INCONSISTENT TRANSFER PRICES AND THE LOCATION OF MOBILE CAPITAL

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We investigate the effects of inconsistent transfer prices on the location and efficiency of capital investments made by multinational firms in a competitive equilibrium. Inconsistent transfer prices create the potential for double taxation. We examine the effects of inconsistent transfer prices on production decisions, production efficiency, and repatriation behavior. We also show how transfer price inconsistency affects the consequences of U.S. tax policy choices relating to the corporate income tax rate, deferral of U.S. taxation of active foreign source income, and the taxation of foreign income on a territorial basis instead of a worldwide basis.

Keywords: inconsistent transfer prices, double taxation, production location, repatriation behavior

JEL Codes: G11, H21

I. INTRODUCTION

The allocation of income between a parent corporation and its subsidiary depends on the price at which goods and services are transferred between the two entities. When the entities operate in different countries, the transfer price determines how much of the income earned by the joint efforts of the two entities is taxed in each country. The determination of the transfer price used for tax purposes is difficult in principle and contentious in practice. Pretax income earned by a multinational enterprise differs from worldwide taxable income to the extent that governments use inconsistent transfer prices to allocate income between countries, which can result in double taxation.1

1 Inconsistent transfer prices may also lead to undertaxation. In this paper, we focus on the more interesting case in which it leads to double taxation. All our results, however, can easily be extended to include the case of undertaxation.

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Using a model of competitive equilibrium in which all after-tax economic profits are driven to zero, we investigate how taxes affect the location and efficiency of capital investments in the presence of transfer price inconsistency. First, we characterize a firm’s investment and repatriation decisions when it is subject to a tax system that features worldwide taxation, deferral of domestic taxation of foreign source income until repatriation, and the possibility of double taxation due to inconsistent transfer prices. These features correspond to how the United States currently taxes international income. Second, we show that inconsistent transfer prices can arise when each country tries to maximize its own welfare, even when this causes overall social welfare to decrease. Third, we investigate the effects of harmonizing transfer prices on investment location and efficiency. Fourth, we explore how transfer price inconsistency changes the effects of U.S. corporate income tax policies such as the level of tax rates, the elimination of deferral of foreign source income, and the taxation of U.S. multinationals using territorial taxation instead of worldwide taxation.

In our model, both countries adhere to the arm’s-length standard when determining transfer prices used by related parties. Under the arm’s-length standard, the transfer price should be the price at which two unrelated parties engaging in a comparable transaction under comparable circumstances would trade. There are various methods that can be used when applying this principle in practice, including the comparable uncontrolled transaction method, the resale price method, the cost-plus method, the comparable profit method, and the profit-split method. Furthermore, how these methods are applied in practice depends both on which transactions between unrelated parties are considered to be most comparable to the related party transaction, and the reliability of the data. If when faced with these various methods the two countries would derive the same transfer price, we consider the transfer price rules to be consistent. If the two countries would derive different prices, we consider the transfer price rules to be inconsistent.

Transfer pricing is the top international tax issue to multinationals according to the most recent Ernst & Young survey, conducted in 2007 (Ernst & Young, 2008, p. 846), which stresses that

"Inconsistencies in the interpretation and application of information, as well as the underlying transfer pricing rules themselves, continue to cause incompatible compliance burdens and risk of double taxation. US taxpayers, for example, are required to include stock-based compensation in the cost base when applying cost- or profit-based methods, but many other countries do not accept this treatment of stock-based compensation as being consistent with the arm’s-length standard."

Mechanisms such as mutual agreement procedures (MAPs) exist to make it possible for a taxpayer to get relief from double taxation. However, in practice the MAP system often fails to provide such relief because governments are not required to resolve the conflict in a manner that eliminates double taxation (Mortier, 2002). Therefore, we focus

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2 See Treasury Regulation §1.482-1(c)(2).
on the case in which transfer price inconsistency results in double taxation, although
the model can be easily extended to include the case of undertaxation.

In this paper, we investigate the effect of double taxation due to transfer price inco-
sistency on production location, repatriation behavior, and social welfare. Maximizing
production efficiency and maximizing aggregate social welfare are equivalent in our
model. Production efficiency is achieved if domestic and foreign investment face
the same tax rate, i.e., if capital export neutrality holds. Although efficiency and capital
export neutrality are not equivalent in general (Horst, 1980; Desai and Hines, 2004),
our focus is not on capital export neutrality per se but rather on how transfer price
inconsistency and repatriation taxes affect the location and efficiency of production.

We first derive a firm’s production and repatriation decisions in a setting that cor-
responds to the way that the U.S. taxes foreign income. We find that the current tax
system can induce the efficient level of investment, excessive domestic investment,
or excessive foreign investment, depending on the tax rates and the extent of transfer
price inconsistency. We find that double taxation can arise if each country chooses its
transfer price in an effort to maximize its own welfare, even when this decreases aggre-
gate social welfare. However, we also find that countries may choose the same transfer
price even though each country is striving to maximize its own welfare. Eliminating
double taxation by harmonizing transfer prices either has no effect on investment or
increases foreign investment; in the latter case, the shift towards foreign investment
could either increase or decrease efficiency. Finally, we find that the effects of changes
in U.S. corporate income tax policies, such as eliminating deferral of taxation of foreign
source income or moving to territorial taxation of foreign source income, depend on
the extent of transfer price inconsistency.

In the next section, we review the relevant theoretical and empirical literature. We
present our model and derive the equilibrium production and repatriation decisions under
current U.S. tax law in the third section. In the fourth section, we examine the effects
of transfer price inconsistency on social welfare. We also illustrate how inconsistent
transfer prices can arise when each country tries to maximize its own welfare. In the fifth
section, we investigate the effects of harmonizing transfer pricing rules on investment
location, production efficiency, and repatriation decisions. We also show conditions
under which countries have conflicting interests regarding the choice of a harmonized
transfer price, as well as conditions under which their interests are aligned. In the sixth
section, we investigate how transfer price inconsistency affects the consequences of
other U.S. corporate tax policies. The seventh section concludes.

II. PRIOR LITERATURE

The model we use to investigate the effects of inconsistent transfer pricing rules was
developed by Anand and Sansing (2000) in their study of formulary apportionment,
the system used by U.S. states and Canadian provinces to allocate taxable income
among political jurisdictions. De Waegenaere and Sansing (2009) also use this model
to compare separate accounting to formulary apportionment.
Most papers that examine tax transfer pricing rules assume that all political jurisdictions use the same transfer price; however, there are several exceptions. Elitzur and Mintz (1996) study tax competition and tax harmonization in the presence of inconsistent transfer prices. De Waegenaere, Sansing, and Wielhouwer (2006, 2007) examine inconsistent transfer pricing rules in the context of strategic tax compliance models in which the production decisions preceding the tax compliance decision are taken as fixed. Unlike these papers, our paper focuses on how inconsistent transfer prices affect production decisions. Halperin and Srinidhi (1987) and De Waegenaere and Sansing (2009) also focus on the production decisions that inconsistent transfer pricing rules induce. Halperin and Srinidhi (1987) examine the effects of transfer price inconsistency on production efficiency when a firm sells to both related and unrelated parties under imperfect competition. They find that inconsistent transfer pricing rules induce production distortions in both markets when the transactions between the unrelated parties affect the transfer price used in the related party transaction. De Waegenaere and Sansing (2008b) focus on the effects of changing from a system of separate accounting with inconsistent transfer prices to formulary apportionment. In contrast to those papers, this paper investigates the effects of transfer price inconsistency as well as transfer price harmonization on the location and efficiency of production, on repatriation decisions, and on country welfare. It also studies how the effects of other U.S. corporate tax policies depend on the degree of transfer price inconsistency. It does so in a competitive equilibrium without non-tax frictions.

Our paper also relates to the literature on the effect of taxes on repatriation decisions. Hartman (1985) was the first to examine the effect of the U.S. tax system on foreign investment and repatriation decisions. He showed that the U.S. repatriation tax does not distort the decision whether to reinvest foreign earnings in a new foreign project or pay a dividend, because all earnings are reduced by the same repatriation tax rate sooner or later. Hines and Rice (1994), Weichenrieder (1996), and Altshuler and Grubert (2002) extend Hartman’s model to consider the role of investment in financial assets by a foreign subsidiary. These papers show that investing in risk-free financial assets costlessly defers the repatriation tax when the parent corporation discounts riskless after-tax cash flows using the after-domestic corporate tax risk-free rate. Therefore, in these models, the subsidiary should reinvest earnings on operating assets in the risk-free asset instead of repatriating them to the parent as a dividend. Using Brennan’s (1970) after-tax capital asset pricing model, De Waegenaere and Sansing (2008a) argue that the appropriate discount rate should reflect the average shareholder tax rate and not the domestic corporate tax rate. In their model, investing in the risk-free asset to avoid the repatriation tax involves an opportunity cost to the extent the after-domestic corporate tax interest rate is less than the after-tax discount rate. We use the same approach in this paper; however, we also allow the shareholder tax parameter to equal the corporate tax rate, so the possibility of costless deferral arises in our model as a special case.

In addition to investing in financial assets, there may be other methods to reduce the burden of the repatriation tax. Altshuler and Grubert (2002), for example, consider the possibility of using riskless after-tax cash flows to support additional debt financing
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by the domestic parent corporation. If a dollar of financial assets held by the foreign subsidiary were to allow the domestic parent to increase the riskless debt in its capital structure by a dollar, the parent would in effect get the use of that dollar without ever paying the repatriation tax. However, Clemons and Kinney (2008) document a substantial response by U.S. multinationals to the temporary 85% reduction in the tax on repatriated foreign earnings enacted as part of The American Jobs Creation Act of 2004. The willingness of multinationals to pay up to a 5.25 percent tax on repatriated foreign earnings suggests rather strongly that techniques for deferring the repatriation tax, such as those described in Altshuler and Grubert, do not fully eliminate the burden of the repatriation tax. Therefore, even though costless deferral of the repatriation tax is a special case of our model, we explicitly take into account the possibility that deferral is costly.

III. THE MODEL

We study an economy with one good and two countries. Demand for this good is perfectly inelastic. Domestic demand for the good is $\delta$; foreign demand for the good is zero. Because the focus of our study is on how inconsistent transfer prices and tax rates affect the location of production, it is convenient to assume that total demand for (and thus the aggregate equilibrium supply of) the good is fixed, and focus on where production takes place.

Production can occur in either country, employing a constant returns to scale production technology with a single non-depreciable input that we call capital. One unit of physical capital is needed to produce one unit of output. We assume that some inputs are immobile (it may be useful to think of land or natural resources as being an important component of capital), which implies that each country has its own supply curve. The price per unit of physical capital associated with production in each country is determined by aggregate production in that country (denoted $q_i$), according to

$$C_i(q_i) = \alpha q_i.$$

The supply curve in each country is upward-sloping, and $C_i(0) = 0$. The upward-sloping supply curves imply that the competing use for physical capital varies within each country; the assumption that $C_i(0) = 0$ ensures that some production occurs in each country.

All sales occur in the domestic country. One unit of non-depreciable physical capital is needed to sell one unit of output. The price per unit of capital associated with sales is $K$. A firm that produces domestically and sells one unit incurs a cost of capital of $r[C_D(q_D) + K]$, where $r$ denotes the cost of equity capital invested in physical assets. A foreign subsidiary that produces one unit incurs a cost of capital of $rC_F(q_F)$, whereas its domestic parent incurs a cost of capital of $rK$.

Firms engage in production under conditions of perfect competition, in the sense that each firm takes input costs and output prices as given. Each firm can produce domestically or in the foreign country. We let $p$ denote the equilibrium price of the good.
A. Taxes

Domestic production is taxed by the domestic government at a rate of $\tau_D < 50\%$ on the domestic pretax accounting income each period, i.e., exclusive of its cost of capital. Therefore, a firm that produces domestically and sells one unit has after-tax accounting income of $p(1 - \tau_D)$. The income of $p$ from foreign production is subject to tax by both the foreign and domestic governments. The allocation of income for tax purposes between the two countries depends on the transfer price. We let $\lambda_F (\lambda_D)$ denote the fraction of income associated with foreign production that according to the transfer price used for tax purposes by the foreign government (domestic government) should be taxed by the foreign government, where

\begin{equation}
0 \leq \lambda_D \leq \lambda_F \leq 1.
\end{equation}

The upper and lower bounds ensure that taxable income in each country is weakly positive. Thus, if a transaction generates one dollar of income, the income taxed by the foreign country is $\lambda_F$, the income taxed by the domestic country is $1 - \lambda_D$, and aggregate taxable income is $\lambda_F + 1 - \lambda_D$. We let $I = \lambda_F / \lambda_D \geq 1$ represent the degree of transfer price inconsistency between the two countries. When $I = 1$, the transfer prices are consistent; double taxation does not occur because the taxable income in the foreign country is equal to the tax deduction permitted by the domestic government. When $I > 1$, the taxable income in the foreign country exceeds the tax deduction allowed in the domestic country, causing more than 100 percent of the income from the transaction to be taxed.\(^3\)

We let $\tau_F$ denote the foreign country’s corporate income tax rate, and assume that $\tau_F < 50\%$. Producing one unit in the foreign country generates after-tax domestic accounting income of $p(1 - \tau_D)(1 - \lambda_D)$, and after-foreign tax foreign earnings and profits of $p(\lambda_F - \tau_F \lambda_F)$.\(^4\) The domestic government uses a worldwide tax system, under which all income is subject to tax by the domestic government. However, the domestic tax on foreign source earnings is deferred if the foreign subsidiary retains the earnings instead of repatriating them to the domestic parent as a dividend. In addition, the domestic government allows a credit for foreign taxes, that cannot exceed the domestic tax on foreign source income. We emphasize that the foreign tax, $\tau_F \lambda_F p$, depends on the transfer price used by the foreign government; the foreign source income for domestic tax purposes, $p \lambda_D$, depends on the transfer price used by the domestic government.

Three cases are possible. In the first and second cases, $I \tau_F < \tau_D$, and the foreign tax is lower than the domestic tax on foreign source income ($\tau_F \lambda_F < \tau_D \lambda_D$), so that the repatriation of after-foreign tax earnings would trigger a repatriation tax of $p(\tau_D \lambda_D - \tau_F \lambda_F)$.

\(^3\) Our model can be easily extended to consider the case $I < 1$, although this requires the governments to allow the taxpayer to use one transfer price when calculating the foreign subsidiary’s revenue and a higher price when calculating the domestic parent’s expenses.

\(^4\) We assume that the economic transfer from the parent to the subsidiary is equal to $p \lambda_D$. This assumption, however, is without loss of generality. Transferring a greater amount is treated for domestic tax purposes as a transfer of $p \lambda_D$ plus a capital contribution, which is dominated by transferring $p \lambda_D$ because there is no advantage to making an additional capital contribution in our model. Transferring a lower amount is treated for domestic tax purposes as a transfer of $p \lambda_D$ followed by a repatriation of $p \lambda_D$ less the amount transferred.
The repatriation tax transforms the after-foreign tax earnings of \( p(\lambda_D - \tau_F \lambda_P) \) into an after-repatriation tax amount of \( p\lambda_P(1 - \tau_D) \). If the foreign subsidiary repatriates its after-foreign tax earnings, the firm’s after-tax income equals

\[
(3) \quad p(1 - \tau_D).
\]

However, the foreign subsidiary can instead invest the after-foreign tax earnings \( p(\lambda_D - \tau_F \lambda_P) \) in bonds that earn the risk-free rate of \( R \), thereby indefinitely deferring the repatriation tax.\(^5\) The interest is taxed at the domestic rate \( \tau_D \), of which \( \tau_F \) is collected by the foreign government and \( \tau_D - \tau_F \) is collected by the domestic government. Because the interest income is taxed immediately under Subpart F, there is no reason to defer repatriation. De Waegenaere and Sansing (2008a) show that Brennan’s (1970) after-tax return on the bond is weakly lower than the foreign subsidiary invest its after-foreign tax earnings in financial assets otherwise. The intuition is as follows. When after-foreign tax earnings are invested in financial assets, the present value to the domestic parent of these earnings is \( (\lambda_D - \tau_F \lambda_P)R(1 - \tau_F)/[R(1 - \tau_S)] \), and the present value of the future after-tax cash flows associated with current sale of one unit equals

\[
(4) \quad \mu \left[ (1 - \lambda_D)(1 - \tau_D) + \frac{(\lambda_D - \tau_F \lambda_P)(1 - \tau_D)}{1 - \tau_S} \right] = \mu \left[ 1 - \tau_D + \frac{(\tau_S \lambda_D - \tau_F \lambda_P)(1 - \tau_D)}{1 - \tau_S} \right].
\]

Comparing the after-tax payoffs to the domestic parent from (3) and (4) shows that the foreign subsidiary will immediately repatriate earnings if \( \tau_F \lambda_P \geq \tau_D \lambda_P \), i.e., \( \tau_D \geq \tau_S \), a domestic tax is due upon repatriation. The repatriation tax can be avoided by having the foreign subsidiary invest its after-foreign tax earnings in financial assets. However, there is an opportunity cost associated with investing in financial assets, because \( \tau_S \leq \tau_D \), which implies that the after-domestic corporate tax return on the bond is weakly lower than the after-tax discount rate for riskless cash flows. As long as \( \tau_F \lambda_P \leq \tau_S \lambda_P \), the benefit of avoiding the repatriation tax exceeds the opportunity cost of investing in financial assets.

In the third case, \( I \tau_D \geq \tau_F \), so no repatriation tax is due because the foreign tax exceeds the domestic tax on foreign source income \( (\tau_F \lambda_P \geq \tau_D \lambda_P) \). There is no reason to defer repatriation because \( \tau_S \leq \tau_D \). Therefore, the after-tax accounting profit from producing one unit in the foreign country is given by

\[
(5) \quad \mu(1 - \tau_D)(1 - \lambda_D) + \mu[\lambda_D - \tau_F \lambda_P] - \mu[1 - \tau_D(1 - \lambda_D) - \tau_F \lambda_P].
\]

\(^5\) The subsidiary could also invest part of the after-foreign tax earnings in bonds, and immediately repatriate the remainder. However, it can easily be verified that this is dominated by either repatriating all the after-foreign tax earnings or none of the after-foreign tax earnings.
The above analysis shows that, in each case, the after-tax profit from foreign production is of the form $p(1 - T)$, where $T$ reflects the combined effect of foreign and domestic taxes imposed on income generated by foreign production, plus the opportunity cost associated with investment in financial assets. The following proposition summarizes the effect of the tax system, tax rates, and transfer prices on the combined tax rate $T$ imposed on foreign production.

**Proposition 1**

(a) If $I\tau_F > \tau_D$, all after-foreign tax earnings are repatriated as earned, there is no repatriation tax, so $T = \tau_D + \lambda_F(\tau_F - \tau_D)$.

(b) if $\tau_S \leq I\tau_F \leq \tau_D$, all after-foreign tax earnings are repatriated as earned, the repatriation tax causes all income to be taxed at the domestic country’s tax rate, so $T = \tau_D$.

(c) if $I\tau_F < \tau_S$, then the repatriation tax is avoided via investment in financial assets, so

$$T = \tau_D - \frac{(\tau_S - \lambda_D)\tau_F}{1 - \tau_F} < \tau_D.$$

Three effects determine $T$: the relation between the corporate tax rates $\tau_D$ and $\tau_F$, the relation between the foreign tax rate $\tau_F$ and the shareholder tax parameter $\tau_S$, and the degree of transfer price inconsistency, $I$. First, suppose there is no transfer price inconsistency, i.e., $\lambda_F = \lambda_D$ and so $I = 1$. If $\tau_F > \tau_D$ because the foreign tax on foreign income exceeds the domestic tax on foreign income; repatriation occurs tax-free in this case. Now consider the case in which a repatriation tax is due upon repatriation because $\tau_F < \tau_D$. If $\tau_F < \tau_S$, then $T = \tau_D$ because then the cost of avoiding the repatriation tax is too high, and so all income is repatriated. Note that when a repatriation tax is due upon repatriation, the condition that determines whether income is repatriated or invested in foreign assets depends on $\tau_F$ and $\tau_S$ and does not involve $\tau_D$. This occurs because repatriating one dollar of after-foreign tax earnings yields an after-repatriation tax cash flow of $(1 - \tau_D)/(1 - \tau_F)$, whereas reinvesting that same dollar in financial assets and repatriating the interest yields an after-repatriation tax perpetual cash flow of $R(1 - \tau_D)$ dollars that has a present value of $(1 - \tau_D)/(1 - \tau_S)$ dollars.

To illustrate the effect of transfer price inconsistency on the tax rate imposed on foreign production, consider the case in which $T = \tau_D$ and transfer prices are consistent, i.e., $\tau_S < \tau_F < \tau_D$. Then, transfer price inconsistency can imply that $T$ is greater than, equal to, or less than $\tau_D$. Specifically, $T > \tau_D$ if transfer price inconsistency is sufficiently high ($I > \tau_D/\tau_F$), $T < \tau_D$ if transfer price inconsistency is sufficiently low ($I < \tau_S/\tau_F$), and $T = \tau_D$ if $\tau_S/\tau_F \leq I \leq \tau_D/\tau_F$. 


Finally, we consider the special case in which $\tau_s = \tau_D$, which implies that the repatriation tax can be costlessly avoided. Parts (a) and (c) of Proposition 1 characterize all of the possible outcomes except in the knife-edge case for which $I \tau_F = \tau_D$. If $I \tau_F > \tau_D$, then Proposition 1(a) applies. Foreign taxes paid on foreign earnings exceed the U.S. tax on foreign earnings, so repatriation occurs tax-free. If $I \tau_F < \tau_D$, then Proposition 1(c) applies. Because $\tau_s = \tau_D$, the corporation earns the same after-tax rate of interest as do the shareholders, $R(1 - \tau_D)$, and thus there is no opportunity cost associated with retaining after-foreign tax earnings in the subsidiary. In that case, $T = \tau_D + \lambda_F \tau_F - \lambda_D \tau_D < \tau_D$.

B. Equilibrium

We define a competitive equilibrium to be an output price $p$ and aggregate output quantities $q_D$ and $q_F$ at which both domestic and foreign production earns zero after-tax economic profits. For domestic production, this requires

\[ p(1 - \tau_D) = rC_D(q_D) = r(\alpha_D q_D + K). \]  

(6)

The equilibrium condition for foreign production is given by

\[ p(1 - T) = rC_F(q_F) = r(\alpha_F q_F + K), \]  

(7)

where the combined tax rate imposed on foreign production, $T$, depends on the subsidiary’s repatriation tax and repatriation strategy, as given in Proposition 1. In addition, total output must equal demand, so

\[ q_D + q_F = \delta. \]  

(8)

The equilibrium price and quantities follow from solving the set of (6)–(8). The equilibrium price is given by

\[ p = \frac{r \left[ \delta \alpha_D \alpha_F + K (\alpha_D + \alpha_F) \right]}{\alpha_D (1 - T) + \alpha_F (1 - \tau_D)}, \]  

(9)

and the equilibrium production quantities $q_D$ and $q_F$ are given by

\[ q_D = \frac{\delta \alpha_F + K \left( 1 - \frac{1 - T}{1 - \tau_D} \right)}{\alpha_D \left( \frac{1 - T}{1 - \tau_D} \right) + \alpha_F}, \]  

\[ q_F = \frac{\delta \alpha_D + K \left( 1 - \frac{1 - \tau_D}{1 - T} \right)}{\alpha_D + \alpha_F \left( \frac{1 - \tau_D}{1 - T} \right)}. \]  

(10)
We assume that \( K \) is sufficiently small to ensure that all prices and quantities are positive. Specifically, we assume that\(^6\)

\[
K < \frac{\delta \alpha (1 - T)}{T - \tau}, \quad \text{if } T > \tau_D, \tag{11}
\]

\[
K < \frac{\delta \alpha (1 - \tau_D)}{\tau_D - T}, \quad \text{if } \tau_D > T.
\]

It follows from (10) that the effects of the tax system, tax rates, and transfer prices on equilibrium production decisions are determined by \( \Pi = (1 - T)/(1 - \tau_D) \), the ratio of the after-tax accounting profit from foreign production to the after-tax accounting profit from domestic production. The fraction of demand satisfied by domestic production is strictly decreasing in \( \Pi \).

The extent of transfer price inconsistency \( I \) affects the ratio \( \Pi \) through its effect on \( T \), as described in Proposition 1. Depending on tax rates and transfer prices, the after-tax accounting profit from foreign production can be either higher or lower than the after-tax accounting profit from domestic production. When transfer price inconsistency is high, \( I \tau_F > \tau_D \), Proposition 1(a) shows that \( T > \tau_D \), and so \( \Pi < 1 \). When transfer price inconsistency is moderate, \( \tau_s \leq I \tau_F \leq \tau_D \), Proposition 1(b) shows that \( T = \tau_D \), so that \( \Pi = 1 \). When transfer price inconsistency is low, \( I \tau_F < \tau_s \), Proposition 1(c) shows that \( T < \tau_D \), so that \( \Pi > 1 \) in this case.

IV. WELFARE ANALYSIS

In this section we analyze the effects of transfer price inconsistency on aggregate social welfare. We also examine the incentives of countries to choose inconsistent transfer prices in an attempt to maximize their own welfare.

A. Aggregate Social Welfare

Aggregate social welfare, \( W \), is composed of three elements — the surplus received by consumers, the surplus received by capital owners in the two countries, and the taxes collected by the two governments. Because both domestic and foreign corporations earn zero economic profits, neither double taxation nor transfer price harmonization affect their payoffs. Consumer surplus is \( \delta (B - p) \), the surplus received by capital owners is \( r[\alpha_F q_F^2 + \alpha_D q_D^2]/2 \), and tax collections are \( p[\tau_D q_D + T q_F] \). Aggregating the three components of social welfare yields

\( \text{Our assumptions that } \tau_F < 50\% \text{ and } \tau_D < 50\% \text{ jointly ensure that } T < 1, \text{ so that both upper bounds on } K \text{ are strictly positive.} \)
Rewriting (12) using (6), (7), and (8), yields \( W = B\delta(B - p) + r[\alpha_F q_F^2 + \alpha_D q_D^2]/2 + p[\tau_D q_D + Tq_F] \).

Because the cost of selling \( \delta \) units, \( r\delta K \), does not depend on where production occurs, maximizing social welfare is equivalent to minimizing the social cost of production. The pair \((q_D, q_F)\) that minimizes the cost of producing \( \delta \) units solves the cost minimization problem

\[
\min_{q_D, q_F} \left\{ \frac{r\alpha_D q_D^2 + r\alpha_F q_F^2}{2} \right\}, \text{ s.t. } q_D + q_F = \delta.
\]

the solution to which is

\[
q_D = \frac{\delta\alpha_F}{\alpha_D + \alpha_F}, \quad q_F = \frac{\delta\alpha_D}{\alpha_D + \alpha_F}.
\]

Comparing (10) to (14) shows that production is efficient if \( T = \tau_D \), inefficient with excess production in the domestic country if \( T > \tau_D \), and inefficient with excess production in the foreign country if \( T < \tau_D \). Therefore, our model reflects capital export neutrality in that production efficiency is achieved if and only if domestic and foreign investment face the same tax rate.

The extent of transfer price inconsistency \( I \) affects efficiency through its effect on \( T \). We summarize the effects of transfer price inconsistency on the location and efficiency of production in Proposition 2.

**Proposition 2**

(a) When transfer price inconsistency is high, \( I\tau_F > \tau_D \), production is inefficient with excessive domestic investment;

(b) when transfer price inconsistency is moderate, \( \tau_S \leq I\tau_F \leq \tau_D \), production is efficient;

(c) when transfer price inconsistency is low, \( I\tau_F < \tau_S \), production is inefficient with excessive foreign investment.

The proof is in Appendix B.

**B. Country Level Welfare**

The analysis in the preceding subsection took the transfer prices \( \lambda_F \) and \( \lambda_D \) as given. In this subsection, we examine the incentives for the governments of the two countries to choose different transfer prices, as each strives to maximize its own welfare. We consider the case in which the two countries are constrained in their choice of transfer price by the arm’s-length standard. We let \( \lambda_A \) denote the transfer price that is the midpoint of a range of transfer prices, \( [\lambda_A - \varepsilon, \lambda_A + \varepsilon] \), where \( \varepsilon \) is arbitrarily small, each of
which satisfies the arm’s-length standard. We ask which transfer price from this interval each country would choose.

We first define the welfare of each country. For purposes of expositional convenience, we consider the case \( \alpha_D = \alpha_F = \alpha \). Because all consumption takes place in country \( D \), consumer surplus \( \delta(B - p) \) is part of country \( D \)’s welfare. The surplus to capital owners in country \( i \in \{F, D\} \) is \( r\alpha q_i^2/2 \). Tax collections by the two countries depend on whether the pretax profit of foreign production is subject to repatriation tax, and, if so, whether the income is repatriated or reinvested in financial assets. We illustrate the economic forces that lead to double taxation in the case in which \( \tau_F > \tau_D \).

Then, for any given, \( \lambda_F, \lambda_D \in [\lambda_A - \varepsilon, \lambda_A + \varepsilon] \), \( \varepsilon \) arbitrarily small, \( \lambda_F \tau_F > \lambda_D \tau_D \), and it follows from Proposition 1(a) that all after-foreign tax earnings are repatriated tax-free. Therefore, the tax revenue of country \( F \) is given by \( \tau_F \lambda_F p q_F \), and the tax revenue of country \( D \) is given by \( \tau_D p[q_D + q_F (1 - \lambda_D)] \).

Adding the three components of welfare shows that the welfare of country \( F \), \( W_F \), is given by

\[
W_F = r\alpha q_F^2/2 + p\lambda_F \tau_F q_F,
\]

and the welfare of country \( D \), \( W_D \), is given by

\[
W_D = \delta(B - p) + r\alpha q_D^2/2 + p\tau_D[q_D + q_F (1 - \lambda_D)].
\]

Proposition 3 characterizes the Nash equilibrium that arises when each country non-cooperatively chooses its transfer price from the interval \([\lambda_A - \varepsilon, \lambda_A + \varepsilon]\) in an effort to maximize its own welfare.

**Proposition 3**

Country \( D \) always chooses \( \lambda_D = \lambda_A - \varepsilon \). There is a critical value \( \delta^* \) for which country \( F \) chooses \( \lambda_F = \lambda_A + \varepsilon \) if \( \delta > \delta^* \), and chooses \( \lambda_F = \lambda_A - \varepsilon \) if \( \delta < \delta^* \).

The proof is in Appendix B.

Country \( D \) always chooses the lowest transfer price. In contrast, country \( F \) chooses the lowest transfer price when \( \delta \) is sufficiently low, and the highest transfer price when \( \delta \) is sufficiently high. An increase in \( \lambda_F \) affects country \( F \)’s welfare both directly and indirectly through its effect on \( q_F \), the equilibrium amount of production located in the foreign country, and on \( p \), the equilibrium output price. Differentiating \( W_F \) with respect to \( \lambda_F \) yields:

\[
\frac{\partial W_F}{\partial \lambda_F} = \tau_F p q_F + \tau_F \lambda_F q_F \frac{\partial p}{\partial \lambda_F} + r\alpha q_F \frac{\partial q_F}{\partial \lambda_F} + \tau_F p \lambda_F \frac{\partial q_F}{\partial \lambda_F}.
\]

\( \lambda \) We focus on this case to illustrate that the efforts by the countries to maximize their own welfare can lead to an outcome in which aggregate social welfare is minimized.
The first term reflects the direct effect of an increase in $\lambda_F$ on country $F$’s tax revenues, taking investment decisions and the equilibrium output price $p$ as fixed. The second term reflects the indirect effect on tax revenues through the effect of $\lambda_F$ on $p$. It is positive because an increase in $\lambda_F$ increases the equilibrium output price $p$ (i.e., $\partial p/\partial \lambda_F > 0$). The third and fourth terms reflect the indirect effect on producer surplus and tax revenues, respectively, through the effect of $\lambda_F$ on the production quantity $q_F$. These two effects are negative because an increase in $\lambda_F$ decreases $q_F$ (i.e., $\partial q_F/\partial \lambda_F < 0$). We consider how the aggregate of these four effects depends on $\delta$, the demand for the output. When $\delta$ is close to its lower bound of $K(T - \tau_D)/(\alpha(1 - T))$, then $q_F$ is close to zero and the first three terms are also close to zero. In that case, the dominant effect of an increase in $\lambda_F$ on country $F$’s welfare is the reduction in $F$’s tax revenues due to a decrease in $q_F$. A higher demand for output induces both a higher equilibrium price and a higher production quantity (i.e., $\partial p/\partial \delta > 0$, $\partial q_F/\partial \delta > 0$). Moreover, an increase in $\lambda_F$ affects the equilibrium price and the production quantity more strongly when aggregate demand is higher, (i.e., $\partial^2 p/\partial \lambda_F \partial \delta > 0$, and $\partial^2 q_F/\partial \lambda_F \partial \delta < 0$). Therefore, the first two effects become more positive and the last two effects become more negative as $\delta$ increases. However, the net effect is positive; when $\delta$ becomes sufficiently large, an increase in $\lambda_F$ increases country $F$’s welfare.

Therefore, when $\delta < \delta^*$, both $D$ and $F$ choose the lowest transfer price within a small interval of arm’s-length prices. When $\delta > \delta^*$, then within the interval of arm’s-length prices, country $F$ would choose the highest price. In combination with country $D$’s incentive to choose the lowest price, double taxation arises in this setting. We emphasize that in this case, the equilibrium choices of the two governments minimize aggregate social welfare. This occurs because the equilibrium transfer prices maximize the difference between the tax rate $\tau_D$ imposed on domestic production and the tax rate $T$ imposed on foreign production.

V. HARMONIZING TRANSFER PRICES

In this section, we investigate the effects of harmonizing transfer pricing rules on production decisions, production efficiency, and repatriation behavior. We consider a setting in which transfer price inconsistency is eliminated. Specifically, both countries agree that the fraction of foreign income allocated to the foreign country is given by $\lambda_H \leq \lambda_D \leq \lambda_F$.

We use Proposition 1 to determine the combined tax rate imposed on foreign production in case of consistent and in case of inconsistent transfer prices, respectively, and then compare (10) to (14) in both cases to investigate the effect of harmonizing transfer prices on production location, production efficiency, and repatriation decisions. Finally, we examine each country’s preferences regarding which single harmonized transfer price should be used.

A. Effects of Harmonization on Firm Decisions and Social Welfare

It follows from Proposition 1 that with harmonized transfer prices (i.e., $I = 1$), the combined tax rate imposed on foreign production depends on the tax rates, $\tau_D$, $\tau_D$, and $\tau_F$. 

The first term reflects the direct effect of an increase in $\lambda_F$ on country $F$’s tax revenues, taking investment decisions and the equilibrium output price $p$ as fixed. The second term reflects the indirect effect on tax revenues through the effect of $\lambda_F$ on $p$. It is positive because an increase in $\lambda_F$ increases the equilibrium output price $p$ (i.e., $\partial p/\partial \lambda_F > 0$). The third and fourth terms reflect the indirect effect on producer surplus and tax revenues, respectively, through the effect of $\lambda_F$ on the production quantity $q_F$. These two effects are negative because an increase in $\lambda_F$ decreases $q_F$ (i.e., $\partial q_F/\partial \lambda_F < 0$). We consider how the aggregate of these four effects depends on $\delta$, the demand for the output. When $\delta$ is close to its lower bound of $K(T - \tau_D)/(\alpha(1 - T))$, then $q_F$ is close to zero and the first three terms are also close to zero. In that case, the dominant effect of an increase in $\lambda_F$ on country $F$’s welfare is the reduction in $F$’s tax revenues due to a decrease in $q_F$. A higher demand for output induces both a higher equilibrium price and a higher production quantity (i.e., $\partial p/\partial \delta > 0$, $\partial q_F/\partial \delta > 0$). Moreover, an increase in $\lambda_F$ affects the equilibrium price and the production quantity more strongly when aggregate demand is higher, (i.e., $\partial^2 p/\partial \lambda_F \partial \delta > 0$, and $\partial^2 q_F/\partial \lambda_F \partial \delta < 0$). Therefore, the first two effects become more positive and the last two effects become more negative as $\delta$ increases. However, the net effect is positive; when $\delta$ becomes sufficiently large, an increase in $\lambda_F$ increases country $F$’s welfare.

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With inconsistent transfer prices, production decisions also depend on the degree of transfer price inconsistency, \( I \). We summarize the effect of transfer price harmonization on the location and efficiency of production in Table 1; the derivations of these results are in Appendix C.

Harmonization increases foreign production when foreign income is heavily taxed relative to domestic income (\( I \tau_F > \tau_D \)). Harmonization also increases foreign production when foreign income is lightly taxed relative to domestic income (\( I \tau_F \leq \tau_D \)) and the opportunity cost of deferring the repatriation tax by having the foreign subsidiary invest in financial assets is sufficiently low (\( \tau_S > \tau_F \)). When foreign income is lightly taxed relative to domestic income, but the opportunity cost of deferring the repatriation tax by having the foreign subsidiary invest in financial assets is sufficiently high (\( \tau_S \leq \tau_F \)), harmonization has no effect on the location of production.

Transfer price harmonization has ambiguous effects on production efficiency. When foreign income is heavily taxed, harmonization increases efficiency if \( \tau_F \geq \tau_S \) by bringing the combined tax rate on foreign income closer to the domestic tax rate. When \( \tau_F < \tau_S \), however, harmonization brings the combined tax rate on foreign income down below the domestic tax rate, yielding excessive foreign investment; this induces a shift from inefficiently high to inefficiently low domestic production. The overall effect of harmonization could increase or decrease efficiency in that case. When foreign income is lightly taxed, harmonization decreases efficiency if \( \tau_S > \tau_F \) and has no effect if \( \tau_F \geq \tau_S \).

Finally, transfer price harmonization affects the foreign subsidiary’s repatriation decision when \( \tau_F < \tau_S \leq I \tau_F \). When transfer price inconsistency is sufficiently high, the subsidiary should repatriate its after-foreign tax earnings to the foreign parent. Harmonizing transfer prices induces the subsidiary to instead reinvest these earnings in financial assets.

### B. Country Preferences Regarding Harmonization

In the preceding subsection, we assumed tax harmonization has occurred and considered the effects of harmonization on investment and repatriation strategies. In this subsection, we illustrate the conflicts that can arise between governments regarding the choice of a harmonized transfer price \( \lambda^H \) in the case \( \tau_F > \tau_D \). Specifically, we find each country’s preferred value of \( \lambda^H \) if they are constrained to a range of arm’s length

<table>
<thead>
<tr>
<th>Production Location</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I \tau_D &gt; \tau_D ); ( \tau_S \leq \tau_F )</td>
<td>Increase foreign investment</td>
</tr>
<tr>
<td>( I \tau_F \leq \tau_D ); ( \tau_S \leq \tau_F )</td>
<td>No effect</td>
</tr>
<tr>
<td>( I \tau_F &gt; \tau_D ); ( \tau_F &lt; \tau_S )</td>
<td>Increase foreign investment</td>
</tr>
<tr>
<td>( I \tau_F \leq \tau_D ); ( \tau_F &lt; \tau_S )</td>
<td>Increase foreign investment</td>
</tr>
</tbody>
</table>
Inconsistent Transfer Prices and the Location of Mobile Capital

prices, \([\lambda_d - \varepsilon, \lambda_d + \varepsilon]\), \(\varepsilon\) arbitrarily small. For the purpose of expositional convenience, we focus on the case \(\alpha_D = \alpha_F = \alpha\).

Proposition 4 characterizes the value of the harmonized transfer price \(\lambda_H\) that maximizes the welfare of countries \(D\) and \(F\), respectively.

**Proposition 4.**

Suppose \(\lambda_H\) is constrained to be in \([\lambda_d - \varepsilon, \lambda_d + \varepsilon]\). Then, there exist two critical values \(\lambda_\Lambda \leq \lambda\) such that

(a) if \(\lambda_d < \lambda_\Lambda\), then \(D\) prefers \(\lambda_d - \varepsilon\), and \(F\) prefers \(\lambda_d + \varepsilon\);

(b) if \(\lambda_\Lambda \leq \lambda_d \leq \lambda\), then both countries prefer \(\lambda_d - \varepsilon\); and

(c) if \(\lambda_d > \lambda\), then \(D\) prefers \(\lambda_d + \varepsilon\), and \(F\) prefers \(\lambda_d - \varepsilon\).

The proof is in Appendix B.

Proposition 4 shows that the two countries may agree or disagree over the harmonized transfer price. If \(\lambda_d < \lambda_\Lambda\), then country \(D\) prefers the lowest transfer price and country \(F\) prefers the highest transfer price. If \(\lambda_d > \lambda\), then the opposite is true. If neither of these conditions hold, then both countries prefer the lowest harmonized transfer price in the arm’s-length range.

**VI. OTHER U.S. CORPORATE INCOME TAX POLICIES**

In this section, we use Proposition 1 to investigate how transfer price inconsistency affects the consequences of other U.S. corporate income tax policies. Our results indicate that the degree of transfer price inconsistency can alter the effects of tax policy changes; ignoring the influence of transfer price inconsistency can yield suboptimal policy choices. We examine the effect of lowering the corporate tax rate, eliminating the deferral of foreign source income from U.S. taxation, and changing to a system of territorial taxation instead of worldwide taxation of foreign source income.

**A. Cutting the Domestic Corporate Income Tax Rate**

The first U.S. tax policy change we examine is lowering the corporate statutory tax rate \(\tau_D\). The U.S. currently has one of the highest tax rates among OECD nations, which as we have seen can induce excessive foreign investment. We analyze the effect of a small decrease in \(\tau_D\) on the location and efficiency of investment. A change in the domestic tax rate affects both the tax rate on domestic production and the combined tax rate \(T\) on foreign production. It follows from (10) that the effect of a change in the domestic tax rate on equilibrium production decisions depends on how it affects the ratio of the after-tax profit from foreign production to the after-tax profit from domestic production, \(\Pi = (1 - T)(1 - \tau_D)\). A change in \(\tau_D\) increases the fraction of demand satisfied by domestic production if it decreases \(\Pi\). It follows from (10) and (14) that a change in \(\tau_D\),
increases efficiency if it moves the ratio $\Pi$ closer to one. We emphasize that effects on production location and production efficiency depend on $\Pi$, and not on the difference between the tax rates $T$ and $\tau_D$.

We summarize the results of decreasing the domestic corporate tax rate $\tau_D$ in Table 2. The derivations of these results are in Appendix C.

If foreign income is heavily taxed relative to domestic income ($I\tau_F > \tau_D$), decreasing $\tau_D$ increases efficiency if transfer price inconsistency is very high ($I\tau_F > 1$) and decreases efficiency otherwise ($I\tau_F < 1$). If foreign income is lightly taxed relative to domestic income ($I\tau_F \leq \tau_D$), decreasing $\tau_D$ has no effect on the location of investment and no effect on production efficiency.

Transfer price inconsistency makes it more likely that a decrease in the domestic tax rate would increase efficiency. A decrease in the domestic tax rate increases efficiency when $I\tau_F > 1$. The greater the level of transfer price inconsistency $I$, the more likely it is that this condition is satisfied.

### B. Eliminating Deferral of Foreign Source Income

Next, we examine the effect of subjecting foreign source income to U.S. tax when it is earned, instead of waiting until it is repatriated from a foreign subsidiary. Eliminating deferral only changes the analysis in Proposition 1(c), increasing the tax rate $T$ on foreign investment to $\tau_F$. This tax change would increase domestic investment and increase efficiency by removing the tax advantage associated with investing in foreign countries with tax rates lower than the U.S. rate. In addition, eliminating deferral would induce the foreign subsidiary to repatriate after-years tax earnings instead of investing in financial assets so as to avoid the repatriation tax. We summarize these results in Table 3; the derivations of these results are Appendix C.

#### Table 2

<table>
<thead>
<tr>
<th>Production Location</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I\tau_F &lt; \tau_D$</td>
<td>Increase domestic investment</td>
</tr>
<tr>
<td>$I\tau_F = \tau_D$</td>
<td>No effect</td>
</tr>
<tr>
<td>$I\tau_F &gt; \tau_D$</td>
<td>Increase foreign investment</td>
</tr>
</tbody>
</table>

#### Table 3

<table>
<thead>
<tr>
<th>Production Location</th>
<th>Efficiency</th>
<th>Repatriation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau_F \leq \tau_S$</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>$I\tau_F &lt; \tau_S$</td>
<td>Increase domestic investment</td>
<td>Increases</td>
</tr>
</tbody>
</table>
Transfer price inconsistency makes the efficiency gains from eliminating deferral less likely to occur. Eliminating deferral only enhances efficiency when $\tau_S > \tau_F$; the greater the transfer price inconsistency, the less likely it is for this condition to be satisfied.

C. Adopting Territorial Taxation

Finally, we examine the consequences of the domestic government adopting a territorial tax regime for the location and efficiency of production, as well as repatriation decisions. We summarize the results in Table 4; the derivations of these results are in Appendix C.

If the worldwide tax system heavily taxes foreign income relative to domestic income ($I\tau_F > \tau_D$), switching to territorial taxation has no effect on production decisions or efficiency. If the worldwide tax system lightly taxes foreign income relative to domestic income ($I\tau_F < \tau_D$), switching to territorial taxation would increase foreign investment and decrease production efficiency. Moreover, if $I\tau_F < \tau_S$, then a switch to territorial taxation would induce the subsidiary to repatriate after-tax earnings instead of investing in financial assets. If $I\tau_F \geq \tau_S$, then a switch to territorial taxation has no effect on the repatriation strategy.

Transfer price inconsistency makes it less likely that a switch to territorial taxation would decrease domestic investment and decrease efficiency. Adopting territorial taxation only changes production decisions when $I\tau_F < \tau_D$. The greater the level of transfer price inconsistency $I$, the less likely it is that this condition is satisfied.

VII. CONCLUSIONS

We have examined the effects of inconsistent transfer prices on multinational firm decisions and government corporate tax policies. Firm decisions are affected by the domestic tax rate, the foreign tax rate, the transfer price used by each country, and a parameter that reflects the average shareholder tax rate on interest. The average shareholder tax rate on interest affects the opportunity cost of deferring the repatriation tax by reinvesting in financial assets.

Transfer price inconsistency can affect the location and efficiency of investment through its effect on the combined foreign and domestic tax rate on foreign income. If this combined tax rate exceeds the domestic tax rate, there is excessive domestic
investment; if it is less than the domestic tax rate, there is excessive foreign investment. Investment decisions are efficient if the two rates are equal.

We show conditions under which transfer price inconsistency arises if each country chooses its transfer price non-cooperatively in an attempt to maximize its own welfare, even if doing so would decrease aggregate social welfare. We also show conditions under which the countries choose the same transfer price, even though each strives to maximize its own welfare.

Harmonizing transfer prices weakly increase foreign investment, which has ambiguous effects on efficiency. Transfer price harmonization also weakly increases the incentive to invest after-foreign tax earnings in financial assets so as to avoid the repatriation tax. Countries may, but need not, disagree over which harmonized transfer price to choose from within a range of prices that satisfy the arm’s-length standard.

Finally, the effects of other U.S. tax policies depend on the extent of transfer price inconsistency. A reduction in the domestic tax rate increases efficiency if the level of double taxation due to transfer price inconsistency is low, but decreases efficiency if it is high. Eliminating deferral of U.S. taxation of foreign source income increases efficiency if transfer price inconsistency is sufficiently low, but has no effect otherwise. Switching from the worldwide system of taxing foreign income to a territorial system decreases efficiency if transfer price inconsistency is low, but has no effect otherwise.

ACKNOWLEDGEMENTS

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REFERENCES


**APPENDIX A**

We consider a model with $M + N$ risk-averse investors who can invest in either a riskless bond or a risky stock. The riskless bond pays interest at the rate $R$ on each date in perpetuity. The stock generates a risky return $\tilde{x}$ on each date in perpetuity. The risky return is normally distributed with a mean of $\mu$ and a variance of $\sigma^2$. The investors are of two types: taxable and tax-exempt. There are $M$ taxable investors that face a constant statutory tax rate $\tau_B$ on interest from the bond and a constant effective tax rate $\tau_G$ on the stock return. The effective tax rate $\tau_G$ can be lower than the statutory rate on realized capital gains because the tax on unrealized gains is deferred until the stock is sold, and tax may be avoided altogether through a charitable gift of the stock, or through a basis step-up upon the investor’s death. The remaining $N$ investors are tax-exempt.
Each investor has a utility function defined over end-of-period wealth of the form \( U(w) = e^{-rw} \). This utility function has the property that if \( \hat{w} \) is normally distributed with mean \( \mu \) and variance \( \sigma^2 \), the investor’s certainty equivalent is equal to \( \mu - (\rho\sigma^2/2) \). We normalize the number of shares outstanding for the stock to be one.

An equilibrium is defined as a portfolio for each investor that maximizes that investor’s expected utility given the stock price, and a stock price at which supply equals demand. Each of the \( M \) taxable investors buys \( s_t \) shares at a price of \( P \) per share to solve the following maximization problem

\[
\max_{s_t} \left\{ \frac{s_t \mu(1-\tau_G) - s_t^2 \rho \sigma^2 (1-\tau_G)^2 / 2}{R(1-\tau_B)} - s_t P \right\}.
\]

Differentiation yields the following first-order condition for each of the \( M \) taxable investors

\[
s_t^* = \frac{\mu(1-\tau_G) - PR(1-\tau_B)}{\rho \sigma^2 (1-\tau_G)^2}.
\]

Each of the \( N \) tax-exempt investors buys \( s_e \) shares of stock at a price of \( P \) per share to solve the maximization problem

\[
\max_{s_e} \left\{ \frac{s_e \mu - s_e^2 \rho \sigma^2 / 2}{R} - s_e P \right\}.
\]

Differentiation yields the following first-order condition for each of the \( N \) tax-exempt investors

\[
s_e^* = (\mu - PR)/\rho \sigma^2.
\]

The market clearing condition completes the characterization of the equilibrium

\[
Ms_t^* + Ns_e^* = 1.
\]

Substituting each investor’s demand into the market clearing condition and solving for \( P \) yields the equilibrium stock price

\[
P = \left\{ \frac{M}{1-\tau_G} + N \right\} - \frac{\rho \sigma^2}{R} \left\{ \frac{M(1-\tau_B)}{(1-\tau_G)^2} + N \right\}.
\]

We determine the appropriate discount rate for riskless cash flows by finding the discount rate \( r_f \) for which \( \Delta \mu / \Delta P = \Delta P \), because an increase in \( \mu \) with no corresponding increase in \( \sigma^2 \) represents an increase in riskless cash flows. Therefore, \( r_f = 1/[\partial P/\partial \mu] \). Differentiating \( P \) with respect to \( \mu \) and solving for \( r_f \) yields

\[
r_f = \left\{ \frac{M(1-\tau_B)}{(1-\tau_G)^2} + N \right\} / \left\{ \frac{M}{1-\tau_G} + N \right\}.
\]

Finally, we express the discount rate as \( r_f = R(1 - \tau_s) \) to highlight the relation between investor tax rates and the appropriate discount rate. Solving for \( \tau_s \) yields

\[
\tau_s = \left\{ \frac{M(\tau_B - \tau_G)}{(1-\tau_G)^2} \right\} / \left\{ \frac{M}{1-\tau_G} + N \right\}.
\]
When \( \tau_g = 0 \), \( \tau_s = M \tau_b/(M + N) \), the average shareholder tax rate on interest; when \( \tau_g > 0, \tau_s < M \tau_b/(M + N) \), sufficient conditions for the discount rate \( R(1 - \tau_d) \) to be normatively appropriate in our model, would be \( N = 0, \tau_g = 0, \) and \( \tau_b = \tau_d \). In other words, no tax-exempt investors own stock, taxable investors face a tax rate on bond interest equal to the domestic corporate tax rate, and taxable investors face a zero effective tax rate on accrued capital gains.

**APPENDIX B**

**B.1 Proof of Proposition 2**

When \( I \tau_F > \tau_d \), Proposition 1(a) shows that \( T > \tau_d \). Therefore, (10) and (14) imply that production is inefficient with excessive domestic investment. When \( \tau_s \leq I \tau_F \leq \tau_d \), Proposition 1(b) shows that \( T = \tau_d \), and so production is efficient. When \( I \tau_F < \tau_s \), Proposition 1(c) shows that \( T < \tau_d \). Therefore, production is inefficient with excessive foreign investment.

**B.2 Proof of Proposition 3**

We first show that, for any \( \lambda_F \in [\lambda_d - \epsilon, \lambda_d + \epsilon] \), country \( D \) will choose \( \lambda_D = \lambda_d - \epsilon \). Specifically, we show that for \( \epsilon \) sufficiently small, 

\[
\frac{\partial W}{\partial \lambda} \bigg|_{\lambda_D = \lambda_d, \lambda_F = [\lambda_d - \epsilon, \lambda_d + \epsilon]} < 0.
\]

Take \( \epsilon = 0 \). Then, substituting the equilibrium values of \( p, q_D, \) and \( q_F \) from (9) and (10), with \( T \) as in Proposition 1(a), into \( W_D \) from (16), and differentiating with respect to \( \lambda_D \) yields

\[
\text{sign} \left( \frac{\partial W_D}{\partial \lambda_D} \big|_{\lambda_D = \lambda_d, \lambda_F = [\lambda_d - \epsilon, \lambda_d + \epsilon]} \right) = \text{sign} \left[ \frac{\alpha \delta}{\lambda_A} \left( \tau_F - \tau_D \right) (2 - 2 \tau_D) - \frac{\lambda_A \tau_F}{(1 - \tau_D)} \right] + \left\{ K \lambda_A \left[ (\tau_F - 3 \tau_D) (1 - \tau_D) - \lambda_A \tau_F (\tau_F - \tau_D) \right] \right\}.
\]

We now show that the right-hand side of (B1) is negative. Because it is linear in \( K \), it is negative for all \( K \) if it is negative for both the upper and lower bounds of \( K \). Because \( T > \tau_d \), it follows from (11) that the upper bound for \( K \) is given by:

\[
K_{\text{max}} = \frac{\delta \alpha (1 - T)}{T - \tau_D} = \frac{\alpha \delta (1 - \tau_D + \lambda_A \tau_F - \lambda_A \tau_D)}{\lambda_A (\tau_F - \tau_D)}.
\]

Substituting this upper bound into the right-hand side of (B1) and simplifying shows that the right-hand side evaluated at \( K_{\text{max}} \) is equal to

\[
- \frac{\alpha \delta (1 - \tau_D) \tau_D}{(\tau_F - \tau_D)} (2 - \tau_D + \lambda_A \tau_D - \lambda_A \tau_F) < 0.
\]

The lower bound of \( K \) is zero. Substituting \( K = 0 \) into the right-hand side of (B1) and simplifying yields
(B3) \[\alpha \delta [\hat{\lambda}_d (\tau_p - \tau_D)(2 - 2 \tau_D - \hat{\lambda}_d \tau_p) - (1 - \tau_p)]^2] \]

This expression is strictly concave in \(\hat{\lambda}_d\) and has a maximum value of zero at \(\hat{\lambda}_d = (1 - \tau_p)/\tau_p > 1\). Therefore, we can conclude that the right-hand side of (B3) is negative, so that for \(\varepsilon\) sufficiently small, country \(D\) will choose \(\hat{\lambda}_d - \varepsilon\).

Next, we consider the incentives of country \(F\), given that country \(D\) chooses \(\hat{\lambda}_D = \hat{\lambda}_d - \varepsilon\). We show that

\[
\frac{\partial W_F}{\partial \hat{\lambda}_F} \bigg|_{\hat{\lambda}_F = \hat{\lambda}_d, \hat{\lambda}_D = \hat{\lambda}_d - \varepsilon} < 0 (> 0),
\]

if and only if \(\delta\) is sufficiently low (high). Setting \(\varepsilon = 0\), and substituting the equilibrium values of \(p, q_D,\) and \(q_F\) into \(W_F\) from (15), and differentiating yields

(B4) \[
\text{sign} \left( \frac{\partial W_F}{\partial \hat{\lambda}_F} \bigg|_{\hat{\lambda}_F = \hat{\lambda}_d, \hat{\lambda}_D = \hat{\lambda}_d} \right) = \text{sign} \left\{ \frac{\alpha \delta [ (1 - \tau_D)^2 - \hat{\lambda}_d (\tau_F - \tau_D)(2 - 2 \tau_D - \hat{\lambda}_d \tau_F)] - }{K \hat{\lambda}_d [(3 \tau_F - \tau_D)(1 - \tau_D) + \hat{\lambda}_d \tau_D (\tau_F - \tau_D)]} \right\}.
\]

Both terms in square brackets are positive because we have assumed \(\tau_p > \tau_D\). Therefore,

(B5) \[
\frac{\partial W_F}{\partial \hat{\lambda}_F} \bigg|_{\hat{\lambda}_F = \hat{\lambda}_d} > 0 \text{ if } \delta > \bar{\delta}
\]

and

(B6) \[
\frac{\partial W_F}{\partial \hat{\lambda}_F} \bigg|_{\hat{\lambda}_F = \hat{\lambda}_d} < 0 \text{ if } \delta < \bar{\delta}
\]

where

\[
\bar{\delta} = \frac{K \hat{\lambda}_d [(3 \tau_F - \tau_D)(1 - \tau_D) + \hat{\lambda}_d \tau_D (\tau_F - \tau_D)]}{\alpha \delta [ (1 - \tau_D)^2 - \hat{\lambda}_d (\tau_F - \tau_D)(2 - 2 \tau_D + \hat{\lambda}_d \tau_F)]}.
\]

Therefore, for \(\varepsilon\) sufficiently small, there exists a \(\delta^*\) (close to \(\bar{\delta}\)) such that country \(F\) would choose \(\hat{\lambda}_d + \varepsilon\) if \(\delta > \delta^*\), and would choose \(\hat{\lambda}_d - \varepsilon\) if \(\delta < \delta^*\).

B.3 Proof of Proposition 4

Setting \(\hat{\lambda}_D = \hat{\lambda}_F = \hat{\lambda}_H\) and differentiating \(W_F\) from (15) with respect to \(\hat{\lambda}_H\) shows that there is a unique maximum at

(B7) \[
\hat{\lambda}_H = \hat{\lambda}_F = \hat{\lambda}_D = \hat{\lambda}_d - \frac{\alpha \delta (1 - \tau_D)(\tau_D + \tau_F)}{(\tau_F - \tau_D)[\alpha \delta (\tau_D + 2 \tau_F) + K (\tau_D + 3 \tau_F)]}.
\]

Setting \(\hat{\lambda}_D = \hat{\lambda}_F = \hat{\lambda}_H\) and differentiating \(W_D\) from (16) with respect to \(\hat{\lambda}_H\) shows that there is a unique minimum at
The result follows from the fact that \( \tau_F > \tau_D \) implies \( \bar{\lambda} < \tilde{\lambda} \).

APPENDIX C

C.1 Derivation of Results in Table 1

We let \( T_H(T) \) denote the combined tax rate imposed on foreign production in case of consistent (inconsistent) transfer prices. We use Proposition 1 to determine \( T \) and \( T_H \), and then compare (10) to (14) for both \( T \) and \( T_H \) to investigate the effect of harmonizing transfer prices on production location and production efficiency. Six cases are possible.

Case 1: \( \tau_F > \tau_D \). The foreign tax on foreign income exceeds the domestic tax on foreign income in case of either consistent or inconsistent transfer prices. Proposition 1 shows that

(C1) \( T_H = \tau_D + \bar{\lambda}_H(\tau_F - \tau_D) > \tau_D \),

(C2) \( T = \tau_D + \bar{\lambda}_F \tau_F - \bar{\lambda}_D \tau_D > \tau_D \).

Output is inefficient with excessive domestic production in both cases. Subtracting \( T \) from \( T_H \) yields \( T_H - T = \tau_F (\bar{\lambda}_H - \bar{\lambda}_D) + \tau_D (\bar{\lambda}_D - \bar{\lambda}_H) < 0 \). Because harmonization decreases both the foreign and domestic tax on foreign income and there is no repatriation tax, harmonization decreases the combined tax imposed on foreign production. Therefore, harmonizing transfer prices increases foreign production and increases efficiency in this case. Because all after-foreign tax earnings are repatriated for both inconsistent and harmonized transfer prices, transfer price harmonization has no effect on the firm’s repatriation strategy in this case.

Case 2: \( \tau_F \leq \tau_D \) and \( \tau_D < I \tau_F \). Under inconsistent transfer prices, the foreign tax on foreign income exceeds the domestic tax; the opposite holds under consistent transfer prices. When transfer prices are inconsistent, Proposition 1(a) shows that \( T > \tau_D \), and so production is inefficient with excessive domestic production. If transfer prices are harmonized, \( I = 1 \), and Proposition 1(b) shows that \( T_H = \tau_D \), which implies that the efficient level of production is achieved. So in this case, harmonizing transfer prices increases foreign production and yields the efficient outcome. Transfer price harmonization has no effect on the firm’s repatriation strategy in this case.

Case 3: \( \tau_F < \tau_D \) and \( \tau_D < I \tau_F \). As in Case 2, harmonization brings the foreign tax on foreign income down from above the domestic tax to below the domestic tax. However, Proposition 1(c) with harmonized transfer prices now implies that deferring the repatriation tax through investment in financial assets is optimal. Therefore, although \( T > \tau_D \), harmonization implies that \( T_H < \tau_D \). So in this case, harmonizing transfer prices increases foreign production, inducing a shift from inefficient excessive domestic production to inefficient excessive foreign production. The overall effect on efficiency is ambiguous. In addition, harmonizing transfer prices changes the firm’s repatriation strategy from one in which all after-foreign tax earnings are repatriated to one in which these earnings are reinvested by the foreign subsidiary in financial assets.

Case 4: \( \tau_F \leq \tau_D \) and \( \tau_F \leq I \tau_F \). In this case, the foreign tax on foreign income is lower than the domestic tax, even with inconsistent transfer prices. Proposition 1(b) shows that with either
consistent or inconsistent transfer prices, immediately repatriating income is preferred to investing in financial assets, so \( T = \tau_d \) and \( T_H = \tau_p \). Production efficiency is achieved in both cases, and harmonizing transfer prices has no effect on either production decisions or repatriation behavior.

Case 5: \( \tau_F < \tau_s \) and \( \tau_s \leq I \tau_F \leq \tau_p \). As in Case 4, the foreign tax on foreign income is lower than the domestic tax, even under inconsistent transfer prices. However, in this case the repatriation strategy is affected by harmonization. It follows from Proposition 1(b) that when transfer prices are inconsistent, it is optimal to immediately repatriate income, yielding \( T = \tau_d \). It follows from Proposition 1(c) that under harmonized transfer prices, it is optimal to avoid the repatriation tax through investment in financial assets, yielding \( T_H < \tau_d \), which induces excessive foreign production. Therefore, harmonizing transfer prices increases foreign production and reduces efficiency in this case. It also causes the foreign subsidiary to switch from a strategy of repatriating after-tax earnings to one in which these earnings are invested in financial assets.

Case 6: \( \tau_F < \tau_s \) and \( I \tau_F < \tau_s \). In this case, Proposition 1(c) shows that avoiding the repatriation tax by investing in financial assets is optimal both under inconsistent transfer prices and under harmonized transfer prices. Specifically,

\[
(C3) \quad T_H = \tau_D - \frac{\lambda_H (\tau_S - \lambda_F) (1 - \tau_S)}{1 - \tau_S} < \tau_D
\]

\[
(C4) \quad T = \tau_D - \frac{(\lambda_D \tau_S - \lambda_F \tau_F) (1 - \tau_D)}{1 - \tau_S} < \tau_D.
\]

In both cases, production is inefficient with excessive foreign production. Subtracting \( T \) from \( T_H \) shows that

\[
T_H - T = \tau_h (\lambda_H - \lambda_F) + \tau_s (\lambda_F - \lambda_H) < 0.
\]

Therefore, transfer price harmonization induces greater foreign investment, decreases efficiency, and has no effect on repatriation strategy in this case.

C.2 Derivation of Results in Table 2

We consider two cases. If \( I \tau_F > \tau_d \), then Proposition 1(a) implies that \( T = \tau_d + \lambda_F \tau_F - \lambda_D > \tau_D \). Therefore, foreign production has a lower after-tax profit than domestic production, and thus \( \Pi < 1 \). Differentiating \( \Pi \) with respect to \( \tau_D \) yields

\[
\frac{d\Pi}{d\tau_D} = -\frac{\lambda_D - \lambda_F \tau_F}{(1 - \tau_D)^2},
\]

which could be positive or negative, depending on whether \( I \tau_F > 1 \) or \( I \tau_F < 1 \). If \( I \tau_F > 1 \), then \( \partial \Pi / \partial \tau_D < 0 \), so decreasing the domestic corporate tax rate increases \( \Pi \), thereby increasing foreign investment and increasing efficiency. If \( I \tau_F < 1 \), then \( \partial \Pi / \partial \tau_D > 0 \), and so decreasing the domestic corporate tax rate decreases \( \Pi \), thereby increasing domestic investment and decreasing efficiency. Therefore, the effect of a tax rate decrease depends on the level of transfer price inconsistency.

In contrast, a small decrease in \( \tau_D \) has no effect on production decisions if \( I \tau_F \leq \tau_D \). Indeed, if \( \tau_s \leq I \tau_F \leq \tau_D \) or \( I \tau_F < \tau_s \), then parts (b) and (c) of Proposition 1 imply that the ratio \( \Pi \) of after-tax
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profits of foreign and domestic production is independent of $\tau_{D'}$. Therefore, a change in $\tau_D$ has no effect on production decisions in these cases. If $\tau_S \leq I\tau_F \leq \tau_D$, a change in $\tau_D$ has no effect because the repatriation tax implies that foreign income and domestic income are taxed at the same tax rate. If $I\tau_F < \tau_S$, a change in $\tau_D$ has no effect because both the income that is allocated to the domestic parent when it is earned ($\rho(1 - \lambda_D)$) and the interest from after-foreign tax foreign earnings ($R(\lambda_D - \tau_F\lambda_F)$) face a tax rate of $\tau_D$.

**C.3 Derivation of Results in Table 4**

We denote $T_{TER}$ for the combined tax rate on foreign income under a territorial system. If the domestic government uses a territorial system, there is no repatriation tax. As was the case in Proposition 1(a), the combined tax rate on foreign income is

\[(C5) \quad T_{TER} = \tau_D + \lambda_F\tau_F - \lambda_D\tau_D'.\]

We distinguish three cases to examine the effects of adopting territorial taxation.

**Case 1:** $I\tau_F > \tau_D'$. This implies $\lambda_F\tau_F > \lambda_D\tau_D'$, and thus no repatriation tax is due under either system because the foreign taxes paid are higher than the U.S. tax on foreign source income under both territorial and worldwide tax systems. Therefore, adopting territorial taxation would have no effect on production decisions or on repatriation decisions.

**Case 2:** $\tau_S \leq I\tau_F \leq \tau_D$. This implies $\lambda_F\tau_F \leq \lambda_D\tau_D'$, so the foreign taxes paid are lower than the U.S. tax on foreign source income. Because under a territorial tax system no repatriation tax is due, it follows from (C5) that $T_{TER} \leq \tau_D'$. Proposition 1(b) shows that under a worldwide system, the repatriation tax causes all income to be taxed at the domestic country’s tax rate. Therefore,

\[(C6) \quad T_{TER} \leq T = \tau_D',\]

and so switching to a territorial system would increase foreign production and decrease efficiency. Switching to territorial taxation would have no effect on repatriation decisions in this case.

**Case 3:** $I\tau_F < \tau_S$. Because $\tau_S \leq \tau_D'$, it follows that $\lambda_F\tau_F \leq \lambda_D\tau_D'$. Therefore, as in Case 2 it holds that $T_{TER} \leq \tau_D'$. However, in this case Proposition 1(c) implies that under a worldwide system the repatriation tax is avoided through investment in financial assets, which yields $T < \tau_D'$. Subtracting $T$ from $T_{TER}$ yields

\[
T_{TER} - T = \frac{(\lambda_D + \lambda_F\tau_F)(\tau_D' - \tau_S)}{1 - \tau_S} < 0.
\]

Foreign investment is inefficiently high under both systems, but is higher under territorial taxation than under worldwide taxation. Therefore, a switch to territorial taxation would increase foreign investment and decrease production efficiency. In addition, moving to territorial taxation would induce the subsidiary to repatriate after-foreign tax earnings instead of investing in financial assets.