Cost Sharing Arrangements and Income Shifting

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ABSTRACT: This study investigates the cost sharing arrangement (CSA), which is a mechanism used by multinational corporations (MNCs) to shift valuable intellectual property (IP) offshore to low-tax jurisdictions. We find that a CSA enables the MNC to shift income to low-tax foreign jurisdictions when the effect of domestic marketing intangibles on foreign income exceeds the effect of foreign marketing intangibles on domestic income. We also find that a CSA is less attractive if payments for the use of IP are not based on the fair market value of that IP. If the MNC can understate the value, it prefers to sell domestically developed IP to a foreign subsidiary, which in turn will develop the IP. If the tax authority can overstate the value by imposing retroactive revaluations of the IP, the MNC prefers to develop the IP domestically.

Keywords: Cost sharing arrangements; income shifting; transfer pricing; commensurate with income standard; intellectual property.

JEL Classifications: H25; D23.
I. INTRODUCTION

This study investigates a mechanism used by multinational corporations (MNCs) to shift valuable intellectual property (IP) offshore. Cost sharing arrangements (CSAs) are a vehicle for multinational firms to split the costs and benefits of research and development (R&D) activities between affiliated entities located in different countries. We evaluate the circumstances under which a CSA enables the U.S. parent (USP) of an MNC to shift income to a low-tax foreign subsidiary (FS), relative to what would occur if USP develops the IP itself and licenses it to FS, or if USP sells its IP to FS and has FS develop the IP.

Our study contributes to the income shifting literature by providing a deeper and more nuanced understanding of a key income shifting mechanism employed by numerous large, U.S. MNCs: the use of CSAs to shift income to low-tax foreign jurisdictions. Further, our comparative analysis sheds light on the alternative transactions through which intellectual property can be used by MNCs to shift income, which are generally not well understood. Our study offers important insights to both policymakers and academic researchers by identifying settings in which CSAs either promote or inhibit income shifting to low-tax countries.

We identify four factors that influence the attractiveness of a CSA. First, a CSA helps shift income to foreign jurisdictions if USP owns valuable marketing intangibles that increase foreign income, such as a globally recognized brand or trademark. This occurs because the Treasury Regulations implicitly assume that marketing intangibles used by USP only increase domestic income. To the extent this assumption is violated, using a CSA allocates more income to foreign jurisdictions, which is generally beneficial.
to the MNC given that the US currently has the highest corporate statutory tax rate in the world (Pomerleau and Lundeen 2014).

Second, a CSA inhibits the shifting of income to foreign jurisdictions if USP’s marketing intangibles primarily benefit domestic income, or if FS owns valuable marketing intangibles that increase domestic income. Again, this occurs because the Treasury Regulations implicitly assume that marketing intangibles only increase income for the party that owns them. To the extent this assumption is violated, using a CSA can allocate more income to the U.S.

Third, the MNC typically has substantial private information regarding the value of the intangible assets that USP and FS contribute to the CSA. In a CSA, these contributions are valued at the inception of the CSA, and typically FS must compensate USP for the value of these contributions with what are called platform contribution payments. If the MNC can exploit its information advantage over the tax authority to undervalue these contributions, the CSA allows the MNC to shift income to low-tax foreign jurisdictions relative to having USP pay for development. Furthermore, the MNC can shift even more income if it sells USP’s intangible assets to FS and has FS pay the development costs.

Fourth, the U.S. Treasury Regulations governing CSAs permit the tax authority, but not the MNC, to retroactively adjust the platform contribution payments under the commensurate with income (CWI) standard if the realized values substantially exceed the expected value used by the taxpayer to determine the payments. The CWI standard, which is viewed as inconsistent with the arm’s length standard by non-U.S. tax authorities, has the effect of shifting income that should be allocated to foreign tax
jurisdictions to the U.S. This makes a CSA less attractive compared to having USP develop the IP, but more attractive relative to selling USP’s intangible assets to FS and having FS develop the IP.

Section II describes the institutional background behind CSAs and the related literature. Section III presents the model and the derivation of our major results. We illustrate our results with numerical examples in Section IV. Section V concludes.

II. BACKGROUND

Institutions

A multinational corporation generally has three options to develop and exploit domestically developed IP overseas through its network of foreign subsidiaries: (i) develop the IP domestically and license the IP to its foreign subsidiaries, (ii) sell the IP to a foreign subsidiary, which then develops and exploits the IP, or (iii) enter into a CSA with a foreign subsidiary. All three transactions are governed by the transfer pricing rules of all associated jurisdictions, which prescribe methods and guidelines for determining appropriate remuneration for intercompany transactions. The U.S. details its transfer pricing regulations in U.S. Treas. Reg. §1.482-4(b) (promulgated under Internal Revenue Code Section 482) while most other developed countries follow the OECD Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations. Both sets of rules and regulations stipulate that intercompany transactions, including those related to intellectual or intangible property (IP), should be priced as if they occurred at arm’s length (i.e., between unrelated parties).¹ This arm’s length standard suggests that

¹ Treas. Reg. §1.482-4(b) defines IP as an asset that “has substantial value independent of the services of any individual,” including patents, formulae, processes, know-how, copyrights, trademarks and trade names. The OECD Guidelines define IP as including “patents, trademarks, trade names, designs or models”
unrelated parties entering into the license or sale of comparable IP under similar economic conditions should serve as a benchmark to price the license or sale of domestic IP to a foreign subsidiary. Thus, under both an IP license and sale, the foreign subsidiary is required to compensate the U.S. parent for the domestically developed IP at market value.

If both the U.S. parent and the foreign subsidiary contribute valuable IP to a transaction and retain ownership of their IP, representing the licensing scenario, a Residual Profit Split Method (RPSM) is a likely candidate to assign returns to each party.\(^2\) Under the RPSM, both the parent and subsidiary are first compensated for any of their routine activities, risks, and assets.\(^3\) The residual amount of profit is then split between the parent and the subsidiary based on the relative value of their contributed IP. For example, assume a U.S. parent and foreign subsidiary each contribute IP worth $50 to develop a new product. The parent uses both the foreign and domestic IP together, incurs additional routine processing costs of $30, and produces a product worth $200. Under the RPSM, the parent is first compensated for its routine costs of $30, leaving a residual profit of $170. Next, both the parent and the subsidiary receive 50 percent ($50/$100) of the residual profit. Thus, the parent receives a total of $115 ($30 + $85) and the subsidiary receives $85 of the $200 total profit. The parent and the subsidiary retain complete ownership over their contributed IP after the transaction. As an example of the economic magnitude of such transactions, Medtronic is currently fighting

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2 The analogous method in the OECD Guidelines is the Transactional Profit Split Method.
3 “Routine contributions ordinarily include contributions of tangible property, services and intangibles that are generally owned by uncontrolled taxpayers engaged in similar activities” [Treas. Reg. §1.482-6(c)(3)(i)(A)].
assessments by the IRS of approximately $960 million in additional U.S. federal income taxes related to the 2005 and 2006 license of U.S. medical device IP to its subsidiary in the Caymans (Teichert 2014).

If either the U.S. parent or foreign subsidiary sells its IP to the other party, both the U.S. and OECD require that the selling party be compensated for its IP at market value. In the case of U.S. MNCs who generally have tax incentives to shift income outside of the U.S., the direction of the IP sale is typically from the U.S. parent to the foreign subsidiary. Although the sale of IP from the U.S. parent to the foreign subsidiary initially shifts income from the foreign jurisdiction to the U.S., future returns from the IP accrue to the foreign subsidiary, thus providing an opportunity for the MNC to shift income away from the U.S. net of the IP sale. Notable IP sales challenged by the IRS include DHL’s 1992 sale of is domestically owned trademark to a Hong Kong subsidiary (Wright and Keates 1999) and Merck’s 1993 transfer of anti-cholesterol drug patents to a Bermuda subsidiary to save $1.5 billion in U.S. federal income taxes over approximately 10 years (Drucker 2006).

Both the U.S. and OECD provide an alternative means of sharing the rights to internally developed intangibles in the form of a CSA. Generally, a CSA allows for a foreign subsidiary to pay for a portion of the development costs, effectively sharing the costs and risks of innovation with their U.S parent, in return for obtaining a share of ownership in the developed IP and therefore a share in the associated income. In its 2013 Senate testimony, Apple Inc. suggested that without the ability for foreign subsidiaries to help fund US R&D via CSAs, many companies would move R&D activities and associated jobs overseas (Apple Inc., 2013). Under a CSA, the foreign subsidiary is
required to compensate the U.S. parent for a share of the domestically developed IP at cost but earns a share of the market value returns to the IP. CSAs provide a safe harbor for the “extremely difficult problems” associated with valuing the related-party transfer of intangibles (Surrey 1968).

The share of development costs paid by the foreign subsidiary should be proportional to their expected share of the benefits generated by the IP (referred to as “reasonably anticipated benefits” or RAB in Treas. Reg. §1.482-7(e)(1)). To delineate benefits, the CSA must specify how ownership in the developed IP will be split, usually by geography (e.g., U.S. versus non-U.S.). The Treasury Regulations suggest various measures for determining the share of benefits, such as the split of sales or income (before R&D expense). For example, assume that upon entering the CSA the parent and subsidiary forecast that the IP will generate sales of $100, $35 of which are foreign sales. The foreign subsidiary has an RAB share of 35 percent, and thus should pay 35 percent of the development costs of the IP. In addition, if either party brings pre-existing development-related IP to the table that contributes to the planned joint R&D, that party must be compensated for the contributed development IP via an arm’s length charge. Thus, any valuable IP owned by either the parent or subsidiary used to conduct the ongoing R&D and generate future income associated with CSA IP must be compensated via a “platform contribution” payment transactions (or PCTs in the U.S.). The U.S. Treasury Regulations specifically state that these platform contributions are to be made at the market value of the contributed IP; however, they specifically exclude non-development IP such as marketing intangibles (e.g., trademarks and trade names) from
the definition of a platform contribution [Treas. Reg. §1.482-7(c)(1) and §1.482-7(g)(7)(v), Example 1].

To be compliant, CSAs must be entered into in writing prior to sharing any development. The written agreement must clearly define the intangible to be developed, the scope of costs and activities planned to develop the intangible, how ownership of the developed intangible will be delineated (e.g., geographically), how the share of benefits will be calculated, how the share of costs will be calculated, the length of the CSA, and terms of modification or termination of the arrangement. Finally, the tax benefits of CSAs are specifically restricted to agreements between related parties.

A simplified version of a typical CSA scenario is as follows. USP develops a product that it sells almost exclusively in the U.S. Continuous development of this product is required for it to continue to be marketable in the U.S. (as in the case of, for example, software). USP begins to market the product outside of the U.S., but a significant amount of development will be required to tailor the product to foreign markets. Once the U.S. begins to sign major contracts for the sale of the product outside the U.S., it forms FS in a tax-advantaged jurisdiction such as Ireland, assigns the new foreign sales contracts to this Irish subsidiary, and enters into a CSA with FS based on a geographic split of the ownership of newly developed IP. The Irish subsidiary makes a platform contribution payment for the IP contributed to ongoing R&D by the U.S. parent, which is valued at market price, and pays the share of ongoing R&D costs equal to the projected foreign share of total worldwide sales generated by the newly developed IP. USP receives the proceeds of all U.S. sales of the CSA IP and FS receives all the proceeds of foreign sales of the CSA IP.
In 1986, U.S. Congress amended the Internal Revenue Code (IRC) by adding a “commensurate with income” (CWI) rule to Section 482. The CWI rule suggests that arm’s length prices for intercompany transactions should be commensurate with the income generated by those transactions. This CWI rule is a departure from the arm’s length standard because it allows for an *ex post* reevaluation of prices after the returns to a transaction have been realized, whereas often related parties enter into an agreement using the best *ex ante* information available at the time and do not modify the terms of the transaction after the benefits have been realized. How the CWI rule affects the transfer prices of intangibles and CSAs has been the subject of much debate; however, the courts have generally upheld the arm’s length standard at the expense of CWI (Brauner 2010). Nonetheless, the IRS continues to use the CWI rule to defend *ex post* periodic adjustments of platform contribution payments if the future realized value of the pre-existing IP falls outside of a safe harbor range of values of the original platform contribution [Treas. Reg. §1.482-7(i)(6)].

The U.S. cost sharing regulations have experienced significant revisions over the past 50 years, including increased guidance and prescribed transfer pricing methods issued in 1992 and 1995 as part of the Section 482 Treasury Regulations. In 2005 and 2008 the IRS issued proposed and temporary cost sharing regulations, representing a complete overhaul of the rules pertaining specifically to CSAs, before issuing final cost sharing regulations in 2011 [Treas. Reg. §1.482-7]. The changes to the regulations since 2005 include several new methods to determine arm’s length transfer prices under CSAs, particularly related the valuation of platform contributions, and introduced the “investor model” standard for assigning returns to each party in a CSA. The investor model is
intended to address a widely criticized abuse of CSAs by disallowing non-routine returns to a foreign CSA participant unless the foreign participant contributes valuable assets to the arrangement above and beyond cash compensation for R&D activities. These recent changes to the cost sharing regulations were also targeted at mitigating the abuse of CSAs involving information asymmetry. Using inside information, the firm can enter into a CSA once it knows it has a viable product, but value the contributed in-process IP as if future success of development is uncertain. Undervaluing the platform contribution allows the firm to transfer valuable domestic IP to low-tax jurisdictions at below-market prices. Changes to the U.S. cost sharing regulations to mitigate below-market transfers of IP offshore coincide with increased tax audit and litigation activity focusing on the valuation of platform contributions.

The OECD Guidelines covering “cost contribution arrangements” (CCAs, Chapter VIII) are similar to the U.S. regulations governing CSAs, but there are some important differences. First, the OECD Guidelines follow the arm’s length standard but allow for evidence to be provided that unrelated third parties share profits differently than results obtained from the prescribed transfer pricing methods. Second, the OECD Guidelines do not define transfer pricing methods that are specific to CCAs but rather elaborate on how existing methods used to determine arm’s length prices for services can be applied in a CCA setting. Third, the OECD Guidelines do not distinguish between cost contributions and contributions of pre-existing IP, only concluding that each party should be compensated at arm’s length for all contributions to the CCA. This point is a source of contention across jurisdictions as to whether the arm’s length charge for contributed intangibles should be at cost or market value (Wittendorf 2010). Finally, the OECD
Guidelines do not discuss any concept analogous to CWI, and thus do not allow for periodic adjustments to the platform contribution payments based on realized values.

Evidence from U.S. Senate hearings shed some light on the economic magnitude of CSAs and, consequently, of foregone U.S. tax revenues. According to its 2012 testimony to the Senate Permanent Subcommittee on Investigations, Microsoft Corporation alone shifts approximately $1.8 billion of taxable income annually from the U.S., where it performs approximately 85 percent of the MNC’s worldwide R&D, to an entity in Bermuda that faces a tax rate of zero percent. The key mechanism that allows for this income shifting is a CSA between the Bermuda entity and Microsoft U.S. (Senate Hearing 112-781). A 2013 Senate case study of Apple Inc. suggests that its CSA with a subsidiary in Ireland allowed the MNC to shift $74 billion in sales from the U.S. to Ireland from 2009 to 2012 (Levin and McCain 2013). Using an average return on sales during that period of 29 percent and the top U.S. federal rate of 35 percent, the CSA saved Apple approximately $1.9 billion in U.S. taxes per year. Further, a summary of all of the cost-sharing arrangements entered into by a sample of 15 large U.S. MNCs reveals that they were signed with low-tax jurisdictions that reported an average return on assets (ROA) of 268 percent, as compared to an average U.S. ROA for the same companies of 40 percent (Avi-Yonah 2012). For large U.S. MNCs, the economic magnitude of income shifting achieved via CSAs is substantial.

**Related Literature**

A long stream of income shifting research documents an association between valuable intellectual property and a firm’s ability to shift income from high-tax jurisdictions to low-tax jurisdictions due to difficulties associated with taxing mobile
capital (Gordon and Nielsen 1997; Slemrod and Wilson 2009; Wilson 1999, 2005). For example, Grubert (2003) examines the relations among intangible assets, production location, and income shifting in 60 countries that account for virtually all investment by U.S. MNCs. He finds that income shifting associated with R&D investments explains about half of the difference in profitability between low-tax rate countries and high-tax rate countries. Furthermore, MNCs with high levels of R&D are more likely to invest in countries with either very high or very low statutory tax rates, which provides an opportunity to benefit from shifting income.

Mutti and Grubert (2007) use Bureau of Economic Analysis data on U.S. multinationals to document that license payments to U.S. parents decreased while payments for technical services increased over the period 1996 to 2002, along with increased cost sharing payments coming from affiliates in Ireland, Bermuda, the Cayman Islands and Luxembourg. These results are consistent with the increased use of CSAs, particularly using subsidiaries located in tax havens. More recently, Griffith et al. (2014) find that the share of patent applications made by low-tax subsidiaries of U.K. MNCs grew significantly over the period 1985 to 2005. De Simone et al. (2014) document that U.S. MNCs with mobile asset bases – including valuable intellectual property – shift more income relative to other U.S. MNCs and achieve a higher long-run level of tax avoidance.

Many studies consider the possibility that a firm can deviate from the arm’s length standard to some degree (e.g. Horst 1971; Samuelson 1982; Smith 2002; De Waegenaere, Sansing and Wielhouwer 2012). In each case, the ability to engage in income shifting increases the attractiveness of foreign investment. We extend this
approach by also considering the possibility that the tax authority can deviate from the arm’s length standard by making retroactive changes under the CWI standard.

Although several law studies examine the cost sharing rules and related court proceedings (e.g., Brauner 2010, Ting 2014), there are relatively few studies in the accounting and economics literatures that specifically address CSAs. A notable exception is Dye, Gokhale, and Guimond (2007), which analyzes appropriate depreciation rates to use in determining arm’s length platform contribution payments, along with a comparison of the RPSM and “market cap” methods.

III. MODEL

Value creation

We consider the development and sale of a product by an MNC that comprises a U.S. parent (USP) and a foreign subsidiary (FS). Development of the product requires the expenditure of $c$ on date zero, which yields a commercially useful product on date $T$.\footnote{For expositional convenience only, we treat $T$ as deterministic. If $T$ were the realization of a random variable, the discount factor $\delta$ would be interpreted as an expected value.}

The present value of the future cash flows received as of date $T$ is the realization of a random variable $\bar{V}$, where $E[\bar{V}] = \mu$, of which a fraction $\phi$ is attributable to foreign operations, and $1 - \phi$ is attributable to domestic operations. The cost sharing regulations refer to $\phi\mu$ and $(1 - \phi)\mu$ as the reasonably anticipated benefits (RABs) of FS and USP, respectively. The expected date zero present value is $\delta\mu$, where $0 < \delta < 1$ is the expected discount factor. The difference, $\delta\mu - c$, reflects four sources of value.

- Intellectual property provided by USP, with a value of $P_D$
- Intellectual property provided by FS, with a value of $P_F$
• Marketing intangibles developed by USP with a value of $M_D$
• Marketing intangibles developed by FS with a value of $M_F$

Each of the four values $P_D$, $P_F$, $M_D$, and $M_F$ are given exogenously, although the sum must equal the present value of future expected cash flows associated with the project. Therefore,

$$
\delta \mu - c = P_D + P_F + M_D + M_F.
$$

(1)

We examine three ways of developing the IP. In order to focus on the tax issues, we assume that the neither the pretax costs nor pretax benefits of the IP are affected by how the IP is developed. First, we consider the case in which USP incurs all the development costs $c$, and licenses the use of the IP to FS when development is complete. Second, we consider the case in which USP sells its intangible property to FS, after which FS develops the IP and receives all of the benefits. Third, we consider a cost sharing arrangement between USP and FS.

The cost sharing regulations distinguish between platform contributions, represented by $P_D$ and $P_F$, and the operating contributions (e.g., marketing intangibles), represented by $M_D$ and $M_F$. A platform contribution is any resource, capability, or right that a participant in the cost sharing arrangement contributes to the effort to develop the property [Treas. Reg. §1.482-7(c)(1)]. For example, if USP has developed a software program, and USP and FS enter into a CSA to develop the next generation of the product, the source code of the current product is a platform contribution by USP [Treas. Reg. §1.482-7(c)(4)(ii), Example 2]. In addition, the value of a research team to be used in the development of the property would also be a platform contribution [Treas. Reg. §1.482-(c)(5), Example 2].
A marketing intangible is a type of operating contribution not related to the actual development of a cost-shared intangible, and may be routine or non-routine (Wittendorf 2010). Marketing intangibles include customer lists, ongoing relations with original equipment manufacturers, and trademarks that are recognized by consumers. Although marketing intangibles create value, they are not considered platform contributions because they relate to the exploitation of the developed asset as opposed to the development of the asset [Treas. Reg. §1.482-7(g)(7)(v), Example 1].

We assume that USP faces a higher tax rate than does FS. This implies that a CSA is preferred to USP developing the product itself if and only if the taxable income allocated to FS is greater under a CSA than when USP pays all of the development costs. We also assume that the tax authority can reliably estimate the relative values of the intangible assets, but is uncertain regarding their aggregate values.

**USP pays all development costs**

We first consider the case in which USP pays the development costs c. Because both USP and FS provide valuable intangible property in the development and sale of the product, we use the Residual Profit Split Method (RPSM) to divide the value that is realized on date T. Example 8 in Treas. Reg. § 1.482-8(b) describes a fact pattern in which both a U.S. parent and its European subsidiary use valuable intangible assets as one in which the RPSM would be preferred to the other methods.

Under the RPSM, USP would be compensated for its development costs in the form of royalties with a present value on date zero of c. The realized residual profit is divided in accordance with the RPSM, so FS receives royalties with a date zero expected

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5 If the purpose of the CSA is to jointly develop a brand, for example, then marketing intangibles would be considered platform contributions (Wittendorf 2010). Anecdotal evidence suggests that this is rare.
present value of

\[(\delta \mu - c) \frac{P_F + M_F}{P_D + M_D + P_F + M_F}.\]

Using equation (1), the date zero payoff to FS is

\[P_F + M_F,\]  

(2)

and therefore the date zero payoff to USP is \(P_D + M_D\).

**FS pays all development costs**

We next consider the case in which USP sells its intangible property to FS on date zero, after which FS pays all of the development costs and receives all of the future benefits from the IP. Therefore, the date zero payoff to FS is the entire date zero value of the project less the date zero payment to USP. If the date zero payment is equal to the value of USP’s intangible assets, the payoff to FS is

\[\delta \mu - c - (P_D + M_D) = P_F + M_F.\]  

(3)

Expression (3) assumes that the sales price is consistent with the arm’s length standard. The actual sales price paid by FS to USP for the IP could deviate from the arm’s length price for two reasons that could either shift income towards or away from USP. First, the MNC has better information than does the tax authority regarding the expected value of the IP, \(\mu\). This information asymmetry puts the tax authority at a disadvantage and suggests that the actual sales price could be less than the arm’s length sales price. Second, the CWI standard allows the Commissioner to retroactively change the sales price if the actual realization of cash flows attributable to the IP, or \(\hat{V}\), diverges significantly from the taxpayer’s representations regarding the expected value of the realization, \(\mu\), [IRC §482]. Because the residual profit split used to allocate the realized income when USP paid the development costs is based on the relative values of the intangible assets, the payoffs in that case were not susceptible to misstatement. In
contrast, the price that FS pays to USP when FS pays the development costs is based on
the expected value $\mu$ as opposed to the realization of $\mathcal{V}$, which creates the opportunity to
deviate from the arm’s length standard. A sales price adjusted \textit{ex post} under the CWI
standard could be greater than a sales price that would be consistent with the arm’s length
standard.

We illustrate how the net effect of the taxpayer’s incentives to understate $\mu$ and
the tax authority’s ability to impose \textit{ex post} adjustments based solely on the realization of
$\mathcal{V}$ can cause the sales price, after considering retroactive adjustments, to be either
understated or overstated. Suppose that $\mathcal{V}$ is drawn from an exponential distribution with
a density function $e^{-v}$, $v > 0$, which has a mean of one. The taxpayer knows the
distribution of $\mathcal{V}$, but the tax authority does not. We parameterize the firm’s ability to
deviate from the arm’s length standard for purposes of computing the sales price by
letting the initial price be $\omega$, where $\omega \leq 1$ is the measure of the firm’s ability to understate
the value of the intangible assets on date zero. However, if the realization $v > \omega \theta$, where
$\theta \geq 1$ is the threshold above which the tax authority retroactively adjusts the initial sales
price, then the payment is based on the realization $v$ instead of $\omega$. Under these
assumptions, the expected sales price, net of \textit{ex post} adjustments, is based on

$$
\int_0^{\omega \theta} \omega e^{-v} \, dv + \int_{\omega \theta}^{\infty} v e^{-v} \, dv = \omega + e^{-\omega \theta} [1 + \omega (\theta - 1)]. \tag{4}
$$

This expected value is decreasing in $\theta$, and is bounded below by $\omega \leq 1$ and bounded
above by $\omega + e^{-\omega \geq 1}$. We let $\lambda$ represent the net deviation from the arm’s length
standard, where $\lambda < 1$ means that the taxpayer has successfully understated the value of
the intangible property and \( \lambda > 1 \) means that the tax authority has successfully overstated the value of the intangible property. Therefore, the net expected date zero payoff to FS is

\[
P_F + M_F + (1 - \lambda)(P_D + M_D).
\]

Comparing (3) and (5) shows that having USP sell its intangible assets to FS and FS develop the IP yields more taxable income allocated to FS than the alternative of having USP develop the IP and license its use to FS when \( \lambda < 1 \). The date zero payment associated with the sale of IP creates both the possibility of understating the sales price and the possibility of retroactive adjustments by the tax authority under the CWI standard; the preferred method of developing the IP therefore hinges on whether \( \lambda < 1 \) or \( \lambda > 1 \).

**Cost sharing arrangement**

Finally, we suppose instead that USP and FS share the development costs \( c \) in accordance with a cost sharing arrangement. In a CSA, the development cost \( c \) must be shared in accordance with each party’s RAB share, so FS pays \( \phi c \) and USP pays \( (1 - \phi)c \), where \( \phi \) is FS’s RAB share.

In a cost sharing arrangement, both USP and FS are compensated for the value of their platform contributions. We assume that USP’s platform contributions create value of which \( \alpha \) goes to FS and \( 1 - \alpha \) goes to USP; FS’s platform contributions create value of which \( \beta \) goes to FS and \( 1 - \beta \) goes to USP. We assume that platform contributions made by USP have relatively more influence in the U.S. and platform contributions made by FS have relatively more influence outside the U.S., so \( \beta \geq \alpha \). Similarly, we assume that USP’s non-routine operating contribution creates value of which \( \gamma \) goes to FS and \( 1 - \gamma \)
goes to USP; FS’s non-routine operating contribution creates value of which $\epsilon$ goes to FS and $1 - \epsilon$ goes to USP. Thus the expected present value of USP’s residual profit is

$$ (1 - \phi)(\delta \mu - c) = (1 - \alpha)P_D + (1 - \beta)P_F + (1 - \gamma)M_D + (1 - \epsilon)M_F $$

and the expected present value of FS’s residual profit is

$$ \phi(\delta \mu - c) = \alpha P_D + \beta P_F + \gamma M_D + \epsilon M_F. $$

Equations (6) and (7) jointly imply that FS’s RAB share is

$$ \phi = \frac{\alpha P_D + \beta P_F + \gamma M_D + \epsilon M_F}{P_D + P_F + M_D + M_F}. $$

USP makes a payment to FS to reimburse it for FS’s platform contribution. The date zero value of this payment is equal to USP’s expected residual profit, $(1 - \phi)(\delta \mu - c)$, multiplied by a fraction. This fraction reflects the extent to which USP’s residual profit is attributable to the value of FS’s platform contributions, compared to the sum of both firms’ platform contributions and USP’s marketing intangibles [Treas. Reg. §1.482-7(g)(7)(iii)(C)]. We denote the fraction of USP’s residual profit that is attributable to foreign platform contributions as $\pi_F$, where

$$ \pi_F = \frac{(1 - \beta)P_F}{(1 - \alpha)P_D + (1 - \beta)P_F + M_D}. $$

Therefore, the payment that USP makes to FS is

$$ \lambda (1 - \phi)(\delta \mu - c)\pi_F. $$

Similarly, FS makes a payment to USP to compensate USP for its platform contribution. The payment that FS makes to USP is

$$ \lambda \phi(\delta \mu - c)\pi_D, $$

where $\pi_D$ is the fraction of FS’s residual profit that is attributable to USP’s platform contributions, or
\[ \pi_D = \frac{\alpha p_D}{\alpha p_D + \beta p_F + M_F}. \]  

(12)

For expositional convenience only, we assume that expression (11) exceeds expression (10), i.e., the net platform contribution payment is from FS to USP.\(^6\) The expected date zero payoff to FS, reflecting its residual profit from (7) plus the payment USP makes to FS in (10) less the payment that FS makes to USP in (11), is

\[ (\delta \mu - c)\{\phi - \lambda[\phi \pi_D - (1 - \phi)\pi_F]\}. \]  

(13)

Next, we characterize the payoff to FS when USP carries out all of the development and profits are divided in accordance with the RPSM. We let \( \sigma_F \) denote the fraction of USP’s residual profit that is attributable to the foreign intangible assets \( P_F \) and \( M_F \).

\[ \sigma_F = \frac{(1-\beta)P_F + (1-\epsilon)M_F}{(1-\alpha)p_D + (1-\beta)P_F + (1-\gamma)M_D + (1-\epsilon)M_F} \]  

(14)

We let \( \sigma_D \) denote the fraction of FS’s residual profit that is attributable to the domestic intangible assets \( P_D \) and \( M_D \).

\[ \sigma_D = \frac{\alpha p_D + \gamma M_D}{\alpha p_D + \beta p_F + \gamma M_D + \epsilon M_F} \]  

(15)

We emphasize the conceptual similarity between \( \pi_F \) and \( \sigma_F \) and between \( \pi_D \) and \( \sigma_D \). The fractions \( \pi_F \) and \( \pi_D \) are based on the Treasury Regulations, in which U.S. marketing intangibles are assumed to only generate value in the U.S. and foreign marketing intangibles are assumed to only generate value outside the U.S. The fractions \( \sigma_F \) and \( \sigma_D \) allow the possibility that U.S. marketing intangibles generate value outside the U.S. and foreign marketing intangibles generate value inside the U.S. The assumptions in the Treasury Regulations are true when \( \gamma = 0 \) and \( \epsilon = 1 \). If either \( \gamma > 0 \) or \( \epsilon < 1 \), \( \pi_F < \sigma_F \)

\(^6\) If the net payment should go from USP to FS, the MNC wants to overstate the value of the intangible assets on date zero and the tax authority prefers to understate the value.
and $\pi_D < \alpha_D$ assuming $M_D > 0$ and $M_F > 0$. In that case, the Treasury Regulations systematically understate the value that USP earns that is attributable to FS’s marketing intangibles, and systematically understate the value that FS earns that is attributable to USP’s marketing intangibles.

We can express the payoff to FS when USP develops the intangible property from (2) as

$$P_F + M_F = (\delta \mu - c)\{\phi - [\phi \sigma_D - (1 - \phi)\sigma_F]\}. \quad (16)$$

Subtracting (16) from (13) shows the effect of using a CSA to develop the intangible property on the allocation of taxable income to FS, relative to the alternative of USP developing the property.

$$\begin{align*}
(\delta \mu - c)[\phi(\sigma_D - \pi_D) - (1 - \phi)(\sigma_F - \pi_F)] \\
+ (1 - \lambda)[\phi \pi_D - (1 - \phi)\pi_F].
\end{align*} \quad (17)$$

Similarly, subtracting (5) from (13) shows the effect of using a CSA to develop the intangible property on the allocation of taxable income to FS, relative to the alternative of USP selling the intangible property to FS and FS developing the property.

$$\begin{align*}
(\delta \mu - c)[\phi(\sigma_D - \pi_D) - (1 - \phi)(\sigma_F - \pi_F)] \\
+ (1 - \lambda)[\phi \pi_D - (1 - \phi)\pi_F] - (1 - \lambda)(P_D + M_D).
\end{align*} \quad (18)$$

In absence of a CSA, it is optimal for FS to develop the IP if the firm can successfully understate the price of the IP relative to the arm’s length price ($\lambda < 1$) and for USP to develop the IP if the tax authority can successfully overstate the price of the IP relative to the arm’s length price ($\lambda > 1$). Because the U.S. tax rate exceeds the foreign tax rate, a CSA is optimal if and only if (17) is positive when $\lambda \geq 1$ and if and only if (18)
is positive when $\lambda \leq 1$. Expressions (17) and (18) each reflect two effects, the *marketing intangible* effect and the *divergence from arm’s length* effect.

The marketing intangible effect can be expressed as

$$[\gamma M_D - (1 - \varepsilon)M_F][1 - \pi_F - \pi_D],$$

which has the same as the sign of $[\gamma M_D - (1 - \varepsilon)M_F]$ because $\beta \geq \alpha$ implies that $\pi_F + \pi_D < 1$. Therefore, the marketing intangible effect makes a CSA more attractive if the effect of USP’s marketing intangible on FS’s residual income exceeds the effect of FS’s marketing intangible on USP’s residual income, and less attractive otherwise. Therefore, an MNC with a valuable global brand developed in the U.S. that increases foreign sales will benefit from a CSA; an MNC with a valuable global brand that increases domestic sales would do better by having either USP or FS develop the intangible property instead of developing it jointly via a CSA.

The sign of the divergence from arm’s length effect depends on whether the value of the intangible assets, net of retroactive adjustments, contributed on date zero are understated ($\lambda \leq 1$) or overstated ($\lambda \geq 1$). When $\lambda \geq 1$, the optimal way to develop the IP is to either have USP develop the IP or use a CSA. Expression (17) shows that a CSA is optimal when the marketing intangible effect is positive and exceeds the arm’s length divergence effect, which is weakly negative because $\lambda \geq 1$ and the net payment from FS to USP is positive. When $\lambda \leq 1$, the optimal way to develop the IP is to either have FS develop the IP or use a CSA. Expression (18) shows that a CSA is optimal when the marketing intangible effect is positive and is larger than the arm’s length divergence effect, which is weakly negative because $\lambda \leq 1$ and

$$\delta \mu - c\phi \pi_D < (\delta \mu - c)\phi \sigma_D < P_D + M_D.$$  

Given that the MNC wants to allocate more taxable income to FS, the ability of the MNC
to understate the value of the IP makes a sale of USP’s intangible assets to FS more attractive than a CSA; the ability of the tax authority to overstate the value via retroactive adjustments makes development by USP more attractive than a CSA.

IV. EXAMPLES AND SUMMARY OF RESULTS

Divergence from arm’s length effect

We illustrate the divergence from the arm’s length standard effect with the following example. Suppose that the value of domestic intellectual property $P_D = $250 million, foreign intellectual property $P_F = $50 million, domestic marketing intangible $M_D = $100 million, and foreign marketing intangible $M_F = 0$. We let the discount factor $\delta = 80\%$, the expected date $T$ realized value of the IP $\mu = $600 million, and development costs on date zero $c = $80 million. As required, $\delta \mu - c = P_D + P_F + M_D + M_F = $400 million. We assume that the portion of the value created by FS’s platform contributions realized by FS $\beta = 0.8$, the portion of the value created by USP’s platform contributions realized by FS $\alpha = 0.64$, and the portion of the value created by USP’s marketing intangible realized by FS $\gamma = 0.4$. These assumptions jointly imply that the fraction of USP’s residual profit that is attributable to FS’s platform contributions $\pi_F = 0.05$ and the fraction of FS’s residual profit that is attributable to USP’s platform contributions $\pi_D = 0.8$ per equations (9) and (12). Equation (8) implies that FS’s RAB share $\phi = 60\%$.

We let the factor by which the sales price deviates from the arm’s length standard $\lambda = 0.75$. The tax authority knows that $P_F$ represents 12.5\% of the date zero value of the project, respectively, but $\lambda = 0.75$ implies that the taxpayer is able to understate the true values of $P_F$ and $P_D$ by 25\% when determining platform contribution
payments in a CSA or the sales price of $P_D$ when the FS develops the intellectual property.

If USP undertakes all of the development, it pays the entire $80 million development cost $c$ on date zero. The developed property generates an expected payoff of $600 million as of date $T$. Of this amount, $100 million is paid to USP to compensate it for the development cost, because $100 \text{ million} \times \delta = 80 \text{ million}$. The remaining date $T$ expected payoff of $500$ million is divided in accordance with the relative values of $P_F$, $P_D$, and $M_D$. Thus, the date zero payoff of $400 \text{ million} (= 500 \text{ million} \times \delta)$ is divided $12.5\%-87.5\%$ between FS and USP, or $50 \text{ million}$ to FS and $350 \text{ million}$ to USP.

Next, we consider the expected payoff from a CSA. First, FS and USP divide the development cost in accordance with their RAB shares $\phi$ and $(1-\phi)$, so FS pays $48 \text{ million}$ ($80 \text{ million} \times \phi$) and USP pays $32 \text{ million}$. Using equations (10) and (11), the net platform contribution payment from FS to USP is $138 \text{ million}$. Finally, the expected $600 \text{ million}$ date $T$ payoff is divided in accordance with the RAB shares. Therefore, the total expected date zero payoff for FS is $-48 \text{ million} - 138 \text{ million} + (600 \text{ million} \times 80\% \times 60\%) = 102 \text{ million}$; the expected date zero payoff for USP is $-32 \text{ million} + 138 \text{ million} + (600 \text{ million} \times 80\% \times 40\%) = 298 \text{ million}$. Relative to the USP licensing IP to FS, the CSA results in the shifting of $52 \text{ million}$ of taxable income from USP to FS. This occurs both because the taxpayer is able to understate the date zero value of the project from $400 \text{ million}$ to $300 \text{ million}$ and because FS does not have to compensate USP for the value of its marketing intangibles in a CSA.

Finally, we consider a sale of USP’s assets to FS on date zero, after which FS develops the intellectual property. The ability to understate the value of $P_F$ and $P_D$ by
25% means that the date zero payoff to USP is $262.5 million, with FS receiving an expected date zero payoff of $262.5 million + ($600 million x 80%) = $137.5 million. Relative to the USP licensing the IP to FS, the sale of USP’s IP to FS results in the shifting of $87.5 million of taxable income from USP to FS; relative to a CSA, the sale of USP’s IP to FS results in the shifting of $35.5 million of taxable income from USP to FS.

This outcome depends on the parameter $\lambda$. Using equation (18), the sale of USP’s assets to FS is optimal in this example if the taxpayer is able to understate the date zero value of the project by a sufficiently large amount, i.e. if $\lambda < \frac{80}{83}$. Using equation (17), having USP develop the intellectual property itself is optimal if the tax authority is able to overstate the date zero value of the project, i.e. if $\lambda > \frac{95}{92}$. For values of $\lambda$ between these two bounds, the marketing intangible effect becomes the most important, making a CSA optimal.

**Marketing intangible effect**

Our second example illustrates the marketing intangible effect. We consider IP with a date zero value of $750, where $P_D = 450$, $P_F = 150$, $M_D = 150$, and $M_F = 0$. We assume that $\phi = 44\%$. We let $\alpha = 40\%$, $\beta = 80\%$, and $\gamma = 20\%$; these assumptions are consistent with equation (8). They also imply that the fraction of USP’s residual profit that is attributable to $P_F$ is

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7 Consistent with equation (3), our model assumes that FS purchases both USP’s intellectual property and marketing intangibles. In practice, and more consistent with a CSA, FS may only purchase the product-related intellectual property, which would make the sale of USP’s IP to FS even more attractive in this example.
\[ \pi_F = \frac{(1-80\%) \cdot 150}{(1-40\%) \cdot 450 + (1-80\%) \cdot 150 + 150} = \frac{$30}{270 + $30 + $150} = \frac{1}{15} \]

and the fraction of FS’s residual profits that is attributable to \( P_D \) is

\[ \pi_D = \frac{40\% \cdot 450}{40\% \cdot 450 + 80\% \cdot 150 + 0} = \frac{$180}{180 + $120} = \frac{3}{5} \]

We let \( \lambda = 1 \), so all payments are consistent with the arm’s length standard.

Using (10), USP makes a payment to FS of

\[ (1 - \phi)(\delta \mu - c)\pi_F = 56\% \times $750 \times \frac{1}{15} = $28 \]

and using (11), FS makes a payment to USP of

\[ \phi(\delta \mu - c)\pi_D = 44\% \times $750 \times \frac{3}{5} = $198, \]

for a net payment from FS to USP of $170. As a result, the date zero expected payoff to USP is (56\% \times $750) + $170 = $590, even though the value contributed by USP on date zero is \( P_D + M_D = $600 \). Had the payments been calculated based on the fractions used in the residual profit-split method, \( \sigma_F = \frac{1}{15} \) from (14) and \( \sigma_D = \frac{7}{11} \) from (15), FS would have made a net payment of $750 \times (44\% \times \frac{7}{11} - 56\% \times \frac{1}{15}) = $180 out of its RAB share of residual profits and the date zero payoff to both USP and FS would equal the value of the assets they bring to the cost sharing arrangement. The fact that the platform contribution payments do not reflect the value of USP’s marketing intangible, some of which generates foreign income, allows the firm to shift $10 of value from the US to a low-tax foreign country.

**Summary of Results**

We summarize our results in Table 1. In the table, USP indicates that the MNC prefers to have USP retain ownership and development of the IP, FS indicates that the
MNC prefers to sell the IP to FS and have FS develop the IP, and CSA indicates that the MNC prefers to enter into a CSA.

### TABLE 1: Summary of MNC Development Preferences

<table>
<thead>
<tr>
<th>Divergence from Arm’s Length Effect</th>
<th>Marketing Intangible Effect</th>
<th>Firm understates value $\lambda &lt; 1$</th>
<th>Arm’s length value $\lambda = 1$</th>
<th>Tax authority overstates value $\lambda &gt; 1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valuable domestic brand $\gamma M_D &gt; (1 - \varepsilon)M_F$</td>
<td>CSA or FS</td>
<td>CSA</td>
<td>CSA or USP</td>
<td></td>
</tr>
<tr>
<td>No net marketing intangible $\gamma M_D = (1 - \varepsilon)M_F$</td>
<td>FS</td>
<td>Indifferent</td>
<td>USP</td>
<td></td>
</tr>
<tr>
<td>Valuable foreign brand $\gamma M_D &lt; (1 - \varepsilon)M_F$</td>
<td>FS</td>
<td>FS or USP</td>
<td>USP</td>
<td></td>
</tr>
</tbody>
</table>

The MNC benefits from entering into a CSA if the effect of the USP’s marketing intangibles on foreign income exceeds the effect of the FS’s marketing intangibles on domestic income. The MNC strictly prefers a CSA if the value of the IP is not under- or overstated (net of tax authority actions). The MNC prefers to have the FS purchase and develop the IP if on average the MNC can understate the value of the IP, and prefers to have USP develop the IP if on average the value is overstated. If the effect of the USP’s marketing intangibles on foreign income is less than or equal to the effect of the FS’s marketing intangibles on domestic income, the MNC generally does not prefer a CSA.
If the MNC can understate the date zero value of the IP, net of any retroactive adjustments, it prefers to sell the intangible assets of USP to FS and have FS develop the IP to a cost sharing arrangement, and prefers a cost sharing arrangement to having USP develop the IP. If the tax authority can overstate the date zero value of the IP using retroactive adjustments, the MNC prefers to have USP develop the IP to a cost sharing arrangement, and prefers a cost sharing arrangement to having FS buy USP’s intangible property and develop the IP.

**IV. CONCLUSIONS**

This study investigates cost sharing arrangements as a mechanism through which U.S. MNCs shift valuable intellectual property offshore to reduce their global tax burdens. We develop a model to explore the payoffs to CSAs as compared to two alternatives commonly employed by MNCs: retaining IP development in the U.S. and licensing the IP to foreign subsidiaries, and selling U.S. IP to a foreign subsidiary that then carries out further development.

We find that a CSA enables the MNC to shift income to low-tax foreign jurisdictions when the effect of domestic marketing intangibles on foreign income exceeds the effect of foreign marketing intangibles on domestic income. We also find that when the ability of the MNC to understate the value of CSA intangible property is greater than the ability of the tax authority to impose retroactive revaluations of the value of intangible assets, there is a tax advantage to having a subsidiary in a low-tax rate jurisdiction buy the domestic parent’s intangible property and pay the cost of development over entering a CSA, and a tax advantage to a CSA over having the domestic parent pay the cost of development. These advantages reverse if the ability of
the tax authority to impose retroactive revaluations is greater than the MNC’s ability to understate the value.

We contribute to the literature by providing a deeper understanding of CSAs, including the institutional features that give rise to circumstances under which CSAs can be used by U.S. MNCs to shift income. Although many studies consider the possibility that a firm can deviate from the arm’s length standard to some degree (e.g., Horst 1971; Samuelson 1982; Smith 2002; De Waegenaere, Sansing and Wielhouwer 2012), we extend this approach by also considering the possibility that the tax authority can deviate from the arm’s length standard by making retroactive changes to platform contribution payments. Future empirical work could test our findings using empirical proxies for foreign versus domestic marketing intangibles and differences in tax enforcement across jurisdictions and over time.
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