, \qquad 0 < \alpha < 1. \tag{2}$$

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The elasticity of substitution between any two varieties in a given sector is $1/(1-\alpha)$. It is assumed that $\alpha > \mu$, so that varieties within a sector are more substitutable for each other than they are for varieties from a different sector or for the homogeneous good. The inverse demand function for any variety i in industry k is given by:

$$p_k(i) = Y_k^{\mu-\alpha} y_k(i)^{\alpha-1}. \tag{3}$$

Producers of differentiated products face a perfectly elastic supply of labor in each country.

Each variety $y_k(i)$ requires a distinct intermediate input which is denoted by $x_k(i)$. Only intermediate supplier M in the South knows how to produce it. Production of high-quality intermediate-input variety requires a combination of two variety-specific inputs, $h_k(i)$ and $m_k(i)$, which we associate with headquarter investment and affiliate investment, respectively. Headquarter services $h_k(i)$ can be produced only by final good producer F in the North, with one unit of labor per unit of output, whereas $m_k(i)$ can be produced only by M in the South, with one unit of labor per unit of output. The entire process is as follows: M produces $x_k(i)$ using $h_k(i)$ which is provided by F and $m_k(i)$ produced by itself, and then sends $x_k(i)$ back to the North where F produces the final good. For the modeling purpose, this is different from Antràs and Helpman (2004), where $m_k(i)$ is considered as the intermediate good provided by M and the final good $y_k(i)$ is produced in the North after F receives $m_k(i)$.

To produce the headquarter input, F needs to incur a fixed cost of entry consisting of f_E units of Northern labor. Upon paying this fixed cost, each F draws a productivity level θ from a known distribution $G(\theta)$. It is the productivity θ that distinguishes their production levels of headquarter services, i.e. $H_k(i) = \theta h_k(i)$. The assumption is that final good producers differ from each other after drawing θ, while intermediate producers in the South are identical. Note that, in Antràs and Helpman (2004), θ does not enter the production of headquarter services, but the production of final goods. This modeling distinction arises from the different production process of intermediate goods as mentioned.

The per-unit trade costs are modeled in the standard iceberg formula, whereby $\phi > 1$ units of a good must be shipped in order for 1 unit to arrive at the destination. Output of every variety

follows a Cobb-Douglas function:

$$x_k(i) = \frac{1}{\phi} \left(\frac{H_k(i)}{\eta} \right)^{\eta} \left(\frac{m_k(i)}{1-\eta} \right)^{1-\eta} = \frac{\theta^{\eta}}{\phi} \left(\frac{h_k(i)}{\eta} \right)^{\eta} \left(\frac{m_k(i)}{1-\eta} \right)^{1-\eta}, \qquad (4)$$

where the productivity parameter θ is firm specific and the parameter η is sector specific. Production of the final good requires no further costs, i.e. $y_k(i) = x_k(i)$. Low-quality intermediate inputs can be produced at a negligible cost.

Denote the wage rate in the North by w_n and the wage rate in the South by w_s. Both F and M bear production fixed costs $f_n w_n^{\eta} w_s^{1-\eta}$ and $f_s w_n^{\eta} w_s^{1-\eta}$, and the total fixed cost satisfies $f = f_n + f_s$. It is assumed that fixed costs in each industry have the same factor intensity as variable costs, so that the total cost functions are homothetic.

Every final good producer F needs to contract with a manufacturing plant M for the provision of intermediate inputs. Ex ante, there is a large number of potential, identical suppliers for each variety i in each sector k. Free entry into each sector ensures zero expected profit for a potential entrant. In order to make all potential suppliers break even, M makes a lump-sum transfer $T_k(i)$ to F upon entry, which can vary by industry and variety.

Profits of the parties are taxed in the countries in which they are located. The corporate tax rate faced by F in the North is τ_n, while the tax rate faced by M in the South is τ_s. Without loss of generality, I assume $\tau_n > \tau_s$. Additionally, I assume that the lump-sum transfer $T_k(i)$ is not taxed in the North during the periods we are interested in so that only production profits of F and M are taxed in the country they are located in. As is consistent with the credit and deferral system introduced in Section 2, domestic taxes on foreign income are usually deferred until the income is remitted in the form of dividends. In this context, I take $T_k(i)$ as the dividends that will not be remitted to the North immediately. To illustrate the benefit of delaying the lump-sum transfer (or the foreign profit), suppose there will be a tax holiday with $\tau_n' < \tau_n$ at some unknown date in the future, at which time the North will tax the dividends at rate $(\tau_n' - \tau_s)$, which is lower than $(\tau_n - \tau_s)$. In this sense, the benefit of delaying the foreign profit comes from the optional time value of the delayed tax payments and the possibly lower future tax rate in the North. Although in theory the

transfer $T_k(i)$ is handed to F ex ante, I assume that, at the very beginning, the parties sign a contract specifying the amount of $T_k(i)$ and the commitment that $T_k(i)$ will be remitted from M to F in later periods.

4.1.2 Incomplete Contract and Nash Bargaining

As is standard in the incomplete-contracting setting, the quality of the intermediate good and the amount of ex ante investments cannot be verified by a third party. Hence the parties cannot write contracts contingent on sale revenues. Instead, they follow a Generalized Nash Bargaining ex post, which leaves F bargaining power β, a fraction of the ex post gains from trade. Foreseeing the total after-tax profits of the two organizational modes, F chooses between outsourcing and integration to obtain the intermediate good from M at the beginning. Let R_o and R_v be the operating revenues generated under outsourcing and integration separately when the parties agree on the distribution of the revenues.

Under outsourcing, since the intermediate good provided by M is distinct, and useless outside this transaction, if F and M cannot agree on the distribution of revenue, their cooperation fails and each party receives zero profit. On the other hand, if the agreement on the distribution of revenue is reached, F and M bargain over R_o, and F's share of revenue is β, which is the sum of the bargaining power plus the opportunity cost that equals zero.[7]

Under integration, M is a division of F and has no control rights over the intermediate good produced. If the parties cannot agree on the distribution of the revenue, F can simply fire M and seize the intermediate output. However, if there were no costs associated with firing M, F would always have an incentive to seize all intermediate output ex post, and M would have no incentive to invest $m_k(i)$ ex ante. Then both of them gain zero and integration will never be chosen. Therefore, it is assumed that firing M results in the loss of a fraction $1 - \delta$ of final good production. The interpretation of δ in Antràs and Helpman (2004) is that F cannot use the intermediate inputs without M as effectively as it can with the cooperation of M. In recent literature, δ is usually taken as the contracting environment, see Antràs and Helpman (2008), Defever and Toubal (2007),

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[7]The opportunity cost can also be considered as the outside option in the incomplete-contracting literature.

Corcos et al. (2009) and Bernard et al. (2010).

In line with the interpretation of ineffective cooperation, I refer to $1-\delta$ as the allocation of functions and risks assigned to M, instead of the contracting environment. Besides providing $m_k(i)$ and producing $x_k(i)$, M contributes to the organization by undertaking some functions and risks, such as warehousing and currency risks in the foreign country. The functions and risks are a concrete translation of M's cooperation and consistent with the rules in determining a proper transfer price, which will be modeled in the next subsection.[8] Accordingly, δ is the allocation of functions and risks assigned to F.

In this circumstance, F sells an amount $\delta y_k(i)$ of the final good. With CES preferences and the constant markup $1/\alpha$, it generates an ex post opportunity cost of $\delta^\alpha R_v$. Nevertheless, the ex post opportunity cost for M is zero, implying that the overall gains from trade that the parties bargain on are $(1-\delta^\alpha)R_v$. As a result, F's share of revenue under integration is the sum of the opportunity cost plus the bargaining gains $\bar{\beta} = \delta^\alpha + \beta(1-\delta^\alpha)$, which is higher than that under outsourcing, i.e. $\bar{\beta} > \beta$. To look at it from a different angle, we can regard δ as F's fraction of residual rights over the amount of $x_k(i)$ under integration, which distinguishes integration from outsourcing.

Let me summarize the time line of the events. At t_0, F bears a fixed cost f_E and draws a productivity level θ from a known distribution $G(\theta)$. Seeing the productivity, F decides whether and how to enter a given market. M commits to hand over a lump-sum transfer $T_k(i)$ to F in the future. At t_1, firms incur their fixed costs of production and F chooses investments in $h_k(i)$. At t_2, F hands the specifications of $\theta h_k(i)$ to M, and M produces the intermediate good, which can be of high or low quality. At t_3, the quality of the component becomes observable, and the two parties bargain over the division of the surplus. At t_4, the final good is produced and sold, and firms' profits are realized and taxed at different tax rates.[9]

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[8]The three determinants in establishing a legal transfer pricing policy are functions, risks and intangible assets, as mentioned in Section 2.

[9]The lump-sum transfer $T_k(i)$ is taken as the dividends that will not be taxed in the North at t_0. As mentioned at the end of Section 4.1.1, the optional time value of the delayed tax payments on $T_k(i)$ and the possibly lower future tax rate in the North give rise to the income-shifting benefit. There is time value of tax payments because I assume there is a discount rate ρ after t_4, though parties do not discount the time between t_0 and t_4. Note that the discounted lump-sum transfer at t_0 has to equal $T_k(i)$ to make the identical suppliers in the South break even. In particular, suppose that $T_k(i)$ will be repatriated to the North after k periods. F and M need to sign a complete contract on $T_k(i)$ which specifies the

4.1.3 Profits under Outsourcing versus Integration

The problem is solved backwards. In the outsourcing case, F and M choose $h_k(i)$ and $m_k(i)$ respectively to maximize their after-tax profits. From now on, I will simplify the notations by dropping i and k.

$$\text{F:} \quad \max_{h}(1-\tau_n)\left[\frac{\beta Y^{\mu-\alpha}\theta^{\alpha\eta}}{\phi^{\alpha}}\left(\frac{h}{\eta}\right)^{\alpha\eta}\left(\frac{m}{1-\eta}\right)^{\alpha(1-\eta)} - w_n h\right] \tag{5}$$

$$\text{M:} \quad \max_{m}(1-\tau_s)\left[\frac{(1-\beta)Y^{\mu-\alpha}\theta^{\alpha\eta}}{\phi^{\alpha}}\left(\frac{h}{\eta}\right)^{\alpha\eta}\left(\frac{m}{1-\eta}\right)^{\alpha(1-\eta)} - w_s m\right] \tag{6}$$

Solving for h and m and using the fact that $y = x$, we can derive the final good price:

$$p_y = Y^{\mu-\alpha}y^{\alpha-1} = \frac{\phi}{\alpha\theta\eta}\left(\frac{w_n}{\beta}\right)^{\eta}\left(\frac{w_s}{1-\beta}\right)^{1-\eta}. \tag{7}$$

The total after-tax operating profit under outsourcing is:

$$\pi_o = [(1-\tau_n)\beta(1-\alpha\eta)+(1-\tau_s)(1-\beta)(1-\alpha+\alpha\eta)]\frac{Y^{\frac{\mu-\alpha}{1-\alpha}}\theta^{\frac{\alpha\eta}{1-\alpha}}\alpha^{\frac{\alpha}{1-\alpha}}}{\phi^{\frac{\alpha}{1-\alpha}}}\left(\frac{\beta}{w^n}\right)^{\frac{\alpha\eta}{1-\alpha}}\left(\frac{1-\beta}{w^s}\right)^{\frac{\alpha(1-\eta)}{1-\alpha}}. \tag{8}$$

On the other hand, to compare the outcome under integration, I replace β with $\bar{\beta}$ in Equation (7) and (8) to obtain the final good price $\bar{p}_y$ and the total profit π_v under integration, where $\bar{\beta}$ has been defined as F's share of ex post revenue under integration. Following Antràs (2003), I first analyze the ratio of operating profits in the two cases. Define the after-tax profit ratio $\Theta_\tau(\eta) \equiv \frac{\pi_v}{\pi_o}$. Whether $\Theta_\tau(\eta)$ is greater than 1 or not determines a firm's organizational decision at t_0. When $\tau_n = \tau_s = 0$, we are back to the tax-free case in Antràs (2003) in which I denote the profit ratio by $\Theta_0(\eta)$. Antràs shows that $\Theta_0(\eta)$ is increasing in η, and that there exists a unique threshold of headquarter-input intensity $\hat{\eta}_0 \in (0,1)$ such that when $\eta < \hat{\eta}_0$, $\Theta_0(\eta) < 1$; and when $\eta > \hat{\eta}_0$, $\Theta_0(\eta) > 1$. Similarly, I prove that $\Theta_\tau(\eta)$ is also increasing in η, and given any η, $\Theta_0(\eta) > \Theta_\tau(\eta)$ is always true. Figure 2 demonstrates this result, which implies that in the presence of taxes, the threshold of headquarter-input intensity, denoted by $\hat{\eta}_\tau$, is greater than the threshold in the tax-free

amount that M has to pay after k periods as $\rho^{-k}T_k'(i)$ such that the discounted lump-sum transfer at t_0 is still $T_k(i)$.

case, i.e. $\hat{\eta}_\tau > \hat{\eta}_0$.

Proposition 1 *In the presence of taxes, there exists a unique threshold of headquarter-input intensity $\hat{\eta}_\tau \in (0,1]$ such that all firms with $\eta < \hat{\eta}_\tau$ choose outsourcing, and all firms with $\eta > \hat{\eta}_\tau$ choose integration as their organizational mode. Only firms with $\hat{\eta}_\tau$ are indifferent between these two options (i.e., $\Theta_\tau(\hat{\eta}_\tau) = 1$). This threshold is greater than the threshold in the tax-free case.*

See Appendix for a complete proof. The key message is that outsourcing is more likely to occur in the incomplete-contracting system where the tax rate faced by F is higher than that faced by M. The intuition is that, although integration helps reduce inefficiency from the incomplete contract when the product is headquarter-input intensive, a higher share of the total operating profit assigned to F under integration also means that a greater fraction of the total profit will be taxed at a high rate, given that $\tau_n > \tau_s$.

To see why integration helps reduce inefficiency from the incomplete contract, note that under integration F's share of revenue is $\bar{\beta} = \delta^\alpha + \beta(1 - \delta^\alpha)$, where the allocation of residual rights δ is equal to an exogenous certain value between 0 and 1. When $\delta = 0$, $\bar{\beta}$ is equal to β which is F's share of revenue under outsourcing. In other words, integration assigns extra residual rights to F. The key insight in Antràs (2003) is that, to achieve efficient production, ownership should be assigned to the party whose investment contributes most to the relationship. Clearly, F contributes more in producing the headquarter-input intensive intermediate goods and the production is more efficient under integration.

When $\tau_n > \tau_s$, to balance efficiency maximization and tax minimization, fewer residual rights should be assigned to the high-tax party. To maximize the total after-tax profit, F wants to "give up" the residual rights and outsource the intermediate good (i.e., $\delta = 0$) when headquarter intensity is between $\hat{\eta}_0$ and $\hat{\eta}_\tau$. Though there is no income shifted within an integrated firm, income flows into M when the firm switches the organizational mode from integration to outsourcing. In this sense, in addition to the relationship-specific investments, the parties have a third discrete choice variable: whether to outsource or to integrate, namely $\delta = 0$ or δ is equal to an exogenous certain value between 0 and 1.

Note that, the purpose of the analysis on the ratio of operating profits in this section is to compare the outcome with that in Antràs (2003), and demonstrate how the threshold of headquarter intensity in choosing integration will change after I add taxes into the model. Fixed costs have not been considered into the exercise.

4.2 The Transfer-Pricing Case

Now I move closer to the real world where integrated firms can shift income through transfer pricing only under integration but not outsourcing. To shift income from the high-tax North to the low-tax South by buying intermediate goods from the affiliate M, the parent firm F will raise the price of the intrafirm transactions. An optimal transfer price higher than the market-based arm's-length price is the key focus of this subsection.

4.2.1 Optimal Transfer Price

I first derive the general formula of the intermediate good price.

Consider the no-income-shifting case under integration. Suppose the intermediate good price is $\bar{p}_x$, and the output of the intermediate good and the final good are $\bar{x}$ and $\bar{y}$ separately. It has been assumed that production of the final good requires no further costs, i.e. $\bar{x} = \bar{y}$. Hence M's net revenue R_v^M can be expressed as $\bar{p}_x\bar{x}$, which is equal to $\bar{p}_x\bar{y}$. Meanwhile, from the bargaining point of view, M gets a share $1 - \bar{\beta}$ of the total revenue R_v, where $R_v = \bar{p}_y\bar{y}$ and $\bar{p}_y$ is the final good price. Thus M's net revenue can also be derived as $R_v^M = (1 - \bar{\beta})R_v = (1 - \bar{\beta})\bar{p}_y\bar{y}$. This simple analysis implies that $R_v^M = \bar{p}_x\bar{y} = (1 - \bar{\beta})\bar{p}_y\bar{y}$. Substituting $\bar{p}_y$ into Equation (7), we have,

$$\bar{p}_x = (1 - \bar{\beta})\bar{p}_y = (1 - \bar{\beta})\frac{\phi}{\alpha\theta\eta}(\frac{w_n}{\bar{\beta}})^\eta(\frac{w_s}{1 - \bar{\beta}})^{1-\eta} = \frac{\phi(w_s)^{1-\eta}}{\alpha\theta\eta}\left(\frac{(1 - \bar{\beta})w_n}{\bar{\beta}}\right)^\eta. \tag{9}$$

This is a general formula for the intermediate good price. I can replace $\bar{\beta}$ with β to get the intermediate-good price under outsourcing, denoted by p_x. Recall that β is F's share of ex post revenue under outsourcing.

Next, I derive the internal transfer price $\tilde{p}_x$, which is used to denote the intermediate good price

under integration in a world where integrated firms shift income by setting an optimal $\tilde{p}_x$. Since M is located in the South where the tax rate is lower, $\tilde{p}_x$ should be greater than $\bar{p}_x$ so that income is shifted from F to M.

It seems natural to use $\tilde{p}_x$ as the choice variable in the after-tax profit maximization problem. However, in this incomplete-contracting framework, the quality of the intermediate good is not verifiable by a third party, and the price of the intermediate good is not contractible ex ante. If the price could be specified, M would always produce low-quality input at zero cost. As a result, we need to find an alternative choice variable. Conveniently, the general formula of the intermediate good price has been derived in Equation (9). Thus I can replace $\bar{\beta}$ with $\tilde{\beta}$, and define $\tilde{\beta}$ as F's share of ex post revenue in the income-shifting case under integration. Further, based on the mathematical form of F's revenue share $\bar{\beta} = \delta^\alpha + \beta(1 - \delta^\alpha)$ in no-income-shifting case, the allocation of residual rights $\tilde{\delta}$ in this income-shifting case can be inversely defined by $\tilde{p}_x$,

$$\tilde{p}_x = \frac{\phi(w_s)^{1-\eta}}{\alpha\theta^\eta}\left(\frac{(1-\tilde{\beta})w_n}{\tilde{\beta}}\right)^\eta = \frac{\phi(w_s)^{1-\eta}}{\alpha\theta^\eta}\left(\frac{(1-(\tilde{\delta}^\alpha + \beta(1-\tilde{\delta}^\alpha)))w_n}{\tilde{\delta}^\alpha + \beta(1-\tilde{\delta}^\alpha)}\right)^\eta \quad (10)$$

Equation (10) implies that manipulating a tax-oriented transfer price $\tilde{p}_x$ is equivalent to manipulating an optimal $\tilde{\delta}$. As a result, a convenient formulation for choosing the transfer price is that a central authority within the integrated firm at the management level exists and manipulates the allocation of functions and risks between F and M, that is, it chooses an optimal $\tilde{\delta}$ to minimize the overall tax burden. Recall that in Section 4.1.2, $\tilde{\delta}$ and $1 - \tilde{\delta}$ have also been treated as the allocation of functions and risks assigned to F and M. In particular, if M takes on fewer functions and risks, F ought to get more residual rights, i.e. higher $\tilde{\delta}$, because F can use the intermediate inputs without M more effectively than in a low $\tilde{\delta}$ case, and vice versa. As mentioned at the end of the Section 4.1.3, the firm's decision to outsource or integrate is essentially a discrete choice between δ equal to 0 and δ equal to an exogenous certain value between 0 and 1. However, in this income-shifting case, the firm's choice of $\tilde{\delta}$ falls continuously into $[0, 1)$, with $\tilde{\delta} = 0$ as the outsourcing choice and $\tilde{\delta} \in (0, 1)$ as the integration choice.[10]

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[10]I restrict $\tilde{\delta}$ from being equal to 1. If $\tilde{\delta} = 1$, there would be no costs associated with firing M. Then F would always have an incentive to seize all intermediate output ex post, and M would have no incentive to invest $m_k(i)$ ex ante. See

In this income-shifting case, foreseeing the total after-tax profit, F makes a take-it-or-leave-it offer on the allocation of functions and risks ($\tilde{\delta}$) to all the potential suppliers at t_0. Note that the bargaining power β is exogenous as always, which ensures that the incomplete-contracting mechanism is functioning. As we are only interested in the transfer price and the overall profit rather than the value of $\tilde{\delta}$, I will use $\tilde{\beta}$, a function of β and $\tilde{\delta}$, instead of $\tilde{\delta}$ as the choice variable to simplify the solution.

4.2.2 Arm's-Length Price and Transfer Pricing Regulation

In fact, tax authorities require the transfer price not to deviate from the arm's-length price. In reality, they generally refer to the arm's-length price as the intermediate good price charged in the unrelated-party transactions, namely outsourcing in my theoretical framework. However, the intermediate good price under outsourcing ($\bar{p}_x$) is structurally different from the price under integration, because $\bar{\beta} > \beta$ is fundamentally built into the model. Since we are comparing the income-shifting case versus the no-income-shifting case, I regard $\bar{p}_x$ rather than p_x as the arm's-length price, which is employed by tax authorities to regulate the transfer pricing behavior. Since $\bar{p}_x$ has been derived in Equation (9), our focus in this part is on the factors that affect transfer pricing regulation.

First of all, tax authorities do not investigate every case in the nation. There is a probability of being caught (*Prob*) for setting a transfer price ($\tilde{p}_x$) different from the arm's-length price ($\bar{p}_x$). Generally speaking, this probability is contingent on three main determinants, industry intangibility (φ_k), the joint regulation level of the two countries (σ) and the transaction value ($\tilde{p}_x \tilde{x}$, which equals $\tilde{p}_x \tilde{y}$), i.e. $Prob = f(\varphi_k, \sigma, \tilde{p}_x \tilde{y})$.[11] An industry is more intangible if it involves more properties that are characterized by manufacturing intangibility, e.g. R&D, and more properties that are characterized by marketing intangibility, e.g. trademarks. It is therefore more difficult to find a comparable market price for the intermediate goods or services in such an industry, for example, pharmaceuticals. Thus *Prob* is lower in the more intangible industries, i.e. φ_k is large. In addition, *Prob* is higher when more resources are invested into transfer pricing regulation by the

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Section 4.1.2 for more details.

[11] Recall that there is no further cost in producing the final good, i.e. $\tilde{x} = \tilde{y}$.

governments and when the transfer pricing law is strictly executed in both countries, i.e. σ is large. Another assumption is that tax authorities are more likely to investigate the transactions with larger volume, and thus potentially larger tax compensation.

Consequent double taxation is very common once the firm is verified to have shifted income.[12] Suppose the shifted income is equal to $(\tilde{p}_x - \bar{p}_x)\tilde{y}$. The Northern tax authority will require the firm to adjust the income in the North, and will tax this amount of income at τ_n. As a result, the expected adjustment cost is $Prob \cdot \tau_n(\tilde{p}_x - \bar{p}_x)\tilde{y}$. Although the Southern government is supposed to return the tax overpayment $\tau_s(\tilde{p}_x - \bar{p}_x)\tilde{y}$ to the firm, similar to the deferral of income repatriation, the tax overpayment can be deferred and the firm suffers from double taxation during the deferred periods. In other words, double taxation gives rise to a loss $Prob \cdot \tau_n(\tilde{p}_x - \bar{p}_x)\tilde{y}$ to the affected firm comparing with the no-loss case.

However, the firm can avoid the potential risk of double taxation by signing an Advance Pricing Agreement (APA) with the tax authorities, which specifies the transfer price in advance, and the transfer pricing investigation will never occur. In the meantime, the APA participants need to pay an extra fixed cost, denoted by f_A, to cover the communicating and negotiating expenses with the authorities. I denote the regular production fixed costs under integration and under outsourcing as f_v and f_o separately. Following Antràs and Helpman (2004), I assume $f_v > f_o$. Considering the extra APA cost, the rank of the fixed costs in the three cases is: $f_o < f_v < f_v + f_A$.

4.2.3 Profit Maximization

Let's first consider the APA case. An optimal share of revenue $\tilde{\beta}_A$ is chosen to maximize the overall after-tax profit,

$$\max_{\tilde{\beta}_A}(1 - \tau_n)(\tilde{\beta}_A \tilde{p}_y^A \tilde{y}^A - w_n \tilde{h}^A) + (1 - \tau_s)[(1 - \tilde{\beta}_A)\tilde{p}_y^A \tilde{y}^A - w_s \tilde{m}^A]. \tag{11}$$

The closed form solution for $\tilde{\beta}_A$ is available, which allows us to do the comparative analysis.

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[12]In spite of the high risk of double taxation following an income adjustment, it is not very often for the MNE to suffer from a penalty imposed by the tax authorities. According to the global transfer pricing 2007-2008 survey mentioned in Footnote 4, among the 27 percent respondents with income adjustments, parent respondents indicated that tax authorities threatened to impose penalties in 31 percent of the adjustment cases, and penalties were actually imposed in 15 percent of them. Therefore, I do not model penalty in this paper.

Further, the transfer price of the integrated firm with an APA ($\tilde{p}_x^A$) can be derived as the intermediate good price, which is related to tax rates, trade costs, the productivity level, and headquarter-input intensity. The final good output $\tilde{y}^A$, the final good price $\tilde{p}_y^A$, the percentage difference between the transfer price and the arm's-length price $(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$, and the operating profit $\tilde{\pi}^A$ will also be influenced by these factors.

Secondly, in the case where the firm chooses not to enter the APA, an expected adjustment cost $Prob \cdot \tau_n(\tilde{p}_x - \bar{p}_x)\tilde{y}$ occurs. A simple form of the probability of being caught is $Prob = \frac{\sigma \tilde{p}_x \tilde{y}}{\varphi_k}$.[13] The firm chooses $\tilde{\beta}$ to maximize the overall after-tax profit,

$$\max_{\tilde{\beta}}(1-\tau_n)(\tilde{\beta}\tilde{p}_y\tilde{y} - w_n\tilde{h}) + (1-\tau_s)[(1-\tilde{\beta})\tilde{p}_y\tilde{y} - w_s\tilde{m}] - \frac{\sigma\tilde{p}_x\tilde{y}}{\varphi_k}\cdot\tau_n(\tilde{p}_x - \bar{p}_x)\tilde{y} \qquad (12)$$

$$s.t. \quad \bar{p}_x = \frac{\phi(w_s)^{1-\eta}}{\alpha\theta^\eta}\left(\frac{(1-\bar{\beta})w_n}{\bar{\beta}}\right)^\eta$$

$$\bar{\beta} = \delta^\alpha + \beta(1-\delta^\alpha).$$

Similarly, after solving for $\tilde{\beta}$, I can derive the transfer price $\tilde{p}_x$, the transfer price premium $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$, the final good price $\tilde{p}_y$, the output $\tilde{y}$, and the operating profit $\tilde{\pi}$ in this non-APA case.

However, it is difficult to get a closed-form solution for $\tilde{\beta}$. Numerically solving the problem and using the same parameters to compare the results with those in the APA case and the outsourcing case, I reach conclusions about profits in Table A and the transfer price in Table B below (see the figures in Appendix for parameterization).

1. Profit differential in the APA ($\tilde{\pi}^A - \pi_o$) and non-APA ($\tilde{\pi} - \pi_o$) cases

Table A.

	Condition	APA	non-APA	Additional Description	Figure
(1)	$\tau_s\downarrow$	$\tilde{\pi}^A - \pi_o\uparrow$	$\tilde{\pi} - \pi_o\uparrow$	This effect is stronger when productivity θ is large	3A, 3B
(2)	$\theta\uparrow(\phi\downarrow)$	$\tilde{\pi}^A - \pi_o\uparrow$	$\tilde{\pi} - \pi_o\uparrow$	$\tilde{\pi}^A - (f_A + f_v) > \tilde{\pi} - f_v > \pi_o - f_o$ always holds	3A, 3B, 4
(3)	$Prob\downarrow$	$\tilde{\pi}^A - \pi_o\uparrow$	$\tilde{\pi} - \pi_o\uparrow$	$Prob\downarrow\Leftrightarrow\varphi_k\uparrow$ or $\sigma\downarrow$	6A
(4)	$\eta\uparrow$	-	-	No monotonic effects	-

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[13]Parameters are properly assigned to make sure that *Prob* is between 0 and 1.

(1) Tax rate differential

Taking the tax rate in the North (τ_n) as given, as the tax rate in the South (τ_s) falls, both the operating profit differential between integration with APA and outsourcing ($\tilde{\pi} - \pi_o$) and that between integration without APA and outsourcing ($\tilde{\pi}^A - \pi_o$) rise. This effect is even larger given a higher productivity θ or a lower trade cost ϕ. This means that, as the tax rate differential rises, firms increasingly favor integration because the income-shifting incentive grows; this is particularly true for the productive firms or low-cost transactions. Figure 3 shows this relationship.

(2) Productivity and Trade Costs

Regardless of fixed costs, the operating profit of an integrated firm with an APA is always greater than it is in the non-APA case with expected adjustment costs, and the profit under outsourcing is always lower than the profits of the two cases under integration. Moreover, the profit differential rises as firm productivity (θ) rises and as the trade cost (ϕ) falls. The correlation of $\tilde{\pi}^A - \pi_o$ (or $\tilde{\pi} - \pi_o$) and θ is illustrated in Figure 3.

Once fixed costs are considered, $f_o < f_v < f_v + f_A$ as assumed at the end of Section 4.2.2, natural cutoffs of $\frac{\theta^\eta}{\phi}$ can be found for the comparison of net profits. As shown in Figure 4, when $\frac{\theta^\eta}{\phi} < (\frac{\theta^\eta}{\phi})_{out}$, firms outsource intermediate goods; when $(\frac{\theta^\eta}{\phi})_{out} < \frac{\theta^\eta}{\phi} < (\frac{\theta^\eta}{\phi})_{int}$, firms choose to integrate but not enter an APA; and when $\frac{\theta^\eta}{\phi} > (\frac{\theta^\eta}{\phi})_{int}$, firms choose to integrate and enter an APA. This figure illustrates a similar result as in Antràs and Helpman (2004): the most productive firms with lowest trade costs utilize the APA and the least productive firms with highest trade costs choose outsourcing. This is because the profit of the organizational mode with higher fixed costs is larger due to the income-shifting benefit. The more productive the firm is, the more profitable it is for the firm to incur higher fixed costs.

(3) Industry intangibility and regulation level

For a given $\tau_n - \tau_s$, an integrated firm without an APA will shift more income when the probability of paying adjustment costs is lower. That is, when *Prob* falls (the industry intangibility φ_k increases or the regulation level in the North σ decreases), the after-tax profit $\tilde{\pi}$ is higher. Figure 5A shows the relationship of $\tilde{\pi} - \pi_o$, *Prob* and τ_s.

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(4) Headquarter-input intensity

There is no monotonic relationship between the headquarter-input intensity (η) and the profit differential ($\tilde{\pi}^A - \pi_o$ or $\tilde{\pi} - \pi_o$) as in Antràs (2003). The interplay of taxes and productivity has complicated the effect of headquarter-input intensity on firms' organizational choice.

2. Transfer price premium in the APA ($(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$) and non-APA ($(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$) cases

Table B.

	Condition	APA	non-APA	Additional Description	Figure
(1)	$\tau_s\downarrow$	$(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x\uparrow$	$(\tilde{p}_x - \bar{p}_x)/\bar{p}_x\uparrow$	-	5A, 5B
(2)	$\theta\uparrow(\phi\downarrow)$	$(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$ constant	$(\tilde{p}_x - \bar{p}_x)/\bar{p}_x\downarrow$	-	5A, 5B
(3)	$Prob\downarrow$	$(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x\uparrow$	$(\tilde{p}_x - \bar{p}_x)/\bar{p}_x\uparrow$	$Prob\downarrow\Leftrightarrow\sigma\downarrow$ or $\varphi_k\uparrow$	6B
(4)	$\eta\uparrow$	-	-	No monotonic effects	-

(1) Tax rate differential

Taking the tax rate in the North (τ_n) as given, as the tax rate in the South (τ_s) falls, the income-shifting incentive rises, and thus the transfer price premium in both the APA ($(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$) and the non-APA ($(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$) cases rise, as shown in Figure 5.

(2) Productivity and trade costs

For a given $\tau_n - \tau_s$, the price difference $(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$ in the APA case is constant as the productivity θ rises or the trade cost ϕ falls (see Figure 4A). Since θ and ϕ enter together into the production function, the explanations of their effects are similar. Hence I only explain this result for θ. If the firm is productive enough to enter an APA, it can set the transfer price in advance according to its best planning of arranging functions and risks, and does not face the risk of adjusting income. Once the productivity threshold of entering an APA is passed, higher productivity will lead to more profit in general, but does not affect the deviation of the transfer price from the arm's-length price. This can also be seen in the maximization problem in the APA case, as θ^η/ϕ just multiplies the profit function by a constant.

However, surprisingly, the price difference $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ in the non-APA case is decreasing as

θ rises or ϕ falls (see Figure 4B). This comes from the assumption in the model that final good producers differ with each other after drawing θ, while intermediate good suppliers are identical. A higher θ means that the production is more efficient if a productive headquarter company controls more residual rights. Provided that income is shifted from the home headquarters to the foreign affiliate as $\tau_n > \tau_s$, the firm will shift less income to trade off production efficiency and tax minimization. Therefore, the transfer price is closer to the arm's-length price.

(3) Industry intangibility and regulation level

For a given $\tau_n - \tau_s$, when the probability of being caught (*Prob*) falls (the industry intangibility φ_k increases or the regulation level in the North σ decreases), the incentive to shift income will rise and thus the price difference $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ in the non-APA case will go up. Figure 5B shows the relationship of $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$, *Prob* and τ_s.

(4) Headquarter-input intensity

There is no monotonic relationship between the headquarter-input intensity (η) and the transfer price premium ($(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$ or $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$)

3. Output under integration ($\tilde{y}^A$ in the APA case or $\tilde{y}$ in the non-APA case) and under outsourcing (y).

Though the output of the final good is not a key interest of this paper, it is worth some analysis because most transfer pricing research focuses on the simple accounting effect, i.e. the difference between the reported transfer price and the true value of intermediate goods. However, the economic effect of transfer pricing on outputs under integration versus outsourcing may shed light on consumer welfare in the domestic market.

I show numerically that output (either $\tilde{y}^A$ in the APA case or $\tilde{y}$ in the non-APA case) is related to the headquarter-input intensity (η). When η is relatively small, $\tilde{y}^A$ (or $\tilde{y}$) is always higher than y under outsourcing, while when η is relatively large, $\tilde{y}^A$ (or $\tilde{y}$) falls as $\tau_n - \tau_s$ rises, and it can be lower than y. The intuition is that, as $\tau_n - \tau_s$ rises, more income is shifted to the South. As the headquarter company controls fewer residual rights, it invests less. Given a large η, though the affiliate supplier invests more, the production becomes less efficient and less output can be

produced. Figure 7 shows the relationship of $\tilde{y}^A$ (or $\tilde{y}$), η and τ_s.

5 Empirical Specification

Most of the theoretical predictions about the effects of the foreign tax rate, firm productivity, trade costs, and industry intangibility on the ownership structure and transfer price premium of importing firms are intuitive and testable. To focus on the choice of integration and outsourcing, I take the decision of which country intermediate imports are produced in as given, as it is not the interest of this paper.

My empirical analysis will be at the firm level using the confidential trade data from the U.S. Census Bureau. However, since my access to the confidential firm-level data is still in the approval process, I use the public industry-level trade data available on the Census Bureau's website, and show only the industry-level empirical results. In this section, I specify the industry-level and firm-level estimation strategies separately.

5.1 Industry-Level Analysis: Organizational Form

The industry-level import value is aggregated at the "NAICS 6-digit industry $\times$ source country" level for each year, and there is no industry-level quantity data available. The drawbacks of using the aggregated data are: (1) I cannot compute the transaction-level price to construct the transfer price and the arm's-length price for each industry-country-year observation in the data, and (2) I cannot examine the effects of firm characteristics such as productivity. As a result, my industry-level analysis is restricted to testing the effects of country and industry characteristics on the organizational mode. The model suggests that the foreign tax rate, trade costs and the regulation level negatively affect the decision of choosing integration, while industry intangibility positively influences it.

First of all, I measure the integration level as the ratio of related-party (or intrafirm) imports IM_{kct}^{in} over total imports IM_{kct}^{total} of industry k from country c in year t and denote it by $IS_{kct}(= \frac{IM_{kct}^{in}}{IM_{kct}^{total}})$. This ratio will be high if more U.S. firms in industry k import goods from their own

affiliates located in country c. It is common practice to use this ratio to measure the integration level in the empirical tests of Antràs-type models.[14]

Taking the U.S. as the home country, the foreign tax rate in country c in year t is TAX_{ct}. When the U.S. tax rate TAX_t^{US} is higher than TAX_{ct}, income is shifted out of the U.S. The lower TAX_{ct}, the more incentive to shift income. I expect a negative correlation between TAX_{ct} and IS_{kct}. On the contrary, when $TAX_t^{US} < TAX_{ct}$, income is shifted back to the U.S. The lower TAX_{ct}, the less incentive to shift income and I expect a positive correlation between TAX_{ct} and IS_{kct}. I could then use a quadratic term of TAX_{ct} to estimate this nonlinear correlation.

However, I cannot to use the quadratic term for the following reasons. I use the effective tax rate in my empirical analysis to account for special tax policies that cannot be revealed in the statutory maximum corporate tax rate.[15] Effective tax rates are only available for 54-56 countries (not including the U.S.) in each year and are not comparable with the U.S. rate. Nonetheless, looking at the data on statutory corporate tax rates, only 18 countries out of 139 countries have a tax rate higher than the U.S. tax rate of 0.35. In fact, among these 18 countries, the effective tax rate is only available in 5 countries. It is difficult to estimate the quadratic correlation with so few observations. Given the large number of low-tax countries, I assume that the negative effect of TAX_{ct} on IS_{kct} is dominant. Therefore, I will not include the quadratic term in my regressions and I caution that the estimate may be biased downwards.

A common endogeneity problem with using the effective tax rate is that it depends on firms' behavior such as investment and profit repatriation decisions, which are related to the sourcing choice. As a result, I also use the lag of the effective tax rate to do the robustness check. Note that the correlation of the current effective tax rate and the lag of the effective tax rate in my sample is 0.6. I offer the hypothesis related to the foreign tax rate as below.

Hypothesis 1. A higher foreign tax rate TAX_{ct} reduces the intrafirm import share IS_{kct}.

The trade cost at the industry-country level is not available. Following the previous literature, I

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[14]See Antràs (2003), Yeaple (2006), Nunn and Trefler (2007), and Bernard et al. (2010).
[15]See Section 6 for more details.

proxy the country-level trade cost by the distance $DIST_c$ from country c to the U.S.[16] The following hypothesis comes from the model.

Hypothesis 2. Greater distance ($DIST_c$) reduces the intrafirm import share (IS_{kct}).

In transfer pricing practice, there are two major intangible properties, manufacturing intangibles and marketing intangibles. The former includes patents and non-patented technical know-how, intellectual property, etc., while the latter includes trademarks, goodwill, etc. I use *R&D* intensity to represent manufacturing intangibility, measured as the ratio of *R&D* expenses to total sales in industry k in year t, $\left(\frac{R\&D}{SALES}\right)_{kt}$. Marketing intangibility is represented by advertising intensity, measured as the ratio of advertising expenses to total sales in industry k in year t, $\left(\frac{ADV}{SALES}\right)_{kt}$. Antràs (2003) also include $\left(\frac{R\&D}{SALES}\right)_{kt}$ and $\left(\frac{ADV}{SALES}\right)_{kt}$ as the industry-level controls in testing the intrafirm import share. However, this paper is the first to define them as manufacturing intangibility and marketing intangibility. Alternatively, I also use the ratio of intangible assets to total assets for industry k in year t, $\left(\frac{INTAN}{TA}\right)_{kt}$, to measure overall intangibility intensity.

Hypothesis 3. Greater industry intangibility ($\left(\frac{INTAN}{TA}\right)_{kt}$, $\left(\frac{R\&D}{SALES}\right)_{kt}$ or $\left(\frac{ADV}{SALES}\right)_{kt}$) raises the intrafirm import share IS_{kct}.

Though in the model, the regulation level in the North affects the organizational choice, the joint regulation in both the home country and the source country matters in reality, which is difficult to measure. Kaufmann et al. (2009) estimates six governance indicators, one of which is "regulatory quality". It captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Some related survey questions are: "How problematic are tax regulations for the growth of your business?", "How problematic are customs and trade regulations for the growth of your business?", etc. As "regulatory quality" is associated with the likely enforcement of transfer pricing regulation in the foreign country, I include it as a control variable, denoted as $REGQUA_{ct}$.

Hypothesis 4. A higher foreign regulation level $REGQUA_{ct}$ reduces the intrafirm import share IS_{kct}.

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[16]See Baldwin and Harrigan (2011) and Harrigan, Ma and Shlychkov (2011).

In Antràs (2003), capital intensity $(\frac{K}{L})_{kt}$ and skilled-labor intensity $(\frac{S}{L})_{kt}$ are the key explanatory variables that increase IS_{kct}. Other Antràs-type empirical work also takes $(\frac{K}{L})_{kt}$ and $((\frac{S}{L})_{kt}$ as the headquarter-input intensity to test the positive correlation as suggested in Antràs and Helpman (2004). Though the theory in this paper does not imply a monotonic relationship between headquarter-input intensity and integration level, I include $(\frac{K}{L})_{kt}$ and $(\frac{S}{L})_{kt}$ in the regressions as control variables. Capital intensity is computed as total real capital stock divided by total employment in industry k in year t, and skilled-labor intensity is calculated as the ratio of the number of non-production workers to the number of production workers in industry k in year t.

Since IS_{kct} often takes a value of 0 or 1, I use a Tobit specification with the standard errors clustered at the industry level,

$$IS_{kct}^* = \rho_0 + \rho_1 TAX_{ct} + \rho_2 DIST_{ct} + \rho_3 \left(\frac{R\&D}{SALES} \right)_{kt} + \rho_4 \left(\frac{ADV}{SALES} \right)_{kt}$$
$$+ \rho_5 REGQUA_{ct} + \rho_6 (\frac{K}{L})_{kt} + \rho_7 (\frac{S}{L})_{kt} + \rho_8 YEAR_t' + \rho_9 W_{kct}' + \varepsilon_{kct}$$

$$\begin{cases} IS_{kct} = 0 & if \quad IS_{kct}^* \leq 0 \\ IS_{kct} = IS_{kct}^* & if \quad 0 < IS_{kct}^* \leq 1 \\ IS_{kct} = 1 & if \quad IS_{kct}^* > 1, \end{cases} \quad (13)$$

where W_{kct}' is a vector of controls for other possible determinants of the integration decision, and the error term ε_{kct} is normally distributed. I include year dummies $YEAR_t'$ to control for the year fixed effects. Industry intangibility $(\left(\frac{R\&D}{Sales}\right)_{kt} + \left(\frac{ADV}{Sales}\right)_{kt})$ can be replaced by $\left(\frac{INTAN}{TA}\right)_{kt}$.

Control variables of the source country include capital abundance, an openness index, GDP, GDP per capita, and three other governance indicators taken from Kaufmann et al. (2009). Capital abundance is calculated by dividing physical capital stock by population. Physical capital stocks in a country can be constructed using the perpetual inventory method as in Hall and Jones (1999).

The governance indicators include rule of law, government effectiveness and political stability. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and especially the quality of contract enforcement, property rights, and the courts, etc. Following the logic of this paper, a higher level of compliance with the authority decreases the

opportunity to shift income. It is expected to be negatively correlated with IS_{kct}. Note that this is a different prediction from other Antràs-type empirical studies that employ rule of law as the proxy of the contracting environment and expect a better contracting environment to increase the intrafirm imports.[17] Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Political stability captures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means. I expect that IS_{kct} is higher (more FDI) in a country that has an effective government and is politically stable.

Industry controls include total employment, capital stock per establishment and the share of value added to total industry sales of the importing industry. Total employment represents the size of the industry. Capital stock per establishment captures scale economies at the plant level. The share of value added to total sales serves as a proxy for the importance of the supplier's production in the overall value chain following Antràs (2003).

5.2   Firm-Level Analysis

My empirical analysis on the transfer price premium relies on the firm-level data to which I have not gotten access. In spite of the inconvenience, I specify the firm-level estimation of the organizational choice and transfer price premium and will report the empirical results once the results are available.

A firm may import multiple products from multiple countries using different transportation modes from both the foreign affiliates and independent suppliers. Following Bernard, Jensen and Schott (2006), I aggregate the transaction-level related-party imports and total imports on the firm-product-country-mode-year level, where mode indicates the transport mode including ship, air, road, etc. As described in Bernard, Jensen and Schott (2006), transport mode has been associated

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[17]See Nunn (2007), Defever and Toubal (2007), Corcos et al. (2009), etc.

with variation in product quality, time sensitivity and other factors that might affect price.[18] This narrowly-constructed bin allows me to link the firm, product and country characteristics with the trade data.

5.2.1 Organizational Form

I first discuss the specification of the organizational form. The model suggests that the foreign tax rate, trade costs and regulation level negatively affect the choice of integration, while firm productivity and industry intangibility positively affect it. In addition, high firm productivity increases the probability of firms entering an Advance Pricing Agreement (APA).

Following the previous literature, I construct the integration level in two ways. Firstly, it can be measured as the intrafirm import share, as described in Section 5.1. Aggregating total imports IM^{total}_{ikcmt} and intrafirm imports IM^{in}_{ikcmt} of firm i importing product k from country c using transport mode m in year t, I calculate the ratio of intrafirm imports to total imports $IS_{ikcmt} (= \frac{IM^{in}_{ikcmt}}{IM^{total}_{ikcmt}})$. Note that, compared with the industry-country-year level IS_{kct}, there are many more zeros and ones in the much more narrowly-constructed bin. Therefore, the integration level is also measured by a dummy variable ID_{ikcmt}, which equals 1 if firm i imports product k in country c using transport mode m in year t through intrafirm transactions at least once, and 0 otherwise.[19]

As specified in Section 5.1, I use the foreign tax rate in country c in year t (TAX_{ct}) as the key independent variable and expect it to have a negative correlation with IS_{ikcmt} or ID_{ikcmt}.

Hypothesis 5. A higher foreign tax rate TAX_{ct} reduces the intrafirm import share IS_{ikcmt} (or the intrafirm import dummy ID_{ikcmt}).

The trade cost $TCOST_{ikcmt}$ of firm i importing product k using transport mode m from country c in year t, is now available in the transaction-level data. It is composed of the transportation cost and the insurance expense. Hypothesis 6 follows from the model.

Hypothesis 6. A larger transportation cost $TCOST_{ikcmt}$ reduces the intrafirm import share IS_{ikcmt} (or the intrafirm import dummy ID_{ikcmt}).

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[18]See Harrigan (2005) and Hummels and Skiba (2004).

[19]Empirical studies using the latter approach include Deferver and Toubal (2007), Corcos et al. (2009), Bernard et al. (2010), etc.

At the product level, I still use $R\&D$ intensity $\left(\frac{R\&D}{SALES}\right)_{kt}$ to represent manufacturing intangibility, $\left(\frac{ADV}{SALES}\right)_{kt}$ to represent marketing intangibility, and $\left(\frac{INTAN}{TA}\right)_{kt}$ as the alternative measurement of the overall industry intangibility of product k in year t.

Hypothesis 7. Greater industry intangibility $\left(\left(\frac{INTAN}{TA}\right)_{kt}, \left(\frac{R\&D}{SALES}\right)_{kt}\right.$ or $\left.\left(\frac{ADV}{SALES}\right)_{kt}\right)$ raises the intrafirm import share IS_{ikcmt} (or the intrafirm import dummy ID_{ikcmt}).

In addition, the regulatory quality $REGQUA_{ct}$ of country c in year t is still the control for the regulation level as in Section 5.1.

Hypothesis 8. A higher regulation level $REGQUA_{ct}$ reduces the intrafirm import share IS_{ikcmt} (or the intrafirm import dummy ID_{ikcmt}).

As for firm characteristics, I estimate the total factor productivity TFP_{it} of firm i in year t using two methods, OLS and the techniques proposed in Olley and Pakes (1996). The latter takes into consideration the endogeneity of input demands and the self-selection induced by exit behavior. Indeed, the estimates of productivity after correcting these biases do not differ much from the OLS estimation.

Hypothesis 9. Higher firm productivity TFP_{it} raises the intrafirm import share IS_{ikcmt} (or the intrafirm import dummy ID_{ikcmt}).

To control for the transport modes, I have two dummy variables, $SHIP_{ikcmt}$, equal to 1 if the goods are transported by ship and 0 otherwise, and AIR_{ikcmt}, equal to 1 if the goods are transported by air and 0 otherwise.

I use firm-level capital intensity $\left(\frac{K}{L}\right)_{it}$ and skilled-labor intensity $\left(\frac{S}{L}\right)_{it}$ as the proxies of headquarter-input intensity following the previous literature.[20]Capital intensity is calculated as the real capital stock per plant hour in firm i in year t, and skilled-labor intensity is calculated as the ratio of non-production hours to production hours in firm i in year t.

I estimate IS_{ikcmt} using a Tobit equation, with the standard errors clustered at the product level,

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[20]See Defever and Toubal (2007), Corcos et al. (2009), Shlychkov (2009), etc. As mentioned in Section 3, Corcos et al. (2009) emphasize that the correct unit of analysis for headquarter-input intensity is the firm but not the industry. In order to control for simultaneity bias, they use time lags of the firm variables in the robust tests and obtain the same quantitative results. Therefore, I also use the firm-level capital intensity and skilled-labor intensity in my empirical work.

$$IS^*_{ikcmt} = \gamma_0 + \gamma_1 X'_{ikcmt} + \gamma_2 YEAR'_t + \gamma_3 W'_{ikcmt} + \varepsilon_{ikcmt}$$

$$\begin{cases} IS_{ikcmt} = 0 & if \quad IS^*_{ikcmt} \leq 0 \\ IS_{ikcmt} = IS^*_{ikcmt} & if \quad 0 < IS^*_{ikcmt} \leq 1 \\ IS_{ikcmt} = 1 & if \quad IS^*_{ikcmt} > 1, \end{cases} \tag{14}$$

where X'_{ikcmt} denotes a vector of country, product and firm characteristics, including TAX_{ct}, TFP_{it}, $TCOST_{ikcmt}$, $\left(\frac{R\&D}{SALES}\right)_{kt}$ and $\left(\frac{ADV}{SALES}\right)_{kt}$ (or $\left(\frac{INTAN}{TA}\right)_{kt}$), $REGQUA_{ct}$, $SHIP_{ikcmt}$, AIR_{ikcmt}, $\left(\frac{K}{L}\right)_{it}$ and $\left(\frac{S}{L}\right)_{it}$, $YEAR'_t$ is a vector of year dummies, W'_{ikcmt} is a vector of controls for other possible determinants of the integration decision, and the error term ε_{ikcmt} is normally distributed. Similar to Equation (13), control variables include country-level capital abundance, an openness index, GDP, GDP per capita, rule of law, government effectiveness, political stability and firm-level total employment.

Using ID_{ikcmt} as the dependent variable, I estimate the following Probit equation, with the standard errors clustered at the product level,

$$ID^*_{ikcmt} = \gamma_0 + \gamma_1 X'_{ikcmt} + \gamma_2 YEAR'_t + \gamma_3 W'_{ikcmt} + \varepsilon_{ikcmt}$$

$$\begin{cases} ID_{ikcmt} = 0 & if \quad ID^*_{ikcmt} < 0 \\ ID_{ikcmt} = 1 & if \quad ID^*_{ikcmt} \geq 0. \end{cases} \tag{15}$$

According to my model, firms with the highest TFP_{it} or lowest trade costs will enter the Advance Pricing Agreement (APA). However, I do not observe the information on APA for all firms. Instead, I have a small sample of 1,926 firms whose APA information is mentioned in their annual SEC filings.[21] With the full sample, I can only examine the prediction that firms with high TFP_{it} or low trade costs choose integration and others outsource intermediate goods. Using the sub-sample with APA information, I create a dummy variable APA_{it}, which equals 1 if firm i in year t has an APA and run separate regressions in the sub-sample.

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[21] The "Advance Pricing Agreement" is not mentioned in the annual SEC filings of the rest of the companies in the full sample. Therefore, I only have a small sample.

Hypothesis 10. Higher firm productivity TFP_{it} increases the likelihood that a firm enters an APA ($APA_{it} = 1$).

To test the APA prediction, I regress APA_{it} on the same independent variables in a Probit equation,

$$APA_{it}^* = \gamma_0 + \gamma_1 X_{ikcmt}' + \gamma_2 YEAR_t' + \gamma_3 W_{ikcmt}' + \varepsilon_{ikcmt}$$
$$\begin{cases} APA_{it} = 0 & if \quad APA_{it}^* < 0 \\ APA_{it} = 1 & if \quad APA_{it}^* \geq 0, \end{cases} \tag{16}$$

where X_{ikcmt}', $YEAR_t'$, and W_{ikcmt}' contain the same variables as in Equation (14).

5.2.2 Transfer Pricing

Next, I examine the determinants of the transfer pricing strategy of the U.S. MNEs. I am interested in the percentage difference between the transfer price and the arm's-length price $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$, which rises as the foreign tax rate falls, regulation level falls, or industry intangibility rises, as indicated by the model. Firm productivity θ and trade costs ϕ are not monotonically related to $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$. Generally speaking, when θ is very high (or ϕ is very low), the firm enters an Advance Pricing Agreement (APA), in which case $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ is constant as θ rises (or ϕ falls); when θ is relatively low (or ϕ is relatively high), the firm does not enter an APA, and $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ falls as θ rises (or ϕ falls).

The import prices for both intrafirm and arm's-length transactions can be computed as a unit value, i.e. total value per unit quantity. I denote the related-party and arm's-length prices of product k from firm i of country c using transport mode m in year t as TP_{ikcmt} and AL_{ikcmt} separately. Each firm-product-country-mode-year bin could include more than one related-party (or arm's-length) transaction. Therefore, I compute TP_{ikcmt} (or AL_{ikcmt}) as the value-weighted average of the N transfer prices (or arm's-length prices) in this bin, i.e. $TP_{ikcmt} = \sum_{n=1}^{N} w_{ikcmt,tp}^n tp_{ikcmt}^n$ and $AL_{ikcmt} = \sum_{n=1}^{N} w_{ikcmt,al}^n al_{ikcmt}^n$, where tp_{ikcmt}^n (or al_{ikcmt}^n) is one of the firm's N related-party (or arm's-length) import prices and $w_{ikcmt,tp}^n$ (or $w_{ikcmt,al}^n$) is the value weight of the firm's N related-party (or arm's-length) transactions.

Although the model setup allows firms to choose outsourcing or integration but not both, I

observe that firms outsource and insource the same product from the same country using the same transport mode at the same time in the data. Reasons of this trade pattern are beyond the scope of this paper, but the pattern per se can be utilized to construct the most comparable arm's-length price to the transfer price. Hence I compute the percentage price difference $PD_{ikcmt} = (TP_{ikcmt} - AR_{ikcmt})/AR_{ikcmt}$ in the firm-product-country-mode-year bin. However, I caution that it is not common that both related-party transactions and arm's-length transactions coexist in the same firm-product-country-mode-year bin. I will use a two-step Probit procedure to deal with the selection problem.

With the same explanatory variables as in Section 5.2.1, the model provides the following hypotheses.

Hypothesis 11. A higher foreign tax rate TAX_{ct} reduces the price difference PD_{ikcmt}.

Hypothesis 12. Higher industry intangibility $((\frac{INTAN}{TA})_{kt}, (\frac{R\&D}{Sales})_{kt}$ or $(\frac{ADV}{Sales})_{kt})$ raises the price difference PD_{ikcmt}.

Hypothesis 13. A higher foreign regulation level $REGQUA_{ct}$ reduces the price difference PD_{ikcmt}.

Hypothesis 14. When productivity TFP_{it} is very high, the firm enters an APA and PD_{ikcmt} remains the same as TFP_{it} changes; when TFP_{it} is at a moderate level, the firm does not enter an APA and PD_{ikcmt} goes down as TFP_{it} rises.

Hypothesis 15. When the trade cost $TCOST_{ikcmt}$ is very low, the firm enters an APA and PD_{ikcmt} remains the same as $TCOST_{ikcmt}$ changes; when $TCOST_{ikcmt}$ is at a moderate level, the firm does not enter an APA and PD_{ikcmt} goes up as $TCOST_{ikcmt}$ rises.

To test Hypothesis 14 and 15, I first estimate how the relationship between TFP_{it} and PD_{ikcmt} varies when the information on whether a firm enters an APA is not available. In other words, I do not know where the cut-off level $\widehat{TFP}$ will be. I follow a similar estimation strategy as in Nunn and Trefler (2007): rank all the firms by their productivity and divide them into four quartiles. Let $p = 1, 2, 3, 4$ index quartiles, with $p = 1$ being the lowest productivity quartile. Finally, let $I_{it}^p = 1$ if firm i is in quartile p and $I_{it}^p = 0$ otherwise. Similarly, I also rank all firm-product-country-mode-year

bins by the trade costs and divide them into four quartiles. I assign the quartile dummy $S^q_{ikcmt} = 1$ if the trade cost $TCOST_{ikcmt}$ is in quartile q and $S^q_{ikcmt} = 0$ otherwise.

I can begin estimating the percentage price difference with an OLS equation controlling for year fixed effects, which allows the relationship between TFP_{it} (or $TCOST_{ikcmt}$) and PD_{ikcmt} to differ by quartile,

$$
\begin{aligned}
PD_{ikcmt} =& \omega_{0t} + \omega_1 TAX_{ct} + \sum_{p=1}^{4} \omega_{2p} I^p_{it} + \sum_{p=1}^{4} \omega_{3p} (I^p_{it} \cdot TFP_{it}) + \sum_{q=1}^{4} \omega_{4q} S^q_{ikcmt} \\
& + \sum_{q=1}^{4} \omega_{5q} (S^q_{ikcmt} \cdot TCOST_{ikcmt}) + \omega_6 Z'_{ikcmt} + \omega_7 YEAR'_t + \omega_8 M'_{ikcmt} + \varepsilon_{ikcmt},
\end{aligned}
\tag{17}
$$

where Z'_{ikcmt} denotes a vector of country, product and firm characteristics, including TAX_{ct}, $\left(\frac{R\&D}{SALES}\right)_{kt}$ and $\left(\frac{ADV}{SALES}\right)_{kt}$ (or $\left(\frac{INTAN}{TA}\right)_{kt}$), $REGQUA_{ct}$, $SHIP_{ikcmt}$, AIR_{ikcmt}, $\left(\frac{K}{L}\right)_{it}$ and $\left(\frac{S}{L}\right)_{it}$, and M'_{ikcmt} which contains the same control variables as those in W'_{ikcmt} in previous regressions except that the exchange rate is added as an additional regressor. I keep the right hand side independent variables the same as in Equation (14) and (15). Some of the variables are of little direct interest but work as controls.

As mentioned, the arm's-length price and the transfer price are not always available in the same firm-product-country-mode-year bin. That is, the dependent variable PD_{ikcmt} is not observed in many observations in my sample. Will this selection issue lead to any bias in the OLS estimation? Any model of product market competition suggests that firm characteristics determine which markets the firm will enter, and the model in this paper has suggested that whether to internalize the transaction is also a key choice determined by firm characteristics. At the same time, it is also shown that the incentive to shift income by charging a higher transfer price than the arm's-length price increases the likelihood of internalizing the transaction. Considering that the transfer price premium conditional on the integration decision is an important determinant of the integration decision, a selection bias occurs in the OLS estimation. I believe that both the choice of integration and the strategy of insourcing and outsourcing the same product from the same country at the same time influence on the transfer price premium, though the latter strategy is not studied in this paper

or in other literature. I correct the selection bias using a two-step Probit procedure described in Chapter 17 of Wooldridge (2002).

In the first stage, I estimate a Probit equation of the intrafirm imports dummy ID_{ikcmt},

$$
\begin{aligned}
ID^*_{ikcmt} =& \lambda_0 + \lambda_1 t_{ct} + \sum_{p=1}^{4} \lambda_{2p} I^p_{it} + \sum_{p=1}^{4} \lambda_{3p}(I^p_{it} \cdot TFP_{it}) + \sum_{q=1}^{4} \lambda_{4q} S^q_{ikcmt} \\
& + \sum_{q=1}^{4} \lambda_{5q}(S^q_{ikcmt} \cdot TCOST_{ikcmt}) + \lambda_6 Z'_{ikcmt} + \lambda_7 YEAR'_t + \lambda_8 W'_{ikcmt} + u^{iod}_{ikcmt}
\end{aligned}
\tag{18}
$$

$$
\begin{cases}
ID_{ikcmt} = 0 & if \quad ID^*_{ikcmt} < 0 \\
ID_{ikcmt} = 1 & if \quad ID^*_{ikcmt} \geq 0,
\end{cases}
$$

where Z'_{ikcmt} is the same as in Equation (17), W'_{ikcmt} is the same as in Equation (14), and the error term u^{id}_{ikcmt} is normally distributed.

Next, I create the dummy variable IOD_{ikcmt}, which equals 1 if firm i imports product k from both the affiliates and the independent suppliers in country c using transport mode m in year t, and 0 otherwise. Using the same right hand side variables, I estimate a Probit equation of IOD_{ikcmt}. In principle, it is believed that the residuals from the Probit estimations are correlated with the residual from the price difference estimation, Equation (17), which gives rise to the selection bias.

To consistently estimate the OLS coefficients, I compute the inverse Mills ratios $\hat{v}^{id}_{ikcmt} \equiv v(U^1_{ikcmt} \hat{\lambda}^{id})$ and $\hat{v}^{iod}_{ikcmt} \equiv v(U^1_{ikcmt} \hat{\lambda}^{iod})$, where U^1_{ikcmt} is the vector of all the right hand side variables of Equation (18), and $\hat{\lambda}^{id}$ and $\hat{\lambda}^{iod}$ are the estimates from the Probit equations. Note that I do not need the vector of right hand side variables, denoted by U^2_{ikcmt}, in equation (17) to be a strict subset of U^1_{ikcmt} if there is sufficient variation in $U^1_{ikcmt} \hat{\lambda}^{id}$ and $U^1_{ikcmt} \hat{\lambda}^{iod}$.

In the second stage, I augment the price difference equation with the inverse Mills ratios, controlling for year fixed effects,

$$PD_{ikcmt} = \lambda_{0t} + \lambda_1 t_{ct} + \sum_{p=1}^{4} \lambda_{2p} I_{it}^p + \sum_{p=1}^{4} \lambda_{3p}(I_{it}^p \cdot TFP_{it}) + \sum_{q=1}^{4} \lambda_{4q} S_{ikcmt}^q$$

$$+ \sum_{q=1}^{4} \lambda_{5q}(S_{ikcmt}^q \cdot TCOST_{ikcmt}) + \lambda_6 Z_{ikcmt}^{'} + \lambda_7 M_{ikcmt}^{'} + \lambda_8 \hat{v}_{ikcmt}^{id} \tag{19}$$

$$+ \lambda_9 \hat{v}_{ikcmt}^{iod} + \varepsilon_{ikcmt}.$$

For the small sample of 1,926 firms whose APA information is known, I also create ID_{ikcmt} and IOD_{ikcmt} and run the two-step Probit selection regressions for the sub-sample where $APA_{it} = 1$ and the sub-sample where $APA_{it} = 0$ separately. In this case, I do not need to use the quartile dummies of productivity and trade costs. In the first stage, I run a Probit equation of ID_{ikcmt},

$$ID_{ikcmt}^* = \lambda_0 + \lambda_1 TAX_{ct} + \lambda_2 TFP_{it} + \lambda_3 TCOST_{ikcmt} + \lambda_4 Z_{ikcmt}^{'} + \lambda_5 W_{ikcmt}^{'} + u_{ikcmt}^{id}$$

$$\begin{cases} ID_{ikcmt} = 0 & if \quad ID_{ikcmt}^* < 0 \\ ID_{ikcmt} = 1 & if \quad ID_{ikcmt}^* \geq 0. \end{cases} \tag{20}$$

Using the same right hand side variables, I also run a Probit equation of IOD_{ikcmt}. I then compute the inverse Mills ratios $\hat{v}_{ikcmt}^{id}$ and $\hat{v}_{ikcmt}^{iod}$, and add them into the OLS estimation of PD_{ikcmt},

$$PD_{ikcmt} = \lambda_{0t} + \lambda_1 TAX_{ct} + \lambda_2 TFP_{it} + \lambda_3 TCOST_{ikcmt} + \lambda_4 Z_{ikcmt}^{'}$$

$$+ \lambda_5 M_{ikcmt}^{'} + \lambda_6 \hat{v}_{ikcmt}^{id} + \lambda_7 \hat{v}_{ikcmt}^{iod} + \varepsilon_{ikcmt}. \tag{21}$$

When $APA_{it} = 0$, λ_2 is expected to be negative and λ_3 is expected to be positive, while they are expected to be insignificant when $APA_{it} = 1$.

6 Data

6.1 Industry-Level Data

As I said earlier, my access to transaction-level data on imports is still in the approval process. Therefore, I replicate the analysis using industry-level data on related-party imports and total imports, and on industry characteristics. My industry-level analysis is restricted to testing the effects of source country characteristics and industry characteristics on the organizational mode as speci-

fied in Section 5.1.

The industry-level import data are available on the website of the U.S. Census Bureau.[22] This database reports the total imports and related-party imports from 2002 to 2010. Related-party trade refers to shipments between U.S. companies and their foreign subsidiaries as well as trade between U.S. subsidiaries of foreign companies and their affiliates abroad. Firms are "related" if either party owns, directly or indirectly, 10 percent or more of the other party. This definition is consistent with that used by the Bureau of Economic Analysis (BEA) in their annual surveys of multinational activity.

I use the data to generate the ratio of related-party imports to total imports IS_{kct} for 451 NAICS 6-digit industries and 229 source countries from 2002 to 2005. Each observation is an industry-country-year pair. In my sample with 115,019 observations, 41.8 percent of the industry-country-year pairs do not have intrafirm imports and 3.9 percent of the pairs only have intrafirm imports, which suggests a Tobit estimation of the equation.

The ideal corporate tax rate is the firm-specific marginal tax rate, which is difficult to obtain. The previous literature has employed the maximum statutory corporate tax rate as a proxy and the effective tax rate as an alternative.[23] The data for the maximum statutory corporate tax rate can be found in the World Tax Database (WTD) compiled by the Office of Tax Policy Research at the University of Michigan.[24] The effective tax rate in the foreign country can be calculated by dividing the foreign income taxes paid by total foreign revenue less cost of goods sold and selling and administrative costs in the foreign country, using data from theannual surveys of multinational activity in the BEA. Table 1 lists the available maximum statutory corporate tax rate for 139 countries and the effective tax rate that I have calculated for 54 countries in 2002.

As mentioned in Section 5.1, the maximum statutory corporate tax rate cannot capture the special low-tax or zero-tax zones, tax holidays, or other low-tax policies in the foreign country. Compared with the effective tax rate, it cannot identify the income-shifting motive of integration

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[22]See http://sasweb.ssd.census.gov/relatedparty/.

[23]See Hines and Rice (1994), Collins et al. (1998), Clausing (2003), and Bernard, Jensen and Schott (2006).

[24]See http://www.bus.umich.edu/otpr/otpr/default.asp.

or transfer pricing. As a result, I only use the effective tax rate in the estimations. In spite of the problems discussed in Section 5.1, the effective tax rate is the best available tax rate to use for the purpose of this paper. Though it is only available for 54-56 countries in each year, these countries cover most of the large trade partners of the U.S. For instance, in 2002, the total import value from these countries makes up 96.6 percent of the total import value from all countries, which means that only very small economies are not included in the sample.

Firm-level R&D expenses, advertising expenses, total revenue, intangible assets and total assets come from Compustat. The data are aggregated at the NAICS 6-digit industry level. Other industry characteristics are taken from the NBER Manufacturing Industry Productivity Database, including the real capital stock, total employment, the number of production workers, and total value added. The number of establishments in an industry is published by the U.S. Census Bureau in its County Business Patterns series.

Distance is measured as kilometers from Chicago to the capital city of the exporting country, which can be found in CEPII. The governance indicators are taken from Kaufmann et al. (2009). The investment data for constructing a country's physical capital stock, the openness index, GDP and GDP per capita are from the Penn-World Tables. Monthly exchange rate data is available on the website of University of British Columbia.[25]

6.2   Firm-Level Trade Data

Since my access to the confidential firm-level data is still in the approval process, I generally introduce the trade data in the Linked/Longitudinal Firm Trade Transaction Database (LFTTD) in this subsection.

The transaction-level data in the LFTTD capture all U.S. international trade transactions from 1992 to present. For each flow of goods across a U.S. border, this data set records the value and quantity shipped, the trade costs charged, the HS 10-digit product classification, the date of

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[25]This is a service for academic research and teaching provided by Professor Werner Antweiler at UBC's Sauder School of Business. The website provides access to current and historic daily exchange rates. Daily exchange rates are available for approximately 200 countries. See http://pacific.commerce.ubc.ca/xr/data.html.

the shipment, the source country, the transport mode, the shipping date, as well as whether the transaction takes place at "arm's length" or between "related parties".

I will compute the export price as the unit value of the transaction. Each observation in my panel data stands for a firm-product-country-mode-year bin. For the regressions involving PD_{ikcmt}, I will drop the bins that contain the lowest 1 percent or the highest 1 percent PD_{ikcmt} to get rid of the outliers.

Country characteristics including the effective tax rate, the regulation level, and so forth have been described in Section 6.1. Industry characteristics are linked with the trade data at the HS 10-digit product level. Pierce and Schott (2009) provide the concordance of NAICS 6-digit codes and HS 10-digit codes for imports.

7 Empirical Results

7.1 Industry-Level Analysis

Hypotheses 1-5 stated in Section 5.1 imply that the intrafirm import share IS_{kct} rises as the foreign tax rate, the distance and the regulation level fall and as industry intangibility rises. I report the estimating results of log IS_{kct} from the industry-level trade data in this subsection.

Table 2 in the Appendix shows the Tobit estimation with standard errors clustered by industry as specified in equation (13). In the first four columns, the key independent variable is the effective tax rate, while it is the lag of the effective tax rate in the last four columns. In each case, industry intangibility is first measured by R&D intensity and advertising intensity, and then measured by intangible-asset intensity. Note that this table shows the marginal effects of the variables. As we can see, the results are similar when I use the current tax rate or the lag, except that the marginal effects are generally larger in the latter case.

As expected, the tax rate effect is significantly negative in all columns. The elasticities are smaller when I include governance indicators. Looking at column 2, the elasticity of -0.081 means that as the tax rate decreases by 10 percent, the share of intrafirm imports increases by 0.8 percent.

Distance represents trade costs as mentioned in Section 5.1. The effect is statistically significant and negative as predicted. As the distance falls by 10 percent, the share of intrafirm imports rises by 2.5 percent.

The marginal effects of R&D intensity is consistently significant and positive. The elasticity is around 0.29, relatively larger than the tax effect. However, advertising intensity is negatively related to the intrafirm share, which contradicts the theory. It might be caused by other effects of advertising intensity on the organizational choices that are not considered in the current model. The effect of intangible-asset intensity is not significant, which may result from the fact that intangible assets are broadly defined and not closely in line with intangibility in the transfer pricing area.

Regulatory quality estimates are not significant. This may be due to the distinction between regulatory quality and the regulation level. The former is defined as the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, which is a broader concept than that of regulation level in the transfer pricing area modeled in this paper. Other governance indicators all have significant effects. It is shown that it is more likely for firms to choose integration when the government is more effective and the nation is the more politically stable. As mentioned, Nunn (2007) and Defever and Toubal (2007) also include "rule of law" and treat it as the contracting environment. However, they get a positive relationship between the intrafirm share and the rule of law variable, which violates the theory in Antràs and Helpman (2006): a better contracting environment should increase the likelihood of outsourcing. Nevertheless, my negative estimate from the U.S. industry-level trade data is supportive of the theory in Antràs and Helpman (2006). It is also consistent with my prediction in the story of this paper that a higher level of compliance with the authority decreases the opportunity to shift income, and thus the integration level.

The estimates of industry-level capital intensity and skilled-labor intensity are also fragile to the choice of regressors, which supports the model outcome in this paper. That is, after introducing the income-shifting mechanism, the intensity of headquarter input does not have a monotonic influence on the ownership structure any more. These results are different from the Antràs-type studies.

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The country-level capital abundance has a significant positive effect, which is consistent with the theory and empirical findings in Antràs (2003). The effect of the openness index and GDP are significantly positive, while the estimate of GDP per capita is fragile to the choice of regressors. The elasticity of total employment is between 0.374 and 0.590, which is a relatively large effect on the organizational decision. Both the share of value added to total industry sales, which is treated as the importance of the supplier's production in the overall value chain, and the capital stock per establishment, which captures the size of scale economies, have effects fragile to the choice of regressors.

I also run the Tobit equations with standard errors clustered by both industry and country, in which case the significant effects of the effective tax rate and distance disappear. Considering that there are only 56 countries in the sample and the variation of the log value of these variables across countries is not large, the results are not surprising. In fact, once standard errors are clustered by industry and country, the robustly significant characteristics only include GDP, R&D intensity, advertising intensity and total employment.

7.2 Firm-Level Analysis

The empirical results using firm-level trade data are not available at this moment.

8 Conclusion

This paper links the incomplete-contracting property-rights literature and the tax-motivated income-shifting literature to address the important role that corporate income taxes and transfer pricing strategies play in the ownership structure of international firms. In my model, an optimal tax-oriented transfer price is established based on the allocation of responsibility shared by the home headquarters and the foreign affiliate. The integrated multinational firms trade off production efficiency and tax minimization when they shift income. I highlight the importance of the corporate

tax rate differential, firm productivity, the APA participation decision, and industry intangibility as key factors that determine international firms' integration decisions and transfer pricing strategies. My industry-level evidence shows that a lower foreign tax rate, lower trade costs, and higher R&D intensity are associated with a higher intrafirm import share.

In the future, I will complete the firm-level empirical analysis and get the results released from the Census Bureau. It is potentially interesting to use the transaction-level trade data to study transfer pricing and organizational modes in individual countries. For instance, I will further study the transfer price premium in Ireland since Ireland has a good reputation for complete transfer pricing law but moderate regulation. Canada and Mexico are also worth attention as Harrigan, Ma and Shlychkov (2011) find that U.S. exporting firms charge systematically lower prices in Canada and Mexico for the same products they sell in other markets. This may be due to the large amount of intrafirm trade between the U.S. and the two adjacent countries, and a closer look at the firm-level data is needed. Moreover, the coexistence of related-party and unrelated-party transactions in the same firm-product-country-mode-year pair is also an extended topic of this project.

Proof of Proposition 1

1. The first step of the proof is to show: $\Theta'_\tau(\eta) > 0$ for all $\eta \in [0,1]$.

Lemma 1 *The likelihood of choosing integration, as measured by $\Theta_\tau(\eta)$, increases with η: $\Theta'_\tau(\eta) > 0$ for all $\eta \in [0,1]$.*

Proof. From simple differentiation of Equation (8), it follows that $\Theta_\tau(\eta) > 0$ if and only if

$$\Omega(\eta)ln\left(\frac{\delta^\alpha}{\beta(1-\delta^\alpha)}+1\right) > \delta^\alpha s(1-\alpha)(1-\beta)(s+n)(1-\alpha+\alpha\eta) + [\alpha s - \Delta - \alpha\eta(n+s)],$$

(22)

where $\Omega(\eta) = [\alpha s - \Delta - \alpha\eta(n+s)]\beta + s(1-\alpha+\alpha\eta)[\alpha s - \Delta - \alpha\eta(n+s)]\bar{\beta} + s(1-\alpha+\alpha\eta)$,

$s = 1 - \tau_s$, $n = 1 - \tau_n$, $\Delta = \tau_n - \tau_s = s - n$, and again, $\bar{\beta} = \delta^\alpha + \beta(1-\delta^\alpha)$. It is not hard to show

that given $\bar{\beta} > \beta > \frac{1}{2}$ and $s > n$ ($\tau_n > \tau_s$), $\Omega'(\eta)$ is negative $\forall \eta \in [0,1]$, and thus $\Omega(\eta) \geq \Omega(1)$.

We need to show $\vartheta(\delta) > 0$ for all $\delta \in (0,1)$, where

$$\vartheta(\delta) = ln\left(\frac{\delta^\alpha}{\beta(1-\delta^\alpha)}+1\right) - \frac{\delta^\alpha sn(1-\beta)(1-\alpha)(2-\alpha)}{\Omega(1)}$$

$$= ln\left(\frac{\delta^\alpha}{\beta(1-\delta^\alpha)}+1\right) - \frac{\delta^\alpha sn(1-\beta)(1-\alpha)(2-\alpha)}{[s-(\Delta+\alpha n)\beta][s-(\Delta+\alpha n)(\delta^\alpha+\beta(1-\delta^\alpha))]}.$$

(23)

Differentiate this expression. It is not hard to show that $\vartheta'(\delta) > 0$ if and only if $[s - (\Delta + \alpha n)\bar{\beta}]^2 > sn\bar{\beta}(1-\bar{\beta})(1-\alpha)(2-\alpha)$ for some $\bar{\beta}$. Since it is simple to check this is true for all α, $\bar{\beta}$, η, s, and $n \in (0,1)$, we have $\vartheta(\delta) > \vartheta(0) = 0$.

As a result, Lemma 1 holds given α, $\bar{\beta}$, η, s, and $n \in (0,1)$.

2. The second step is to show: $\Theta(0) < 1$ given $\eta \in (0,1)$ and $\Theta(1) > 1$ for some $\eta \in (0,1)$. First,

$$\Theta(0) = \left(\frac{1-\bar{\beta}}{1-\beta}\right)^{\frac{\alpha}{1-\alpha}}\left[\frac{(\alpha s - \Delta)\bar{\beta}+s(1-\alpha)}{(\alpha s - \Delta)\beta+s(1-\alpha)}\right]$$

$$= \left(\frac{\bar{x}}{x}\right)^{\frac{\alpha}{1-\alpha}}\left[\frac{(\alpha s - \Delta)(1-\bar{x})+s(1-\alpha)}{(\alpha s - \Delta)(1-x)+s(1-\alpha)}\right],$$

(24)

Consider that any function with a form $f(x) = (1-x)^{\frac{\alpha}{1-\alpha}}[(\alpha s - \Delta)x + s(1-\alpha)]$ is monotonically increasing in x for any $x \in (0,1)$. Since $1 - \bar{\beta} < 1 - \beta$, we have $f(1-\bar{\beta}) < f(1-\beta)$.

Therefore, $\Theta(0) < 1$ always holds. Similarly,

$$\Theta(1) = (\frac{\bar{\beta}}{\beta})^{\frac{\alpha}{1-\alpha}} [\frac{s - (\Delta + \alpha n)\bar{\beta}}{s - (\Delta + \alpha n)\beta}]. \tag{25}$$

Consider that the derivative of any function with a form $f(x) = x^{\frac{\alpha}{1-\alpha}} [f - (\Delta + \alpha h)x]$ is monotonically increasing in x for any $x \in (0, 1)$ and when Δ is not very large. Since $\Delta = s - n = \tau_n - \tau_s \in (0, 1)$ and $\bar{\beta} > \beta$, we have $f(\bar{\beta}) > f(\beta)$, and thus $\Theta(1) > 1$ holds.

Given $\Theta'_\tau(\eta) > 0$ (Lemma 1), $\Theta(0) < 1$, and $\Theta(1) > 1$, we can find a unique threshold $\hat{\eta}_\tau$ such that all firms with $\eta < \hat{\eta}_\tau$ only choose outsourcing, while all firms with $\eta > \hat{\eta}_\tau$ only choose integration.

3. In the last step, we want to compare $\hat{\eta}_\tau$ with the threshold $\hat{\eta}_0$ in the tax-free case. Consider the difference of the profit ratio in the two cases,

$$\Theta_0(\eta) - \Theta_\tau(\eta) = \left(\frac{\alpha(1 - 2\eta)\bar{\beta} + 1 - \alpha + \alpha\eta}{\alpha(1 - 2\eta)\beta + 1 - \alpha + \alpha\eta} - \frac{[\alpha s - s + n - \alpha\eta(n + s)]\bar{\beta} + s(1 - \alpha + \alpha\eta)}{[\alpha s - s + n - \alpha\eta(n + s)]\beta + s(1 - \alpha + \alpha\eta)} \right)$$
$$\cdot [\frac{\delta^\alpha}{(1 - \delta^\alpha)\beta} + 1]^{\frac{\alpha\eta}{1-\alpha}} (1 - \delta^\alpha)^{\frac{\alpha}{1-\alpha}}. \tag{26}$$

Let $A = \alpha(1 - 2\eta)$, $B = 1 - \alpha + \alpha\eta$, $C = \alpha s - s + n - \alpha\eta(n + s)$ and $D = s(1 - \alpha + \alpha\eta)$. It is simple to check that given α, η, s, and $n \in (0, 1)$, $\frac{A\bar{\beta} + B}{A\beta + B} - \frac{C\bar{\beta} + D}{C\beta + D} > 0$, which means $\Theta_0(\eta) > \Theta_\tau(\eta)$ always holds. In other words, the curve for $\Theta_0(\eta)$ always lies above the curve for $\Theta_\tau(\eta)$. Since $\Theta'_\tau(\eta) > 0$ and $\Theta'_0(\eta) > 0$, we have $\hat{\eta}_\tau > \hat{\eta}_0$. Q.E.D.

Figure 1: Share of Intrafirm Imports and Effective Tax Rate
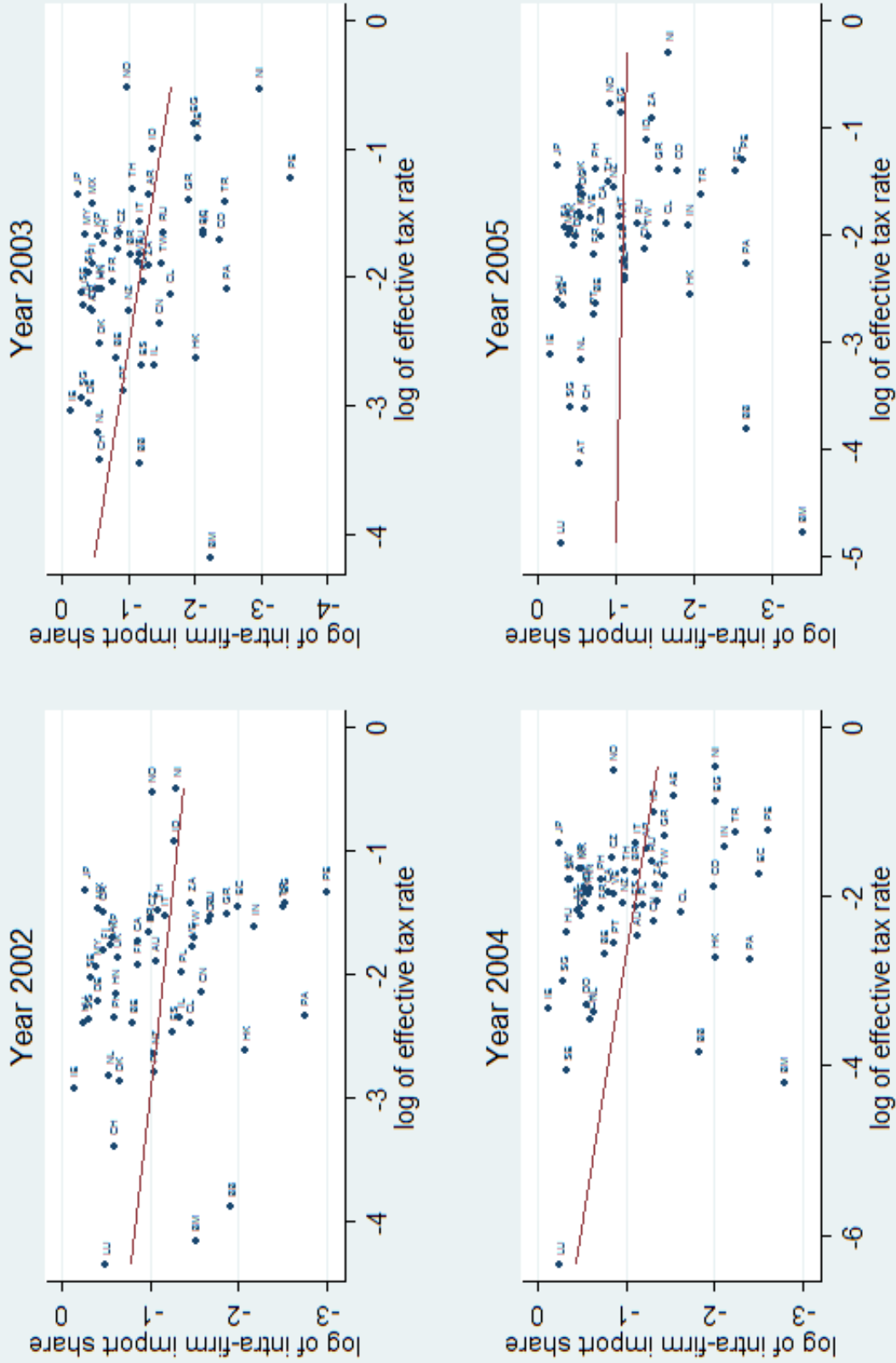
Notes: This figure shows the negative correlation of the log values of the share of intrafirm imports in total imports and the effective tax rate from 2002 to 2005. There are 54-56 countries for which the effective tax rate is available in each year. The intrafirm import share and the effective tax rate are calculated using data from the U.S. Census Bureau and the Bureau of Economic Analysis. See the table in the following page for the abbreviation of country names.

Figure 1: Continued

Country	Abbreviation	Country	Abbreviation	Country	Abbreviation
Argentina	AR	Germany	DE	Panama	PA
Australia	AU	Greece	GR	Peru	PE
Austria	AT	Honduras	HN	Philippines	PH
Barbados	BB	Hong Kong	HK	Poland	PL
Belgium	BE	Hungary	HU	Portugal	PT
Bermuda	BM	India	IN	Russia	RU
Brazil	BR	Indonesia	ID	Saudi Arabia	SA
Canada	CA	Ireland	IE	Singapore	SG
Chile	CL	Israel	IL	South Africa	ZA
China	CN	Italy	IT	Spain	ES
Colombia	CO	Japan	JP	Sweden	SE
Costa Rica	CR	Korea, Republic of	KP	Switzerland	CH
Czech Republic	CZ	Luxembourg	LU	Taiwan	TW
Denmark	DK	Malaysia	MY	Thailand	TH
Dominican Republic	DO	Mexico	MX	Turkey	TR
Ecuador	EC	Netherlands	NL	United Arab Emirates	AE
Egypt	EG	New Zealand	NZ	United Kingdom	UK
Finland	FI	Nigeria	NI	Venezuela	VE
France	FR	Norway	NO		

Figure 2: Profit Ratio of Integration and Outsourcing and Headquarter-Input Intensity

$\Theta(\eta)$

$\Theta_0(\eta)\ \Theta_\tau(\eta)$

1

0

$\hat{\eta}_0\ \ \hat{\eta}_t\ \ 1$

η
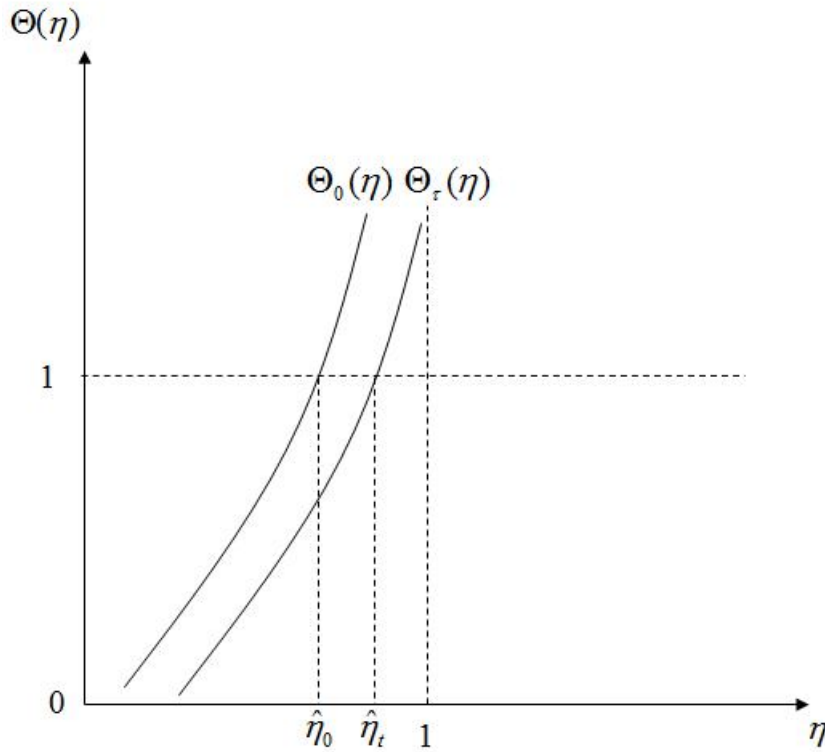
Notes: The curve for the profit ratio of integration and outsourcing in the tax-free case is entirely above that of the no-income-shifting case in the presence of taxes, e.g. $\Theta_0(\eta) > \Theta_\tau(\eta)$ for any η. This means that the threshold of headquarter-input intensity increases and outsourcing is more likely to be chosen in a world with taxes.

Figure 3: Profit Difference, Foreign Tax Rate and Productivity
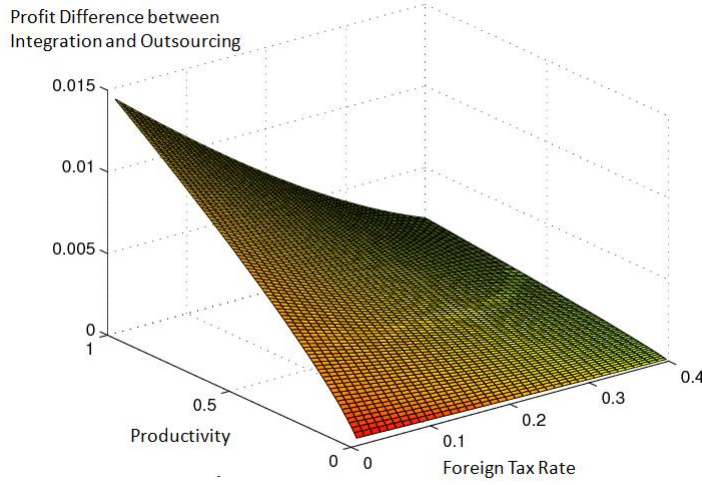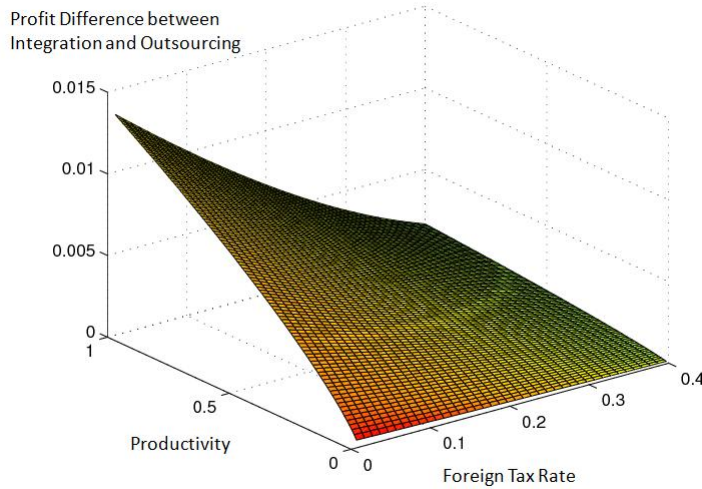
Figure 3A: The APA case

Figure 3B: The non-APA case

Notes: With τ_n fixed, as τ_s decreases, the income-shifting incentive grows, and thus the profit difference between integration and outsourcing in both the APA case ($\tilde{\pi}^A - \pi_o$) and the non-APA case ($\tilde{\pi} - \pi_o$) go up. This effect is even larger given a higher productivity θ. In the meantime, both $\tilde{\pi}^A - \pi_o$ and $\tilde{\pi} - \pi_o$ increase as θ rises.

Parameters for the numerical model are set as follows: $\alpha = 0.5$, $\mu = 0.5$, $\tau_n = 0.5$, $\phi = 1.2$, $\eta = 0.8$, $Y = 1$, $w_n = 1$, and $w_s = 0.8$.

Figure 4: Profits and Productivity under APA, Non-APA and Outsourcing
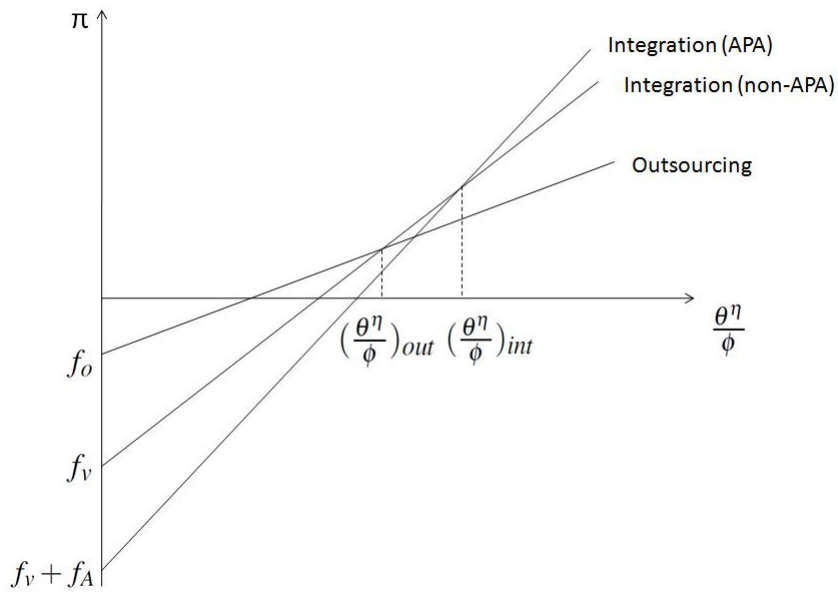
Notes: The most productive firms with lowest trade costs enter an APA, the least productive firms with highest trade costs outsource the intermediate goods, and the middle choose integration without entering an APA.

Figure 5: Transfer Price Deviation, Foreign Tax Rate and Productivity
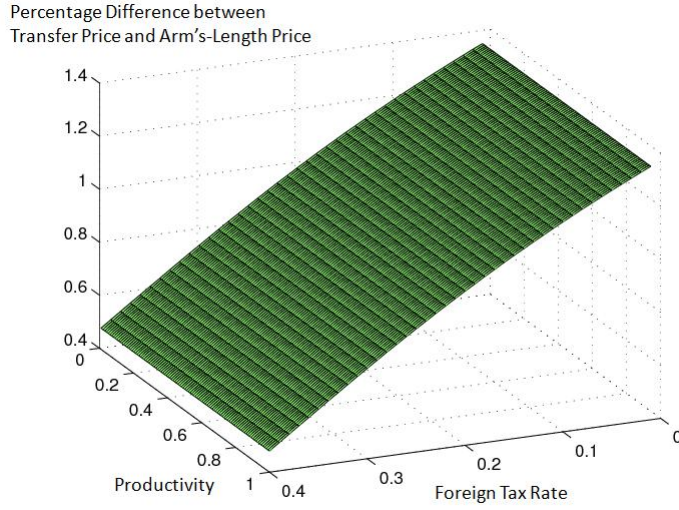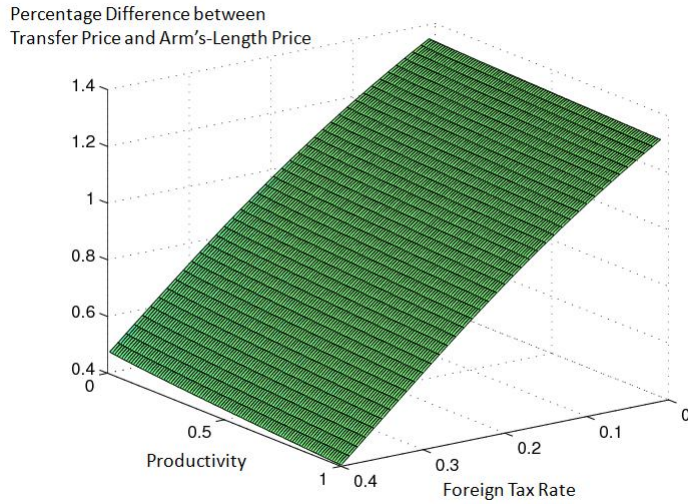
Figure 5A: The APA case

Figure 5B: The non-APA case

Notes: With τ_n fixed, as τ_s decreases, the percentage difference between the transfer price and the arm's-length price in both the APA case $((\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x)$ and the non-APA case $((\tilde{p}_x - \bar{p}_x)/\bar{p}_x))$ rise. For a given τ_s, $(\tilde{p}_x^A - \bar{p}_x)/\bar{p}_x$ under APA is constant, but $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ without APA is decreasing as productivity θ rises.

Parameters for the numerical model are set as follows: $\alpha = 0.5$, $\mu = 0.5$, $\tau_n = 0.5$, $\phi = 1.2$, $\eta = 0.8$, $Prob = 0.5$, $\bar{\beta} = 0.8$, $Y = 1$, $w_n = 1$, and $w_s = 0.8$.

Figure 6: Effects of Foreign Tax Rate and Industry Intangibility on Profit Difference and Transfer Price Deviation in the Non-APA Case

Figure 6A: Profit difference between integration and outsourcing
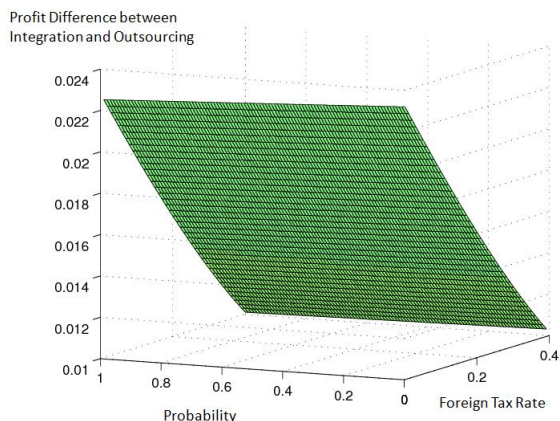
Figure 6B: Percentage difference between transfer price and arm's-length price
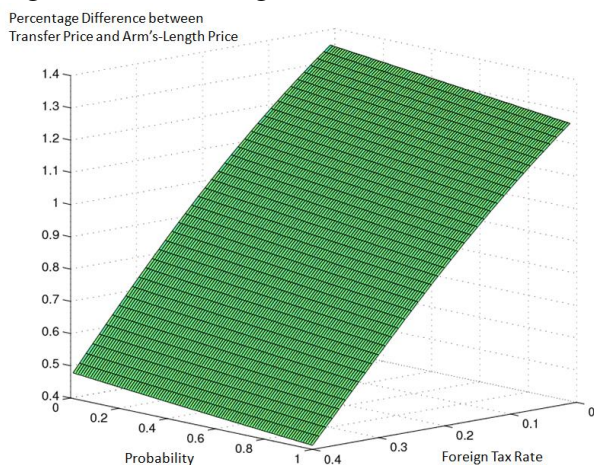
Notes: For a given $\tau_n - \tau_s$, an integrated firm without entering an APA will shift more income when the industry it belongs to is more intangible and thus the probability of paying an adjustment cost is lower. With a lower expected adjustment cost, the after-tax profit $\tilde{\pi}$ is also higher. Meanwhile, more shifted income means the price difference between the transfer price and the arm's-length price $(\tilde{p}_x - \bar{p}_x)/\bar{p}_x$ is larger.

Parameters for the numerical model are set as follows: $\alpha = 0.5$, $\mu = 0.5$, $\tau_n = 0.5$, $\phi = 1.2$, $\eta = 0.8$, $\theta = 0.5$, $\bar{\beta} = 0.8$, $Y = 1$, $w_n = 1$, and $w_s = 0.8$.

Figure 7: Output, Headquarter Intensity and Foreign Tax Rate

Figure 7A: The APA case
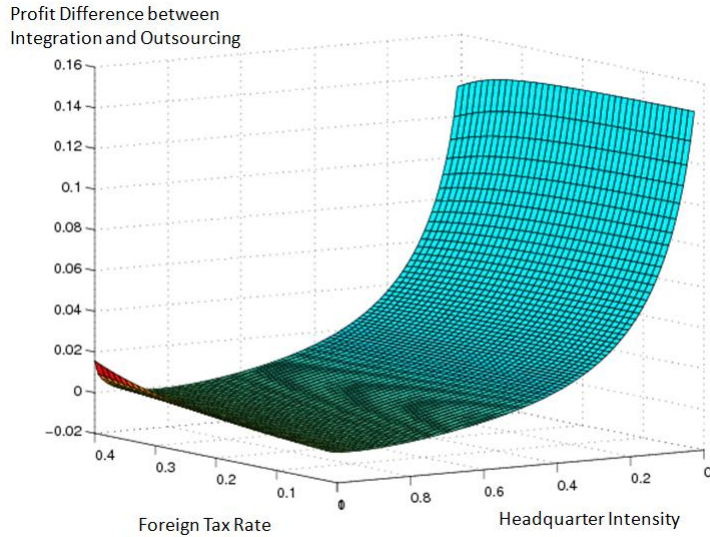
Figure 7B: The non-APA case
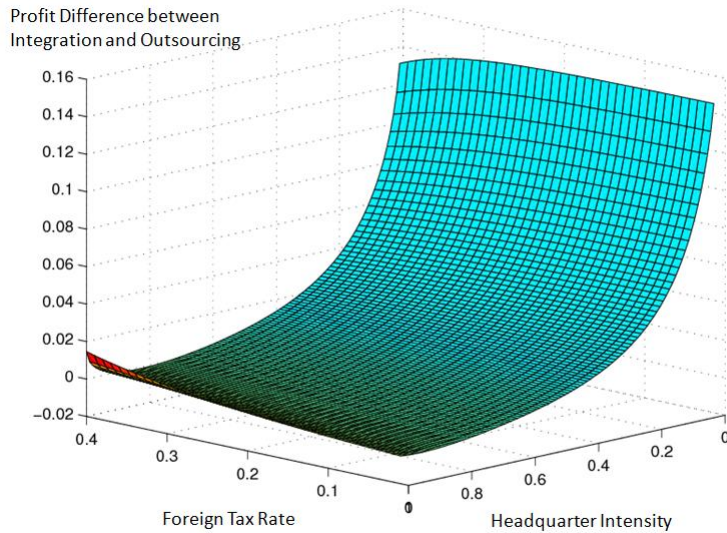
Notes: When η is relatively small, the output $\tilde{y}^A$ (or $\tilde{y}$) under integration is always higher than the output y under outsourcing. When η is relatively large, $\tilde{y}^A$ (or $\tilde{y}$) falls as $\tau_n - \tau_s$ rises, and it can be lower than y.

Parameters for the numerical model are set as follows: $\alpha = 0.5$, $\mu = 0.5$, $\tau_n = 0.5$, $\phi = 1.2$, $\theta = 0.5$, $Prob = 0.5$, $\bar{\beta} = 0.8$, $Y = 1$, $w_n = 1$, and $w_s = 0.8$.

Table 1: Statutory Corporate Tax Rate and Effective Tax Rate in 2002

Country	WTD	BEA	Country	WTD	BEA	Country	WTD	BEA	Country	WTD	BEA
Albania	0.25		Ecuador	0.25	0.237	Kyrgyz Republic	0.3		Russia		0.220
Angola	0.35		Egypt	0.4	0.242	Latvia	0.22		Saudi Arabia	0.3	
Argentina	0.35	-0.501	El Salvador	0.25		Lebanon	0.15		Senegal	0.35	
Armenia	0.2		Estonia	0.26		Lesotho	0.35		Seychelles	0.4	
Australia	0.3	0.152	Ethiopia	0.35		Liechtenstein	0.15		Sierra Leone	0.45	
Austria	0.34	0.174	Fiji	0.32		Lithuania	0.24		Singapore	0.245	0.095
Azerbaijan	0.27		Finland	0.29	0.167	Luxembourg	0.3	0.013	Slovak Republic	0.25	
Bahamas, The	0		France	0.333	0.148	Macau	0.15		Slovenia	0.25	
Bahrain	0		Gabon	0.35		Macedonia	0.15		Solomon Islands	0.35	
Bangladesh	0.4		Gambia	0.35		Malawi	0.35		South Africa	0.3	0.245
Barbados	0.375	0.021	Georgia	0.2		Malaysia	0.28	0.146	Spain	0.35	0.086
Belarus	0.25		Germany	0.25	0.110	Malta	0.35		Sri Lanka	0.35	
Belgium	0.39	0.092	Ghana	0.325		Mauritius	0.25		Sudan	0.4	
Belize	0.25		Greece	0.35	0.223	Mexico	0.35	0.233	Suriname	0.36	
Bermuda	0	0.016	Guatemala	0.31		Monaco	0.333		Swaziland	0.3	
Bolivia	0.25		Guinea	0.35		Morocco	0.35		Sweden	0.28	0.133
Botswana	0.25		Guyana	0.45		Mozambique	0.35		Switzerland	0.085	0.034
Brazil	0.15	0.192	Haiti	0.35		Myanmar	0.3		Taiwan	0.25	0.183
British Virgin Islands	0.15		Honduras	0.25	0.116	Namibia	0.35		Tanzania	0.3	
Bulgaria	0.2		Hong Kong	0.16	0.074	Netherlands	0.345	0.060	Thailand	0.3	0.230
Cambodia	0.2		Hungary	0.18	0.093	Netherlands Antilles	0.35		Trinidad and Tobago	0.35	
Cameroon	0.385		Iceland	0.18		New Zealand	0.33	0.071	Tunisia	0.35	
Canada	0.38	0.178	India	0.35	0.202	Nicaragua	0.25		Turkey	0.3	0.236
Cayman Islands	0		Indonesia	0.3	0.403	Nigeria	0.3	0.620	Uganda	0.3	
Chile	0.16	0.092	Iran	0.54		Norway	0.28	0.599	Ukraine	0.3	
China	0.3	0.118	Ireland	0.16	0.055	Oman	0.12		United Arab Emirates	0	
Colombia	0.35	0.209	Israel	0.36	0.096	Pakistan	0.45		United Kingdom	0.3	0.157
Congo, Republic of	0.4		Italy	0.36	0.220	Panama	0.3	0.098	Uruguay	0.3	
Costa Rica	0.3	0.228	Jamaica	0.333		Paraguay	0.3		Uzbekistan	0.33	
Cote d' Ivoire (Ivory Coast)	0.35		Japan	0.3	0.271	Peru	0.27	0.268	Venezuela	0.34	0.171
Croatia	0.2		Jordan	0.35		Philippines	0.32	0.096	Vietnam	0.32	
Cyprus	0.25		Kazakhstan	0.3		Poland	0.28	0.139	Yemen	0.35	
Czech Republic	0.31	0.218	Kenya	0.3		Portugal	0.3	0.062	Zambia	0.35	
Denmark	0.3	0.058	Korea, Republic of	0.27	0.183	Qatar	0.35		Zimbabwe	0.3	
Dominican Republic	0.25	-0.019	Kuwait	0.55		Romania	0.25				

Note: The maximum statutory corporate tax rate comes from the World Tax Database (WTD). The effective tax rate is estimated using the Bureau of Economic Analysis (BEA) data. The maximum statutory corporate tax rate is available for 139 countries and the effective tax rate is available for 54 countries in 2002.

Table 2: Tobit Estimation: Share of Intrafirm Imports in Total Imports

	Effective Tax Rate				Lag of Effective Tax Rate			
Log (effective tax rate)	-0.235***	-0.081**	-0.211***	-0.073**	-0.318***	-0.082**	-0.279***	-0.072**
	(0.036)	(0.038)	(0.030)	(0.031)	(0.039)	(0.042)	(0.032)	(0.034)
Log (distance)	-0.132***	-0.255***	-0.207***	-0.306***	-0.150***	-0.275***	-0.220***	-0.324***
	(0.046)	(0.043)	(0.036)	(0.035)	(0.045)	(0.043)	(0.036)	(0.035)
Log (R&D intensity)	0.289***	0.296***			0.286***	0.294***		
	(0.056)	(0.058)			(0.056)	(0.058)		
Log (advertising intensity)	-0.052**	-0.052**			-0.054**	-0.054**		
	(0.024)	(0.025)			(0.024)	(0.025)		
Log (intangible assets/total assets)			-0.007	-0.008			-0.004	-0.005
			(0.059)	(0.060)			(0.059)	(0.060)
Regulatory quality		0.077		0.029		0.075		0.042
		(0.122)		(0.099)		(0.116)		(0.095)
Rule of law		-1.227***		-1.039***		-1.222***		-1.023***
		(0.140)		(0.106)		(0.136)		(0.103)
Government effectiveness		2.221***		1.907***		2.258***		1.926***
		(0.165)		(0.126)		(0.163)		(0.123)
Political stability		0.163***		0.134***		0.177***		0.141***
		(0.060)		(0.045)		(0.058)		(0.044)
log (capital abundance)	0.653***	1.015***	0.397***	0.710***	0.731***	1.067***	0.458***	0.757***
	(0.130)	(0.141)	(0.102)	(0.113)	(0.126)	(0.138)	(0.100)	(0.111)
log (openness)	0.578***	0.290***	0.498***	0.250***	0.524***	0.260***	0.461***	0.232***
	(0.069)	(0.067)	(0.050)	(0.051)	(0.067)	(0.065)	(0.049)	(0.049)
log (GDP)	1.044***	0.962***	0.948***	0.873***	1.043***	0.948***	0.947***	0.861***
	(0.039)	(0.038)	(0.034)	(0.033)	(0.039)	(0.037)	(0.034)	(0.032)
log (GDP per capita)	-0.028	-1.425***	0.146	-1.037***	-0.139	-1.542***	0.061	-1.144***
	(0.147)	(0.195)	(0.115)	(0.159)	(0.144)	(0.192)	(0.113)	(0.157)
log (capital/labor)	0.485**	0.522**	-0.059	-0.045	0.480**	0.519**	-0.059	-0.044
	(0.210)	(0.218)	(0.179)	(0.185)	(0.209)	(0.217)	(0.177)	(0.183)
log (skilled labor/unskilled labor)	-0.047	-0.045	0.346***	0.356***	-0.056	-0.055	0.333***	0.344***
	(0.142)	(0.147)	(0.108)	(0.112)	(0.141)	(0.146)	(0.107)	(0.111)
log (total employment)	0.555***	0.590***	0.357***	0.374***	0.548***	0.584***	0.356***	0.374***
	(0.068)	(0.070)	(0.073)	(0.075)	(0.068)	(0.071)	(0.072)	(0.075)
log (value added/sales)	-0.027	-0.032	-0.094***	-0.099***	-0.031	-0.035	-0.097***	-0.101***
	(0.041)	(0.042)	(0.034)	(0.035)	(0.041)	(0.042)	(0.034)	(0.035)
log (capital/establishments)	-0.383***	-0.408***	-0.094	-0.107	-0.390***	-0.416***	-0.099	-0.113
	(0.143)	(0.149)	(0.119)	(0.123)	(0.143)	(0.149)	(0.118)	(0.122)
Number of Observations	30520	30520	49177	49177	30854	30854	49660	49660

Note: This table shows the marginal effects of the independent variables. Robust standard errors adjusted for clustering at the six-digit NAICS level are reported below coefficient estimates. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

References

[1] Antràs P., "Firms, Contracts, and Trade Structure," *Quarterly Journal of Economics* (2003), Pp. 1375-1418

[2] Antràs P. and Helpman E., "Global Sourcing," *Journal of Political Economy* (2004), Vol. 112, No. 3

[3] Baldenius T., Melumad N. and Reichelstein S., "Integrating Managerial and Tax Objectives in Transfer Pricing," *The Accounting Review* (2004), Vol. 79, No. 3, Pp. 591-615

[4] Baldwin R. and Harrigan J., "Zeros, Quality, and Space: Trade Theory and Trade Evidence," *American Economic Journal: Microeconomics* 3 (2011), Pp. 60-88

[5] Bernard A. B. and Jensen J. B., "Exceptional Exporter Performance: Cause, Effect or Both?" *Journal of International Economics* (1999), 47, Pp. 1-25.

[6] Bernard A. B., Jensen J. B., Redding S. J. and Schott P. K., "Intrafirm Trade and Product Contractibility," *American Economic Review* (2010), Pp. 444-448

[7] Bernard A. B., Jensen J. B., and Schott P. K., "Transfer Pricing by U.S.-based Multinational Firms," NBER Working Paper No. 12493 (2006)

[8] Bernard A. B., Jensen J. B., and Schott P. K., "Importers, Exporters, and Multinationals: A Portrait of Firms in the US that Trade Goods," NBER Working Paper No. 11404 (2005)

[9] Clausing K. A., "Tax-motivated Transfer Pricing and US Intra Firm Trade Prices," *Journal of Public Economics* 87 (2003), Pp. 2207-2223

[10] Collins J., Kemsley D. and Lang M., "Cross-Jurisdictional Income Shifting and Earnings Valuation," *Journal of Accounting Research* (1998), Vol. 36, No. 2, Pp. 209-229

[11] Corcos G., Irac D. M., Mion G. and Verdier T., "The Determinants of intrafirm Trade," CEPR (Center for Economic Policy Research) Discussion Paper No. 7530 (2009)

[12] Defever F. and Toubal F., "Productivity and the Sourcing Modes of Multinational Firms: Evidence from French Firm-Level Data," CEP (Center for Economic Performance) Discussion Paper No. 842 (2007)

[13] Desai M. A., Foley C. F. and Hines J. R., *"The Demand for Tax Haven Operations,"* *Journal of Public Economics* 90 (2006), Pp. 513-531

[14] Desai M. A., Foley C. F. and Hines J. R., "Chains of Ownership, Regional Tax Competition, and Foreign Direct Investment," NBER Working Paper No. 9224 (2002)

[15] Eden L., Valdez L. F. J. and Li D., "Talk softly but carry a big stick: transfer pricing penalties and the market valuation of Japanese multinationals in the United States," *Journal of International Business Studies* 36 (2005), Pp. 398-41

[16] Grubert H. and Mutti J., "Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making," *The Review of Economics and Statistics* (1991), Vol. 73, No. 2, Pp. 285-293

[17] Hall R. E. and Jones C. I., "Why Do Some Countries Produce So Much More Output per Worker than Others?" *Quarterly Journal of Economics* (1999), Pp. 83-116

[18] Harrigan J., Ma X. and Shlychkov V., "Export Prices of U.S. Firms," October (2011)

[19] Harris D., Morck R., Slemrod J., and Yeung B., "Income Shifting in US Multinational Corporations," NBER Working Paper No. 3924 (1991)

[20] Hart O. and Moore J., "Property Rights and the Nature of the Firm," *Journal of Political Economy* (1990), Vol. 98, No. 6

[21] Hines J. R. and Rice E. M., "Fiscal paradise: foreign tax havens and American business," *Quarterly Journal of Economics* (1994), 109 (1), Pp. 149-182

[22] Hines J. R., "Tax Policy and the Activities of Multinational Corporations," NBER Working Paper No. 5589 (1996)

[23] Helpman E., "Trade, FDI, and the Organization of Firms," *Journal of Economic Literature* (2006), Vol. XLIV , Pp. 589-630

[24] Holmstrom B. and Tirole J., "Transfer Pricing and Organizational Form," *Journal of Law, Economics & Organization* (1991), Vol. 7, No. 2, Pp. 201-228

[25] Hummels D. L. and Skiba A., "Shipping the Good Apples Out: An Empirical Confirmation of the Alchian-Allen Conjecture," *Journal of Political Economy* (2004), 112, Pp. 1384-1402

[26] Kaufmann D., Kraay A. and Mastruzzi M., "Governance Matters VIII: Aggregate and Individual Governance Indicators 1996-2008," The World Bank Policy Research Working Paper No. WPS4978 (2009)

[27] Melitz M. J., "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica* (2003), Vol. 71, No. 6, Pp. 1695-1725

[28] Nunn N., "Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade", *Quarterly Journal of Economics* (2007)

[29] Nunn N. and Trefler D., "The Boundaries of the Multinational Firm: An Empirical Analysis," April (2007)

[30] Olley S. G. and Pakes A., "The Dynamics of Productivity in the Telecommunications Equipment Industry," *Econometrica* (1996), Vol. 64, No. 6, Pp. 1263-1297

[31] PricewaterhouseCoopers, "International Transfer Pricing 2009"

[32] Shlychkov V., "Organizational Forms of Importing Firms in U.S. Manufacturing," November (2009)

[33] Yeaple S. R., "Offshoring, Foreign Direct Investment, and the Structure of U.S. Trade," *Journal of the European Economic Association* (2006), 4(2-3), Pp. 602-11