Economic Substance Requirements and Multinational Firm Behavior[*]

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Abstract

The OECD's Base Erosion and Profit Shifting project has focused on income attributed to intangibles with an objective of curtailing perceived artificial profit shifting by multinational firms. A key part of this effort is a renewed emphasis on the concept of "economic substance." Economic substance standards require companies to locate employees and other people functions in jurisdictions where the companies report profits related to intangibles. Our analysis suggests that an emphasis on economic substance tied to people functions can have a significant impact on the scale as well as the location of economic activity (i.e., employees dedicated to the creation and use of intangibles). Furthermore, the likely implications on economic activity can be highly unfavorable for high-tax jurisdictions. Viewed from a U.S. perspective, this new international environment provides one more impetus to strive for a reform of the corporate tax code to make it more competitive. In the absence of such changes, the United States—which taxes corporate income at a rate higher than most developed economies—will risk losing economic activity to other countries.

Keywords: BEPS, economic substance, intangibles, international tax, transfer pricing

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I.   Introduction

In an attempt to reduce perceived tax avoidance through profit shifting, the Organisation for Economic Co-operation and Development (OECD) has reinforced the concept of "economic substance" in its Base Erosion and Profit Shifting (BEPS) project reports dealing with transfer pricing. This is aimed at securing one of the key objectives of the project: that multinational enterprises (MNEs) report taxable income in the jurisdictions that host the income-generating economic activity. The allocation of income associated with intangibles features prominently in these reports. The OECD has identified intangibles – a mobile form of capital that can be moved across jurisdictions without significant (non-tax) costs – as a key area where enhanced guidance can have a significant impact in limiting the ability of an MNE to "artificially" shift profits from high tax to low tax jurisdictions. The OECD's new guidelines, presented in the report on BEPS Actions 8 through 10 (OECD, 2015), emphasize that when reporting profits related to intangibles in a certain jurisdiction, the MNE also should be able to demonstrate the location of employees necessary for the development, management, and exploitation of the relevant intangibles within that same jurisdiction.[1] This is intended to minimize (if not entirely eliminate) "artificial profit shifting" where the location of income attributed to a company's intangibles is disassociated from the location of important people functions.

This paper explores the potential consequences of this evolving international tax regime, comprising newly defined standards on economic substance as well as their expected enforcement in an environment shaped by the BEPS project. In particular, we develop a theoretical model to analyze the impact of economic substance requirements on firms' behavioral

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[1] The OECD guidance in this area of people functions related to intangibles has been summarized in terms of the acronym "DEMPE" which stands for development, enhancement, maintenance, protection and exploitation.

responses with regard to both the scale and the location of intangible capital. The model also analyzes the corresponding scale and location of people functions necessary for the development, management, and exploitation of the firms' intangible capital under varying standards of economic substance. Such "complementary labor" is used as the measure of economic substance with regard to intangibles in this paper. This is the labor necessary for the creation and productive deployment of intangible capital.

Our analysis suggests that higher economic substance requirements can have a significant impact on the scale as well as the location of economic activity - i.e., employees dedicated to the creation and use of intangibles. Furthermore, this impact on economic activity can be highly unfavorable for high-tax jurisdictions. Viewed from a U.S. perspective, this new international environment provides one more impetus to strive for a reform of the corporate tax code to make it more competitive. In the absence of such changes, the United States—which taxes corporate income at a rate higher than most developed economies—very possibly will lose economic activity to other countries.

The authors previously explored some of these issues as part of a commentary on the BEPS project and its potential for unintended consequences given evidence gleaned from the relevant economics literature (Singh and Mathur, 2013). These issues are explored more formally in this paper by way of a theoretical model. There are at least two strands of literature that are related to this paper. One specifically deals with the impact of international tax differences on firms' decisions regarding intangibles and the related role of intercompany transactions. Grubert and Slemrod (1998), Grubert (2003), Karkinsky and Riedel (2009) and Dischinger and Riedel (2011) are notable studies within this segment of the literature. While not specifically addressing location of intangible investment, the interaction of tax policy and firms' cross-border

intercompany arrangements is the focus of studies such as Haufler and Schjelderup (2000), Eggert and Schjelderup (2003), Huizinga and Laeven (2008), and Gumpert, Hines and Schnitzer (2016) that constitute a second segment of the literature relevant to this paper. However, while dealing with related issues, none of these works specifically address the role of economic substance in shaping firms' decisions regarding the scale and location of intangible capital along with the associated people functions.

A notable exception is the relatively recent analysis of economic substance requirements by Sullivan (2015). The focus of this work is how standards for economic substance can operate to avoid firms' location of intangibles (and related income) in low-tax jurisdictions. The central thesis in Sullivan (2015) is as follows. Starting from low substance requirements, a marginal increase in these requirements does not prevent the location of intangible income in low-tax jurisdictions. In fact, increasing substance requirements within a certain range only has the effect of transferring *more* economic substance to the low-tax jurisdiction at the cost of the high-tax jurisdiction. In contrast, were substance requirements increased more significantly per this thesis, this perverse result could be reversed. In particular, increasing substance requirements to their maximum limit under the framework of Sullivan (2015) prevents *all* shifting of income and economic substance to the low-tax jurisdiction (i.e., the high-tax jurisdiction loses no income and no economic substance to the low-tax jurisdiction). This analysis seems to support the case for significantly higher substance requirements as opposed to half measures (at least from the perspective of the interests of high-tax jurisdictions).

While we find the approach in Sullivan (2015) to be problematic on a number of counts, its biggest limitation may be its characterization of substance requirements, how they work, and what constitutes "artificial" income shifting. In the author's framework, substance standards are

used to directly and *selectively* limit the extent of income an MNE can report in a "low tax" jurisdiction. The most stringent substance requirements under this view limit the taxable income in a low-tax jurisdiction to a (low) routine rate of return on the tangible capital located in that jurisdiction.[2] This conception does not take into account how much substance the high-tax jurisdiction possesses relative to the low-tax jurisdiction. In fact, under this framework it is possible for the high-tax jurisdiction to be assigned all intangible-related income even when it possesses lower substance than that present in the low-tax one. This is clearly incompatible with any international tax regime that requires global consistency of standards (and no double-taxation) as a necessary design feature.[3] Furthermore, the model in Sullivan (2015) starts with an incorrect premise regarding "artificial profit shifting". We first note that the OECD's stated objective with regard to BEPS is neither to prevent firms from responding to tax rate differentials nor to limit the ability of independent states to decide how much to tax business income. Instead, the objective is to shape the rules of the game such that firms' response to tax rate differentials does not result in a mere shifting of income to a jurisdiction without a concomitant location of relevant economic activity within that jurisdiction.   Thus, in our view reporting income in a "low tax" jurisdiction in itself is not tantamount to artificial income shifting per the OECD standards if the economic activity underlying that income is co-located in the same jurisdiction. More stringent substance requirements are intended to enforce a greater degree of correlation between economic activity taking place within jurisdictions and the taxable income reported there. That higher substance requirements – by increasing the real costs of moving taxable income – may limit the responsiveness of taxable income to tax rate differentials between jurisdictions can

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[2] Tangible capital is the measure of economic substance used in Sullivan (2015).

[3] A separate, and not insignificant, problem is that the current international tax landscape with a proliferation of IP boxes and other special rules that make it difficult to define a "low-tax" jurisdiction.

certainly be viewed as an added bonus of the BEPS project but is not the stated aim for such requirements based on OECD statements and documents.

This misplaced view of substance also may be the explanation for an important omission in Sullivan (2015). With his sole focus on how substance requirements may affect the magnitude of substance located in a low-tax jurisdiction, the author leaves unanswered the question on how heightened substance requirements affect economic activity in the high-tax jurisdictions in an absolute sense. The impact of such requirements on overall investment is either not considered or assumed to be nonexistent. It is to these questions we turn to with the model of firm behavior that is presented next.

The paper is organized as follows. Section II presents an analytical framework that models an MNE's decision-making across jurisdictions with tax differences. The model specifically studies the implications of varying standards of economic substance on the firm's decision margins dealing with intangible investment and employment of associated labor. While the theoretical framework is stylized to allow for a tractable treatment of the subject, it is consistent with findings documented in the empirical literature on multinational firm behavior with regard to the relationship between economic activity in low-tax and high-tax jurisdictions.[4] Section III concludes with the main points of the analysis and identifies extensions of the analysis.

II.   Theoretical Framework

A. Model setup and assumptions

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[4] See Dharmapala (2014) for a survey of the relevant literature.

We model a representative multinational firm's decision regarding the magnitude and location of intangible capital across two jurisdictions – the domestic jurisdiction of the firm's incorporation (indexed by subscript "*d*") and a foreign jurisdiction (indexed by subscript "*f*"). The foreign jurisdiction is assumed to have a lower corporate income tax (τ_f) than the domestic jurisdiction (τ_d). The firm's decisions involve choosing an overall level of intangible capital (K) as well as the location of such capital between the domestic (K_d) and foreign jurisdictions (K_f) to maximize total after-tax profits (π).[5] While the decision regarding overall investment in intangible capital is a "real" one, the decision regarding the "location" of such capital – which has no physical manifestation – across jurisdictions is one dictated by income tax reporting considerations and any transaction costs entailed by that decision. Said differently, this decision would have no consequences, and would not be required, in a world without income taxes.

The (monetary value) of the firm's output associated with intangible capital is generated via a production function, denoted by *f(.)*, with two complementary factors of production. The first is the investment made in the intangible capital (i.e., *K*).[6] The second reflects the units of complementary labor (denoted by *L)* needed to successfully translate the capital investment into output. This labor represents the total "economic substance" – covering the *full* spectrum of activities from the most routine to the highest valued-added – required to productively deploy

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[5] The decisions –with regard to the scale and location of investment and economic substance – that are modeled here represent those facing a firm at the outset of a project without any history of prior investment. However, the model can be readily adapted to capture situations where the firm's current decisions regarding the scale and location of intangible capital investment and substance have to be made in the context of a prior history of such choices previously made by the firm. While this will add some complexity to the model it will not detract away from any of the main conclusions.

[6] Readers troubled by capital investments not having an economic life beyond one period can view the output of the production function as representing the present value of the revenues generated from the capital investment made (along with the complementary labor employed) in the current period.

intangible investments in this model.[7] We believe this is the appropriate characterization of economic substance in the context of intangibles.[8]

The amount of labor required to productively deploy each dollar invested in intangible capital is dictated by the inherent "production technology" available to the firm and is captured by a parameter (γ) in the model. This parameter represents the minimum (units of) labor required to successfully translate one dollar of investment in intangible capital into output. Hiring additional units of labor absent additional investment in capital is assumed to generate no incremental output. Consequently, a production function for an efficient firm implies a constant capital labor ratio (i.e., γ). This (de-facto) fixed relationship between capital investment and labor means that the firm's decision with regard to the overall level of capital investment and employment can be reduced to one choice variable.[9] In particular, the firm's choice of how much to invest in intangible capital will also dictate the level of labor needed as a complementary input.

The production function is characterized as twice continuously differentiable in K with $f(0; L)$ $=0$, $f_K()\geq0$ and $f_{KK}()<0$. These conditions, which are standard in such types of models, imply that

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[7] Standards of economic substance compatible with the arm's length principle (ALP) – the governing framework in apportioning an MNE's income between jurisdictions for income tax reporting purposes – will generally fall short of requiring that the entire range of activities relevant to the intangible capital be performed by the entity claiming the intangible-related income. Instead, economic substance requirements under the ALP require that the entity claiming intangible-related income possess some requisite threshold of important functions related to control and management of the intangibles.

[8] Two clarifications are in order with regard to the model presented here. First, that the production function has no role for tangible capital is a deliberate assumption to focus on the central issue of intangibles and economic substance in a cross-border transfer pricing context. Readers can view this either as representing the case of a firm whose core business does not involve the use of tangible property or that that firm's overall production function can be separated into two additive production functions – one for intangible capital and the other for tangible capital. Neither interpretation takes away from the main conclusions of this analysis. Second, the treatment of the subject admittedly abstracts away from risk and uncertainty, issues that are in fact fundamental to any discussion of investment in, and entitlement to returns from intangibles. Again, this is done in the interest of simplicity and the model presented here can be readily adapted to accommodate a richer treatment of decision-making under uncertainty without such treatment taking away from the principle results of the analysis presented here.

[9] Mathematically, this can be represented in terms of the following characteristics of the production function: $f_L(K;L)=0$ for $L< \gamma K$ and $f_L(K;L)=0$ for $L> \gamma K$.

capital investments are subject to diminishing returns thereby ensuring that there is an interior solution in this model.

The rate of return demanded by investors in the firm's intangible capital is denoted by r. The entirety of this required rate of return – i.e., the firm's cost of intangible capital – is assumed to be non-deductible for tax purposes (e.g., as would be the case where the firm finances one hundred percent of its investment through equity capital). This is assumed for simplicity and without loss of generality– the results of this analysis hold as long as a part of this required return is non-deductible for tax purposes or (contrary to what is assumed below also for simplicity) less than one hundred percent of the firm's capital expenditures are currently deductible for tax purposes). Furthermore, the required rate of return is assumed to be the same across jurisdictions (e.g., as would be the case under perfect capital mobility between jurisdictions).

Labor cost in each jurisdiction is fully and currently tax deductible under the model. The cost that the firm has to incur in deploying one unit of labor necessary to complement its intangible capital in the domestic jurisdiction is assumed to be constant and denoted by w. In contrast, the cost incurred by the firm in deploying one unit of the requisite quality of labor needed to complement it capital in the foreign jurisdiction is assumed to be higher on account of a transaction cost denoted by $c(L)$. This component reflects the incremental cost that must be borne by the firm on account of its decision to locate labor in a jurisdiction different from its optimal location (i.e., from a non-tax perspective). Furthermore, this transaction cost is assumed to be increasing in the amount of labor located in the foreign jurisdiction such that the per-unit cost to the firm increases as it locates more labor away from its optimal source.[10] The per unit cost of

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[10] In particular the following are assumed for this cost function: $c(0)=0, c'(\,)>0$ and $c''(\,)>0$.

labor incurred by the firm in the foreign jurisdiction associated with L units of labor is given by the expression $w+c(L)$.

The taxable income reported in a given jurisdiction is expressed as the share of revenue (i.e., output) reported in that jurisdiction less the cost of the two factors of production located there. The first part of this taxable income is modeled as an allocable share of the global output that is proportionate to the share of the firm's global intangible capital located in that jurisdiction: $\frac{K_i}{K} f(K; L)$.

Under globally enforced rules of taxation, such attribution of revenue between the jurisdictions must satisfy economic substance requirements. In particular, substance requirements are modeled in terms of a constraint that applies uniformly to each jurisdiction (although, as can be expected and as we show below, such a constraint will only be binding in the low tax jurisdiction). For every unit of intangible capital purportedly located in a certain jurisdiction for income tax reporting purposes, the firm is required to have *a minimum of λ* units of labor in that jurisdiction as the necessary economic substance. The stringency of substance requirements under a given regime of international taxation is captured by λ. A value of zero for this parameter denotes a regime with no substance requirements. On the opposite end of the spectrum, the regime with the strongest substance requirements is one where the minimum quantity of labor per unit of intangible capital required in each jurisdiction is equal to the overall ratio of labor to intangible capital for the global firm as a whole. In the model this is captured by the case where $\lambda = \gamma$. This is a natural upper bound on substance requirements if such requirements are to be consistent across all jurisdictions bound by a multilateral framework. Only if substance requirements are selectively applicable to one of the two jurisdictions (e.g., foreign) is it possible to have λ exceed γ. Such a requirement would force one jurisdiction to have more labor per unit of intangible

capital located there than deployed by the firm as a whole. However, while such a measure may be implemented unilaterally (e.g., as an incentive mechanism) it is incompatible with an international tax regime that requires enforcement of minimum and *consistent* standards of economic substance for each jurisdiction. Thus, a regime with the most stringent substance requirements dictates that the firm's reported intangible capital in each jurisdiction be no higher than a fixed multiple of the labor located in in that jurisdiction where that multiple is the firm's overall worldwide ratio of capital to labor. Under such a regime with the most stringent standards of economic substance a firm choosing to locate intangible capital in a low tax jurisdiction can only do so up to the point where its reported input mix in that jurisdiction – in terms of the combination of capital and labor – is in line with its overall (i.e., global) production function. A formulary apportionment approach with income allocation based entirely on observable economic activity (i.e., labor in the present case) is an example of a regime that would yield this outcome.

The firm's problem is thus to choose an overall level of investment in intangible capital (K) along with an allocation of that capital in the foreign (K_f) and domestic (K_d) jurisdictions. Alongside this decision, the firm decides on the location of the requisite labor across the two jurisdictions (i.e., L_f and L_d, respectively) needed to support the overall level of capital. The labor location (i.e., substance) decision has to satisfy the "technological constraint" imposed by the production function – i.e., $L_f + L_d = \gamma(K_f + K_d)$. Furthermore, the firm's choice with regard to the location of labor allows for one location to "outsource" services from labor located in the other jurisdiction. Such intercompany service transactions are represented by a net intercompany

payment (*ICP*) from the foreign jurisdiction to the domestic jurisdiction.[11] These decision variables are chosen by the firm so as to maximize the following function representing the firm's total after-tax profits:[12]

Equation 1

$$\pi = (1 - \tau_f) \left[\frac{K_f}{K} f(K; L) - K_f - \left(w + c(L_f) \right) L_f - ICP \right]$$

$$+ (1 - \tau_d) \left[\frac{K_d}{K} f(K; L) + ICP - K_d - w L_d \right] - rK$$

This maximization exercise is conducted under the following "technological" constraint requiring a constant labor-capital ratio in the aggregate:

Equation 2

$$L = \gamma K$$

Given the higher per-unit cost of labor the firm needs to bear in the foreign jurisdiction, it will choose to locate the *minimal* level of labor needed to satisfy the substance requirements for that jurisdiction. Said differently, the firm will locate no more labor in the low tax jurisdiction than what is needed to have its optimal level of intangible capital reported in the jurisdiction be respected for income tax purposes. In turn, this minimal level of labor located in the low tax jurisdiction is defined by the substance requirements under the prevalent regime of international taxation (as captured by the parameter λ in the model). Any residual labor needed for the foreign intangible capital– i.e., intended to satisfy the technological constraint in Equation 2 – will be met by the labor located in the domestic jurisdiction given the per-unit cost of labor the firm

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[11] The net payment can be positive or negative although, as shown below, profit maximizing behavior on the part of the firm will preclude negative values (i.e., a net payment from the domestic jurisdiction to the foreign jurisdiction).
[12] Variables without any subscript denote the aggregate values for the firm across the two jurisdictions.

needs to incur there.[13] This implies a positive ICP between the foreign jurisdiction and the domestic jurisdiction – i.e., the foreign jurisdiction will import services from labor located in the domestic jurisdiction. This ICP equals the cost incurred by the firm on labor located in the domestic jurisdiction in support of the foreign capital plus a profit mark-up (μ) consistent with transfer pricing rules (specifically, intrafirm pricing consistent with the arm's length principle).

The firm's objective function in Equation 1 can thus be modified where are all its choice variables are expressed in terms of the aggregate level of intangible capital and its allocation across jurisdictions as shown below in Equation 3.

Equation 3

$$\pi = (1 - \tau_f) \left[\frac{K_f}{K} f(K; L) - \left[1 + \lambda \left(w + c(\lambda K_f) \right) + (\gamma - \lambda)(1 + \mu)w \right] K_f \right]$$

$$+ (1 - \tau_d) \left[\frac{K_d}{K} f(K; L) + (\gamma - \lambda)(1 + \mu)w K_f - K_d - w[\gamma K_d + (\gamma - \lambda)K_f] \right]$$

$$- rK$$

In the above, the firm's choice of capital in the low tax jurisdiction and the substance requirements together dictate its choice of labor in that jurisdiction (λK_f). The level of labor located in the domestic jurisdiction can be viewed as having two components. The first (γK_d) is driven by the level of capital located there and the production technology. The second (($\gamma - \lambda)K_f$) is the "slack" in the necessary labor related to the capital in the low tax jurisdiction. This slack (on account of the higher cost of the necessary labor in the foreign jurisdiction) has to be

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[13] Implicit in this statement is the assumption that the arm's length profit mark-up receivable by the labor in the domestic jurisdiction is lower than the transactional cost inefficiency associated with locating the labor in the foreign jurisdiction (i.e., $\mu < c(L)$ for any $L > 0$). This is not an unreasonable assumption in light of typical profit mark-ups under the ALP for intragroup services being relatively small (usually no greater than 10%).

made up in the domestic jurisdiction to ensure that the technological constraint in relation to the labor-capital ratio is maintained in the aggregate across the two jurisdictions for the firm.

The firm's choices in K_f and K_l that maximize the after-tax profit function in Equation 5 are identical to those that maximize the before-tax profit function in Equation 5 below.[14]

Equation 4

$$\pi_p = f(K; L) - \left[[1 + \frac{r}{(1-\tau_f)}] + \lambda[w + c(\lambda K_f)] + (\gamma - \lambda)[1 + \frac{(\tau_d - \tau_f)}{(1-\tau_f)}\mu]w\right]K_f$$

$$- \left[\left(1 + \frac{r}{(1-\tau_d)}\right) + w\gamma\right]K_d$$

   a. **Marginal cost function**

The firm's marginal cost function (MC_f) when it chooses to locate the marginal unit of capital in the foreign jurisdiction is given by Equation 5 below.

Equation 5

$$MC_f = \left(\frac{r}{1-\tau_f} + 1\right) + \lambda[c(\lambda K_f) + \lambda K_f c'(\lambda K_f) + w] + (\gamma - \lambda)[1 + \frac{(\tau_d - \tau_f)}{(1-\tau_f)}\mu]w$$

The marginal cost reflects the "fully loaded" costs that the firm needs to bear when it makes an incremental investment in intangible capital and reports this investment (for income tax purposes) in the foreign jurisdiction. These costs encompass not just the direct cost of the unit of

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[14] The transformation of the firm's post tax profit function into the equivalent – in terms of respective choices of K_f and K_l that maximize each of the two functions – is achieved by dividing each term K_i by $(1+\tau_i)$.

intangible capital but also the cost of "economic substance." This is the requisite labor needed to complement the capital when such substance is optimally located across the two jurisdictions.

The first term in the expression for MC_f reflects the direct cost of capital – the (gross) return that the capital investment needs to generate before tax. The lower the tax rate in the foreign jurisdiction the lower the rate of return the firm needs to generate on a pre-tax basis on the investment to satisfy its investors. The second and third terms relate to the cost the firm has to incur on the labor that it needs to employ – in the foreign and domestic jurisdictions, respectively – to productively exploit the marginal unit of capital invested in the foreign jurisdiction. For every unit of capital invested in the foreign jurisdiction the firm needs γ units of labor given the production technology available to it. Given the difference between the (non-tax) cost of labor between the jurisdictions, the firm employs only λ (i.e., the minimal level required to satisfy the prevailing substance requirements) units of labor in the foreign jurisdiction and the remaining $(\gamma - \lambda)$ units in the domestic jurisdiction. The marginal cost for the labor hired in the foreign jurisdiction is given by the expression within the square brackets of the second term on the right hand side of Equation 5. This cost is higher than in the domestic jurisdiction (w) on account of the transactional cost inefficiency ($c(L)$)associated with the foreign jurisdiction. As noted above, this transaction cost is increasing in the level of labor deployed. Finally, the third term on the right hand side shows the marginal cost burden the firm has to bear on the labor in the domestic jurisdiction hired specifically in support of the intangible capital investment made in the foreign jurisdiction. This cost is higher than the pre-tax cost of labor in the domestic jurisdiction (w) by a fraction that amounts to a "transactional tax." This is the result of an intragroup payment from a low-tax jurisdiction to a high-tax jurisdiction. The domestic jurisdiction receives a payment equal to μ on the cost of each of the $(\gamma - \lambda)$ units of labor that complement the intangible capital

reported in the foreign jurisdiction. The firm gets to deduct this mark-up in the foreign jurisdiction at a tax rate lower than the rate at which it is taxed in the domestic jurisdiction.[15]

Figure 1 below depicts the marginal cost function faced by the firm when locating its intangible capital in the foreign jurisdiction.[16]

Figure 1

Marginal Cost of Foreign Investment
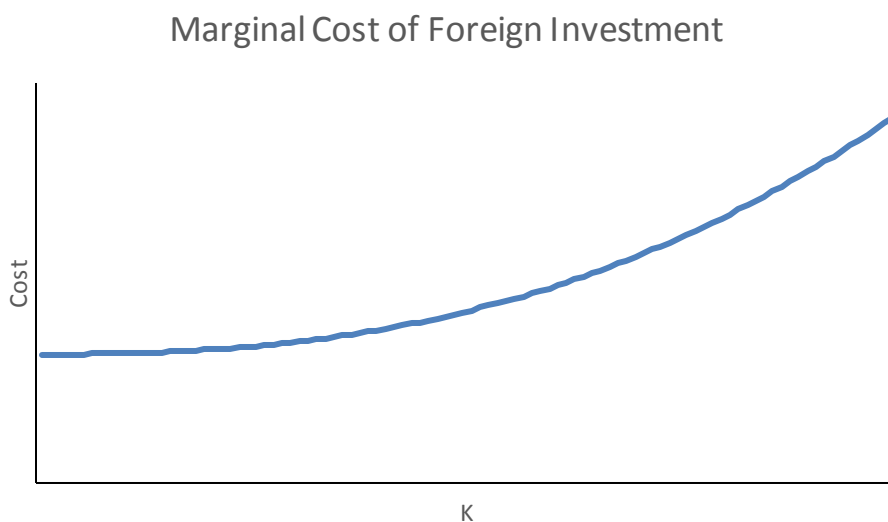
The MC_f curve is affected by the strictness of economic substance requirements in two ways. First, higher substance requirements lower the fraction of labor that can be deployed in the domestic jurisdiction in support of foreign capital, thereby lowering the "transactional tax" that comes from having to pay a profit mark-up to such labor. Higher substance requirements thus translate into downward shifts in the MC_f curve.[17]

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[16] The MC_f curve is shown as upward sloping and convex although the assumptions only guarantee that it will be upward sloping.

[17] Formally, the vertical intercept of the MC_f curve is given by $\left[\left(\frac{r}{1-\tau_f} + 1 \right) + \gamma \left[1 + \left(\frac{\tau_d - \tau_f}{1-\tau_f} \right) \mu \right] w - \lambda \frac{(\tau_d - \tau_f)}{(1-\tau_f)} \mu w \right]$ and is decreasing in λ.

Second, higher substance requirements make the MC_f curve steeper – by enforcing a higher degree of correlation between the capital and labor located in the foreign tax jurisdiction (and given that the jurisdiction in turn is characterized by increasing costs that rise at an increasing rate), the firm is forced to face a progressively higher cost per unit of capital located in the foreign jurisdiction.[18]

Figure 2 shows the position and shape of the MC_f curve faced by the firm under varying regimes of economic substance requirements where the requirements lie within the natural boundaries such that $\gamma > \lambda_1 > \lambda_2 > \lambda_3 > 0$. Other things equal, higher substance requirements translate into a marginal cost curve for the firm's investment in the low-tax jurisdiction that starts out lower but is steeper.

Figure 2

Marginal Cost of Foreign Investment Under Different Economic Substance Requirements

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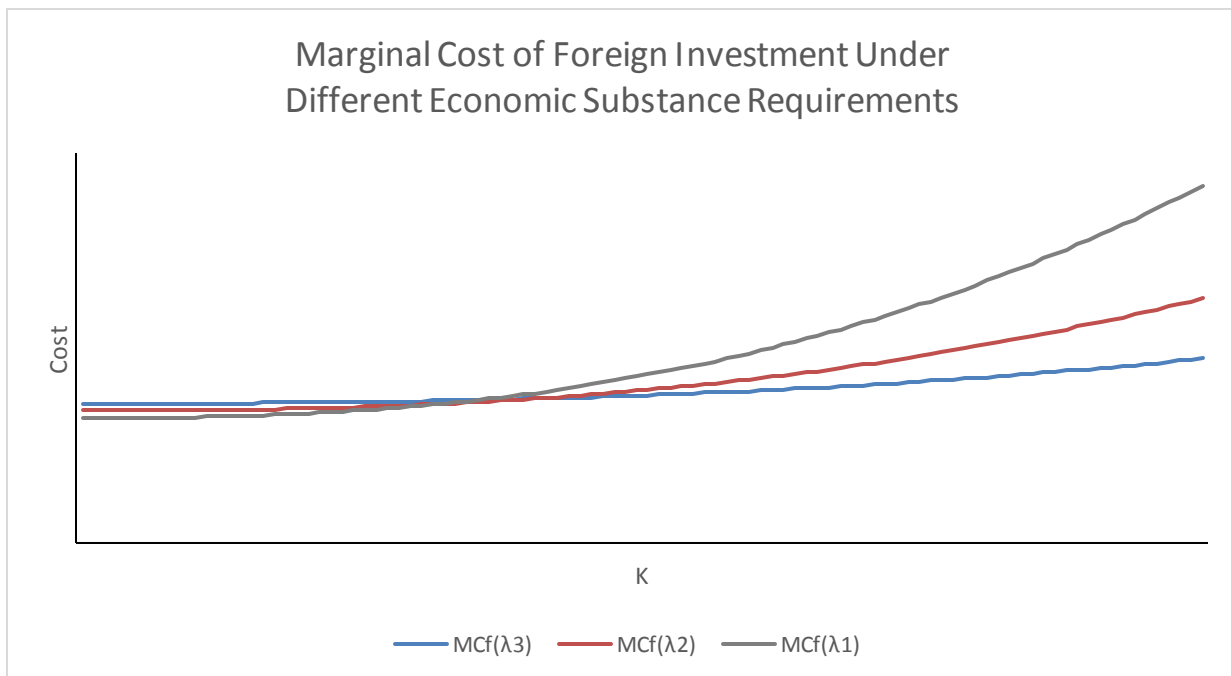
[18] Formally, the first derivative (i.e., slope) of the MC_f curve is given by $[\lambda^2[2c'(\lambda K_f) + \lambda K_f c''(\lambda K_f)] - \left(\frac{\tau_d - \tau_f}{1 - \tau_f}\right)\mu w]$ and is increasing in λ.

The firm's marginal cost function (MC_d) when it chooses to locate the marginal unit of capital in the domestic jurisdiction is given by Equation 6 below.

Equation 6

$$MC_d = \left(\frac{r}{1 - \tau_d} + 1\right) + \gamma w$$

The marginal cost of investment in the domestic jurisdiction is more straightforward on account of the constant cost per unit of domestic labor needed to complement that capital as well as the lack of any motivation on the part of the firm to locate any complementary labor in the foreign jurisdiction.

Figure 3 below depicts the marginal cost function faced by the firm when locating its intangible capital in the domestic jurisdiction.

Figure 3

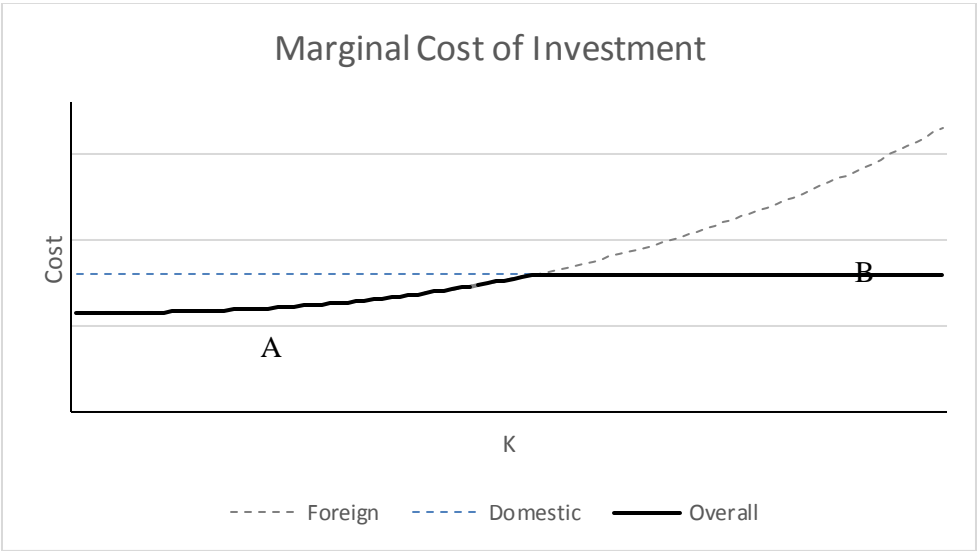
Marginal Cost of Domestic Investment
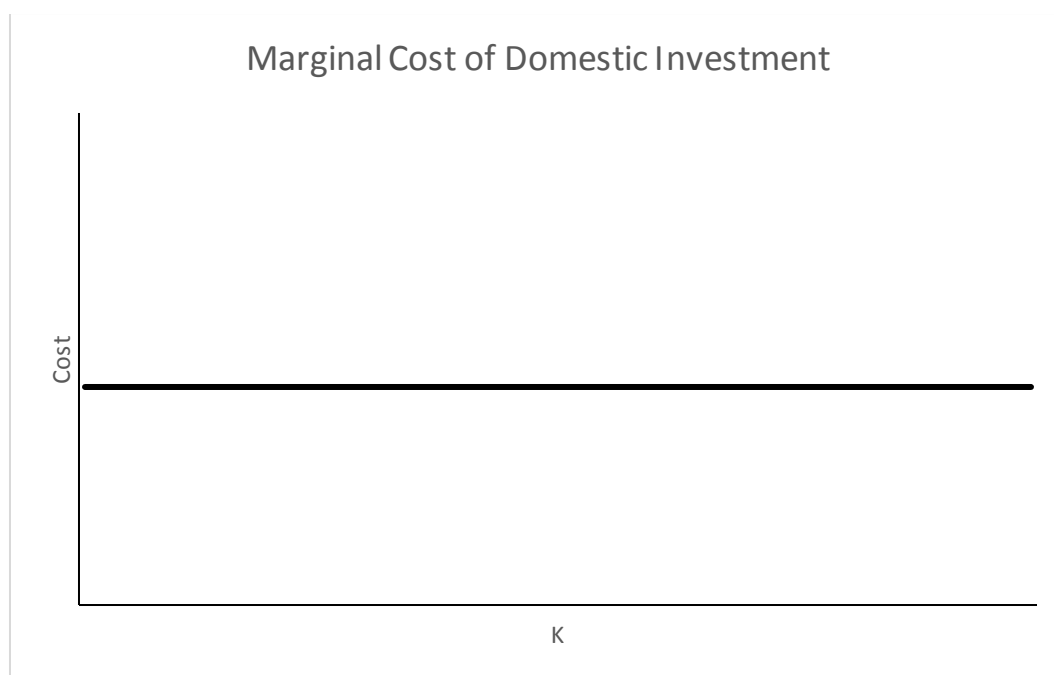
In order to maximize profits, the firm will make its investment location decision to minimize the marginal cost of that investment – i.e., its investment location choice will ensure that the firm is always on the lower of the two marginal cost functions MC_f and MC_d. The overall marginal cost for the firm (MC) is thus given by Equation 7.

Equation 7

$$MC = min[MC_f, MC_d]$$

The marginal cost function for the firm overall – always reflecting an optimal investment location choice – is represented by the solid upward sloping curve in Figure 4 below. The figure below represents the case where the international regime imposes an "intermediate" level of substance requirements – i.e., greater than zero but lower than the maximum feasible level (i.e., where $\lambda = \gamma$).

Figure 4

Marginal Cost of Investment

The lower tax rate in the foreign jurisdiction translates into a lower marginal cost of investment than in the domestic jurisdiction – the pre-tax rate of return that the firm needs to achieve is lower in the foreign jurisdiction than the domestic jurisdiction. Substance requirements that fall short of the maximum possible level (and thus allow the firm to locate some of the labor necessary to support the foreign capital in the domestic jurisdiction) allow the firm to enjoy this advantage in favor of the foreign jurisdiction without having to bear the higher labor cost necessary to complement the capital in that jurisdiction to the full extent. With positive substance requirements (i.e., $\lambda > 0$) however, the advantage enjoyed by the foreign jurisdiction does not persist indefinitely in terms of investment levels. As the firm locates greater levels of capital in the foreign jurisdiction, the advantage offered by the foreign jurisdiction through a lower tax rate is increasingly offset by the higher non-tax cost the firm has to incur. For every unit of capital the firm invests in the foreign jurisdiction, it is required to incur the cost of an additional λ units of labor that need to be co-located. Each such increment of labor comes at a higher marginal cost. The inflection point in the firm's marginal cost curve is when the marginal cost associated with an incremental unit of capital in the foreign jurisdiction is exactly equal to that in the domestic jurisdiction. Beyond this inflection point, the firm will locate all intangible capital in the domestic jurisdiction. Thus, the firm's marginal cost of investment in relation to intangible capital corresponds to the marginal cost associated with foreign investment (i.e., MC_f) before the inflection point to the marginal cost of domestic investment (i.e., MC_d) thereafter. For ease of exposition, the section of the firm's marginal cost curve that corresponds to MC_f is labeled "A", while that which corresponds to MC_d is labeled "B".

Looking at Figure 2 and Figure 4 together can help the reader visualize that section A would account for a relatively larger part of the firm's marginal cost curve with lower substance

requirements. Conversely, section B would account for a larger portion of the firm's overall marginal cost curve with higher substance requirements.

b. Optimality conditions (general case)

The firm's equilibrium characterizing its optimal choice of capital and labor is represented by the following first order condition derived from Equation 4 and Equation 7.
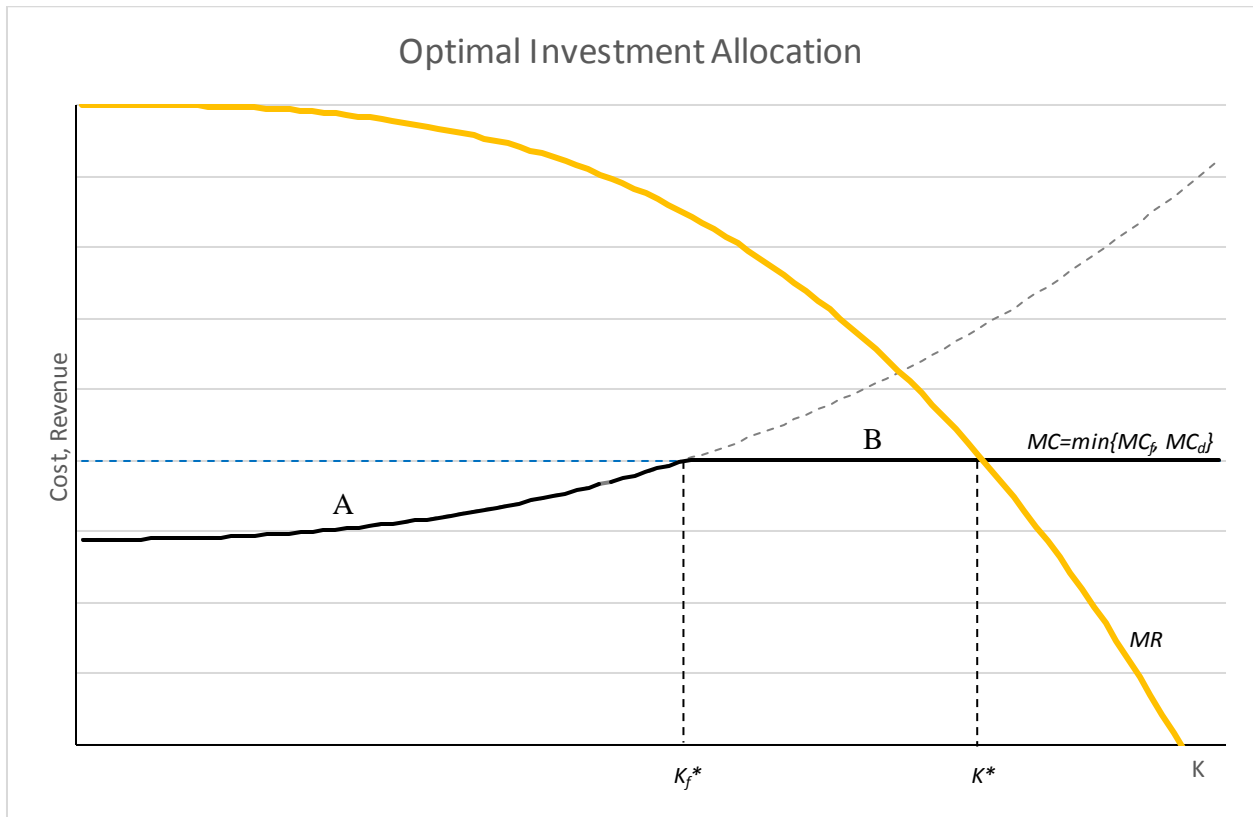
Equation 8

$$f'(K;L) = min[MC_f, MC_d]$$

In Equation 8, the left side represents the firm's (before-tax) marginal revenue (*MR*) attributable to intangible capital (deployed together with the requisite complementary labor). The right side represents the marginal cost of the investment when the firm makes its location choice both with regard to the capital as well as the requisite labor optimally. Figure 5 depicts the firm's equilibrium in this general case where K^* is the firm's optimal level of total capital investment and is identified by the intersection of the *MR* and *MC* curves. Of this total capital investment, the firm locates K_f^* in the foreign jurisdiction with this level being identified by the inflection point in the firm's *MC* curve. The level of capital located in the domestic jurisdiction is given by $K_d^* = K^* - K_f^*$.[19]

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[19] The case that is depicted here has the MR curve intersecting section B of the firm's MC curve – i.e., the portion that corresponds to MC_d. The equilibrium level of capital thus has nonzero allocations across each jurisdiction. An equilibrium situation that has the firm's *MR* curve intersecting section A of the firm's *MC* curve will have all capital located in the foreign jurisdiction. Which situation actually prevails will depend on a number of factors such as the tax rate differential between the two jurisdictions, the severity of the labor cost disadvantage of the foreign jurisdiction (i.e., $c(L)$) and, what is the focus of this paper, economic substance requirements.

Figure 5

Optimal Investment Allocation

Cost, Revenue (y-axis)

A

B

$MC=min\{MC_f, MC_d\}$

MR

K_f^* K^* K (x-axis)

Lastly, the firm's choice with regard to the location of the labor needed to complement its capital investment is entirely driven by the substance requirements and given by Equation 9 and Equation 10 below.

Equation 9

$$L_f^* = \lambda K_f^*$$

The firm locates no more than the minimal level of labor necessary to meet the substance requirements in the foreign jurisdiction (Equation 9) with all remaining labor needs being met in the domestic jurisdiction (Equation 10).

Equation 10

$$L_d^* = \gamma K_d^* - (\gamma - \lambda)K_f^*$$

III. Impact of Economic Substance Requirements

With the above set up, we now turn to the firm's optimal choices – with regard to the level as well as location of its capital-labor mix – under two polar cases. The first case represents an international regime with no economic substance requirements (i.e., where $\lambda=0$). The second represents a regime with the most stringent standard feasible (i.e., where $\lambda=\gamma$). Contrasting these two extreme cases is intended to highlight the impact of economic substance requirements on firms' decisions regarding the level and location of intangible capital as well as on the corresponding level and location of the people functions and activities needed to complement such capital.

a. No substance requirements

With no economic substance requirements mandated or enforced under an international regime, the cost of locating the marginal investment in intangible capital in the foreign jurisdiction is derived from Equation 5 (by setting $\lambda=0$). This function is shown in Equation 11 below.

Equation 11

$$MC_f = \left(\frac{r}{1 - \tau_f} + 1\right) + \gamma\left[1 + \frac{(\tau_d - \tau_f)}{(1 - \tau_f)}\mu\right]w$$

Absent any substance requirements, the firm is able to benefit from the lower tax rate in the foreign jurisdiction without having to bear any of the higher (and increasing) non-tax costs associated with locating complementary labor in that jurisdiction.

The firm's cost of locating its marginal investment in the domestic jurisdiction is unaffected by economic substance requirements and is thus unchanged from what is shown in Equation 6. Without any economic substance requirements to constrain its labor location choice, the firm is able to access the best of both worlds when locating intangible capital in the foreign jurisdiction – a lower tax rate at which the intangible income is taxed along with the lower costs at which the requisite labor can be accessed in the domestic jurisdiction. Consequently, under this regime the marginal cost of locating a unit of intangible capital in the foreign jurisdiction is lower than in the domestic jurisdiction *for all levels* of investment.

The overall marginal cost function for the firm thus coincides with its marginal cost function for the foreign jurisdiction as shown in Equation 12 below.

Equation 12

$$MC = min[MC_f, MC_d] = MC_f$$

Figure 6 visually depicts the firm's optimal choice of capital investment under this regime. The firm's equilibrium is characterized by the intersection of the MR curve and the MC_f curve (the MC_d curve is shown purely for reference). This choice of capital is denoted by K^* and all of this is capital is located in the foreign jurisdiction (i.e., $K^* = K_f^*$).

Figure 6

Optimal Investment Allocation Under No Substance Requirements
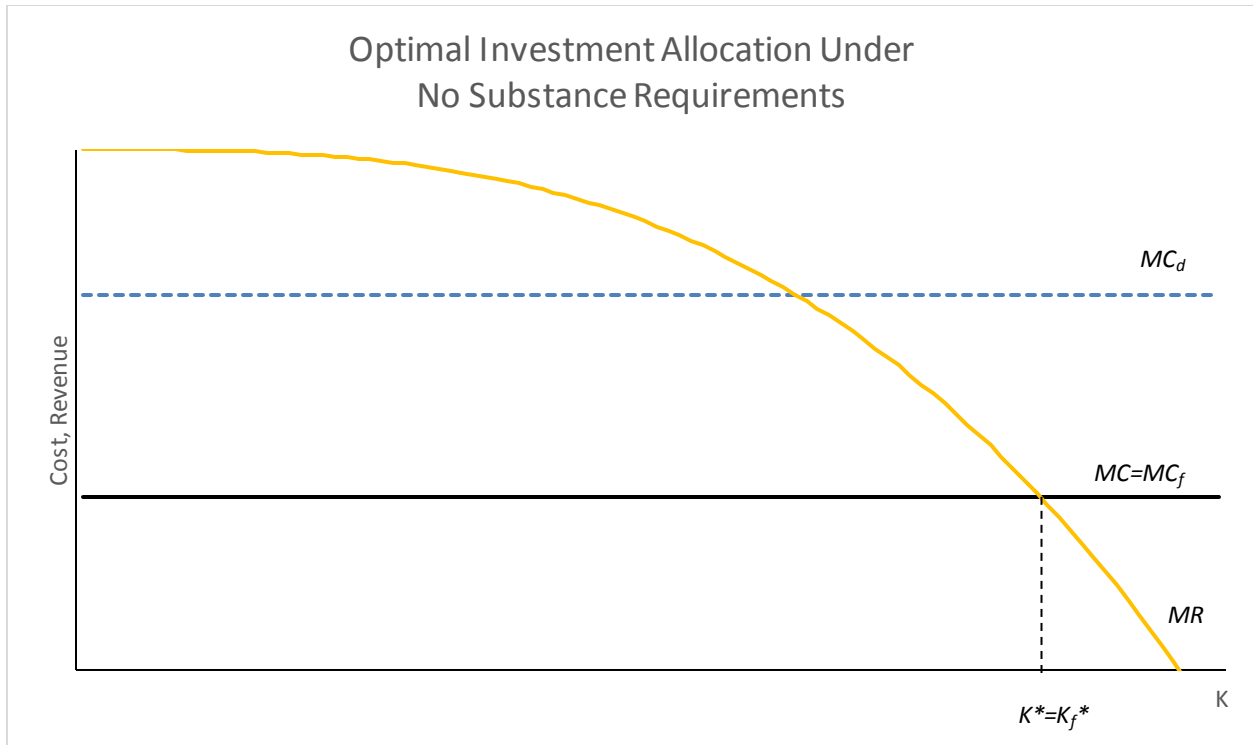
The firm chooses a total level of labor equal to L^* corresponding to the overall investment in capital and as required by its production function. In the absence of any substance requirement constraining the firm's choice, all of this labor is located in the domestic jurisdiction. The following equations thus characterize the equilibrium choices made by the firm under this regime with no substance requirements.

Equation 13

$$f'(K^*; L^*) = \left(\frac{r}{1 - \tau_f} + 1\right) + \gamma[1 + \frac{(\tau_d - \tau_f)}{(1 - \tau_f)}\mu]w$$

Equation 14

$$L^* = \gamma K^*$$

Equation 15

$$K_f^* = K^*$$

Equation 16

$$L_d^* = L^*$$

Given the production function and the tax rates in the respective jurisdictions, the firm faces the lowest possible marginal cost of investment in a regime with no substance requirements. This corresponds to marginal cost function for the foreign jurisdiction as the location of all intangible capital with all complementary labor being located in the domestic jurisdiction. That the firm faces the lowest possible marginal cost function means that it chooses the maximum possible level of investment in intangible capital and the associated level of complementary labor under this regime. The two jurisdictions receive distinct elements of the firm's investments. The foreign jurisdiction receives all of the intangible capital (with the corresponding taxable income attributable to it) and none of the labor. In contrast, all economic activity by way of the labor needed to complement the capital is located in the domestic jurisdiction although it receives none of the intangible capital (or the income attributable to such capital that can be taxed). We next contrast this outcome with what prevails under a regime with the highest possible substance requirements.

b. Highest substance requirements

As described previously, the most stringent substance requirement that can be imposed under a regime requires a firm to have the same ratio of labor to capital in each of the two jurisdictions. This ratio is in turn dictated by the firm's production function. Thus, this regime requires that

$\lambda = \gamma$. The firm's cost of locating its marginal investment in intangible capital in the foreign jurisdiction is the highest under this regime and can be derived from Equation 5 (by setting $\lambda = \gamma$). This is shown in Equation 17.

Equation 17

$$MC_f = \left(\frac{r}{1 - \tau_f} + 1 \right) + \gamma \left[c(\gamma K_f) + \lambda K_f c'(\gamma K_f) + w \right]$$

With the maximum possible substance requirements, the firm is forced to bear the full extent of the transactional cost inefficiency that comes from having to locate labor in the foreign jurisdiction. These transactions cost bear on every additional unit of labor needed to complement an incremental unit of intangible capital located in the foreign jurisdiction.

Once again, the firm's cost of locating its marginal capital investment in the domestic jurisdiction remains unchanged and is given by Equation 6. Comparing MC_f in Equation 17 with MC_d we can see that, despite the highest possible substance requirements, it is not the case that MC_f is higher than MC_d at *all* levels of capital.[20] Thus, the firm's overall marginal cost function will have a section – corresponding to a range of capital investments – that corresponds to MC_f and the remainder that corresponds to MC_d. The overall marginal cost for the firm continues to be specified by Equation 7 but with the MC_f function now being given by Equation 17.

The shape of the firm's MC curve is not fundamentally dissimilar to what is depicted in Figure 4 which shows the MC curve corresponding to an "intermediate" level of substance requirements. The difference is that, relative to the intermediate case, the firm's MC curve under a regime with the highest substance requirements will have its segment A that is steeper and accounts for a

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[20] This is validated by the observation that $MC_f < MC_d$ at $K=0$. Continuity of both cost functions then ensures that there is some non-zero range of values for K where MC_f is lower than MC_d.

smaller portion of the overall *MC* curve and its segment B that accounts for a larger portion of the *MC* curve. Finally, the height difference between the two segments (reflecting the maximum extent of the cost advantage enjoyed by the foreign jurisdiction over the domestic) is greater.

The firm's equilibrium under this regime is shown in Figure 7. The intersection of the *MR* curve and the *MC* curve identifies the firm's optimal choice of overall capital investment. This choice of capital is denoted by K^{**}. Of this overall investment, K_f^{**} is located in the foreign jurisdiction where K_f^{**} is identified by the intersection of section A of the firm's MC curve (i.e., the portion corresponding to MC_f) with section B (i.e., the portion corresponding to MC_d). Finally, the difference between K^{**} and K_f^{**} defines the level of capital located in the domestic jurisdiction K_d^{**}.

Figure 7

Optimal Investment Allocation Under Maximum Substance Requirements
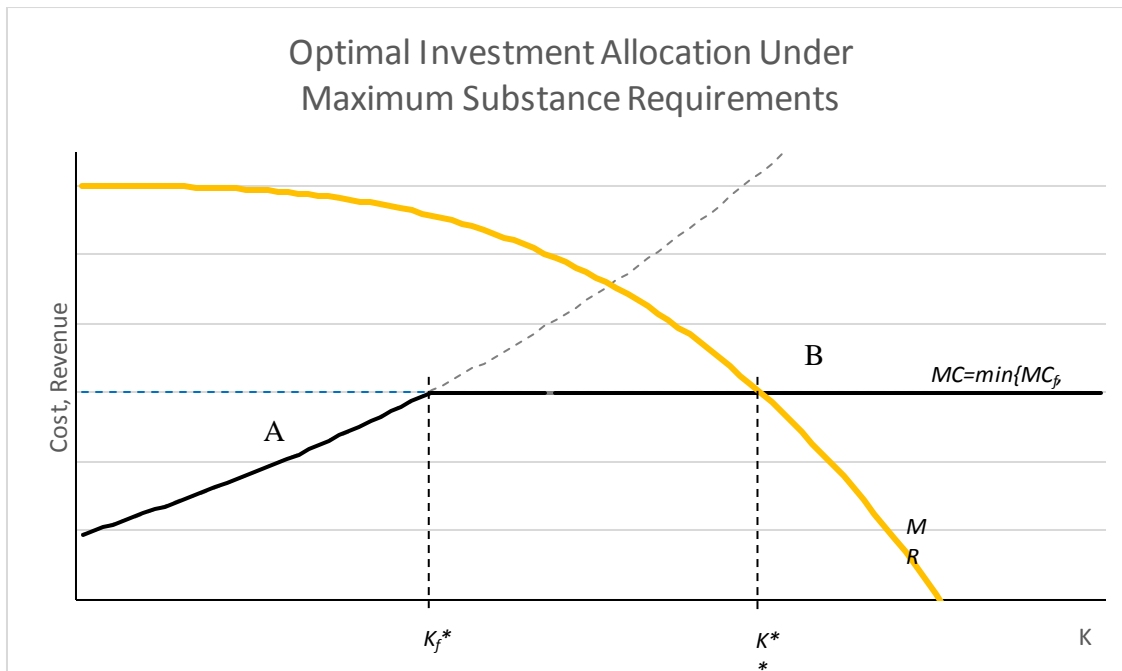
In Figure 7, the MR curve for the firm is shown intersecting that section of the MC curve that corresponds to MC_d (i.e., section B). It deserves mention that this is by no means the only possibility. It is not inconceivable that even at the highest possible substance requirements, the intersection of the *MR* and *MC* curves takes place at some point that lies on section A. This would mean that while the higher substance requirements would be successful in raising the cost the firm has to face when locating its intangible capital in the foreign jurisdiction, it doesn't raise the cost enough for the firm to actually locate any investment in the domestic jurisdiction. The non-tax disadvantage of the foreign jurisdiction – which is what the firm is prevented from avoiding because of the substance requirements – are simply not high enough in such a case to offset the tax advantage. The domestic jurisdiction would gain nothing by way of higher substance requirements in such a case. However, this is not the case presented in the equilibrium shown in Figure 7 and characterized below. Instead, we characterize the most favorable possibility from the perspective of the domestic jurisdiction to show how, even in such a case, the domestic jurisdiction is not unambiguously better off from higher substance requirements. Instead, as discussed below, the domestic jurisdiction trades one objective (higher corporate income tax revenues) for another (economic activity by way of people functions).

The first condition for the firm's equilibrium as shown in Figure 7 characterizes its overall level of capital investment chosen and is captured by Equation 18.[21]

Equation 18

$$f'(K^{**}; L^{**}) = \left(\frac{r}{1 - \tau_d} + 1 \right) + \gamma w$$

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[21] Note that over the range of capital investment that the intersection of the *MR* and *MC* curves is assumed to take place, the firm's *MC* curve corresponds to MC_d (since this is lower than MC_f for the range of capital investments).

Next, of the total level of capital investment K^{**} chosen by the firm, K_f^{**} is located in the foreign jurisdiction and is identified by the condition in Equation 19 below.[22]

Equation 19

$$\left(\frac{r}{1-\tau_f} + 1\right) + \gamma\left[c(\gamma K_f^{**}) + \lambda K_f^{**} c'(\gamma K_f^{**}) + w\right] = \left(\frac{r}{1-\tau_d} + 1\right) + \gamma w$$

The level of capital located in the domestic jurisdiction is then given by Equation 20.

Equation 20

$$K_d^{**} = K^{**} - K_f^{**}$$

Finally, the highest possible substance requirements under this regime enforce a level of labor deployment in each jurisdiction that is strictly proportionate to the capital located there. The following equations characterize the firm's optimal choices of level and location of labor to complement its capital investments under this regime.

Equation 21

$$L_f^{**} = \gamma K_f^{**}$$

Equation 22

$$L_d^{**} = \gamma K_d^{**}$$

We now turn to a comparison of the equilibriums under the two regimes representing the opposite ends of the spectrum with regard to economic substance requirements.

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[22] By rearranging the terms, the equation can be shown to identify the level of capital in the foreign jurisdiction where the tax advantage of locating the subsequent unit of investment in the foreign jurisdiction (relative to the domestic jurisdiction) is exactly offset by the transactional cost disadvantage.

c. Comparison of regimes with alternative substance requirements

In this section we compare the equilibrium decisions of the firm under the two alternative regimes of substance requirements with regard to the following:

1) The worldwide level of investment (in intangible capital) and associated economic activity (as measured by the overall level of labor employed to complement the capital investment);

2) The level of intangible capital investment received (and the corresponding corporate tax revenues generated) by the domestic jurisdiction; and,

3) The level of economic activity – specifically, level of employment generated – within the domestic jurisdiction.

i. Worldwide investment and employment

A comparison of Equation 13 and Equation 18 shows that the firm's total level of investment under a regime with no substance requirements (K^*) is higher than the corresponding level under the regime with the highest possible substance requirements (K^{**}). This is ensured by the combination of the production function exhibiting diminishing returns and the marginal cost of investment being lower under the "no substance" regime than the "high substance" regime *for all levels* of investment. This result is hardly surprising: without substance requirements forcing the firm to "internalize" (at least some of) the foreign jurisdiction's higher non-tax costs, the firm is

able to access its required capital-labor input mix at the lowest possible cost by locating these inputs in their respective "low-cost" jurisdictions.

Given the one-to-one relationship between capital and labor via the production technology, the above also means that the total labor employed by the firm under the "no substance" regime (L^*) is higher than that under the "high substance" regime (L^{**}). Thus, from the perspective of global economic efficiency the "no substance" regime is superior to the "high substance" regime – it generates greater investment and employment overall.

Lack of substance requirements can allow certain types of firms (i.e., those with international operations involving intangible capital) to lower their effective burden of corporate taxes at relatively low cost. By avoiding some of the corporate tax burden, such firms also avoid some of the detrimental economic effects that come with such taxes (e.g., lower investment and activity). The effect of substance requirements is to increase the transaction costs firms have to incur in locating their intangible capital in tax favorable jurisdictions. To the extent such requirements are successful in having the aforementioned effect, *starting* from a state mandating or enforcing low substance requirements mandate, it should not be surprising that higher substance requirements bring with them all the concomitant effects of higher taxes on investment.

Next, we turn to comparing the two regimes in terms of how the respective jurisdictions fare in attracting investment and employment – in particular the domestic jurisdiction whose interests the substance requirements are ostensibly designed to serve – under the two regimes.

ii. Intangible capital located in the domestic jurisdiction

Under the "no substance" regime the domestic jurisdiction receives no intangible capital. It fares significantly better under the "high substance" regime in regard to its ability to attract intangible

capital. While initial levels of investments under this regime are located in the foreign jurisdiction, the substance requirements require the firm to locate all necessary labor needed to complement capital in that jurisdiction as well. As investment levels rise, the accompanying labor comes at a progressively higher cost in the foreign jurisdiction. The point at which the firm's benefit from the lower tax cost in the foreign jurisdiction is exactly offset by the higher labor costs identifies the equilibrium level of capital that the firm chooses to locate in the foreign jurisdiction. This is shown mathematically in Equation 19 and depicted by the point in Figure 7 where Section A of the firm's MC curve intersects section B.

As shown in Equation 20, all investment beyond this "inflection point" is located in the domestic jurisdiction. Thus, in contrast to the "no substance" regime where the domestic jurisdiction receives no intangible capital, the situation depicted here has the firm bifurcating its intangible capital investment between the two jurisdictions. The domestic jurisdiction is unambiguously better off in the "high substance" regime with regard to the firm's location choice of intangible capital.

iii. Substance (employment) in the domestic jurisdiction

That more stringent substance requirements are, at best, a mixed blessing for the domestic jurisdiction is borne out by how the jurisdiction does with regard to employment under the "high substance" regime. Under the "no substance" regime, the domestic jurisdiction is the exclusive beneficiary of all employment generated to complement the firm's intangible investment (even though the latter is located entirely in the foreign jurisdiction). In contrast, the employment generated in the domestic jurisdiction under the "high substance" regime is limited on two counts.

First, as discussed in Section 31, overall (worldwide) employment is lower under the "high substance" regime than under the "no substance" – an outcome that stems from the firm's lower level of investment in intangible capital under the regime. This stems from a pure "deadweight loss" that results from the firm having to face a higher marginal cost of investment now that it cannot avail of a low-tax jurisdiction (in a costless manner). This result by itself would be sufficient to make the domestic jurisdiction worse off in relation to employment under the "high substance" regime. However, unlike under the "no substance" regime, the domestic jurisdiction gets less than the full share of the global employment under the "high substance" regime. Even the most stringent of substance requirements cannot entirely eliminate the attractiveness of the foreign jurisdiction for the firm with regard to the location of intangible capital. Consequently, the firm does locate some positive level of intangible capital (howsoever small) in the foreign jurisdiction even under a regime that imposes the maximum permissible level of (non-tax) costs on the firm for doing so. Moreover, such investment in the foreign jurisdiction comes with the co-location of the corresponding level of complementary labor. Thus, the domestic jurisdiction loses out on employment through a second channel – the foreign jurisdiction gets some positive employment at the cost of the domestic jurisdiction.

IV.   Conclusion

Given the substantial focus devoted to the subject in the BEPS report on Actions 8 through 10 and the approaches in tax administration   adopted by many taxing authorities, MNEs' intercompany pricing arrangements involving intangibles undoubtedly will be required to meet a higher standard of economic substance in the post-BEPS international tax regime. There is a risk

that some taxing authorities will push this concept beyond the bounds compatible with the arm's length principle such that the application of this concept may start to resemble formulary outcomes (i.e., allocations of intangibles-related income based purely on the location of people functions).

This paper presents an analytical framework to explore the implications of more stringent economic substance requirements on multinational firm behavior – specifically in relation to such firms' choices with regard to the scale as well as location of capital and labor. In modeling standards of economic substance, the framework establishes certain natural limits that would exist under an international regime that requires consistency of standards and enforcement as a necessary design feature. We find that a formal treatment of the subject of economic substance requirements has been missing from the literature, thereby hindering a grounded analysis of the change being ushered in by the OECD's BEPS project.

This paper finds that stronger economic substance requirements are not an unqualified panacea for revenue authorities in high-tax jurisdictions. While stronger standards of economic substance and their enforcement can result in firms' reporting a higher share of their intangible assets (and related income) in high-tax jurisdictions, this comes with a cost. This cost is the lower economic activity – in the form of the functions and jobs related to the development and management of the intangibles – generated in these jurisdictions. Not only is such economic activity a source of revenue in its own right (possibly a more important one than the corporate income tax), it has larger welfare implications. Only some of the high-tax jurisdiction's loss of such economic activity is the result of relocation to the low-tax jurisdiction. The remainder is simply a deadweight loss that results from the firm having to face a higher marginal cost of investment than it did previously. It may be argued that such deadweight loss is consistent with the "correct"

income tax burden and one that the firm should have faced all along. However, such an argument does not alter the likely implications of higher substance requirements relative to a status quo where firms face a lower marginal cost of investment by virtue of their location of intangible assets.

In future work, we hope to model more explicitly the impact on global versus national welfare. Some earlier work along these lines by Slemrod and Wilson (2006) and Hong and Smart (2010) suggests competing implications of international tax planning and income shifting on national welfare. Slemrod and Wilson (2006) find that the presence of income shifting to tax havens reduces welfare in high-tax countries. Our results similarly suggest significant implications for a relatively high-tax country like the United States. The United States currently has one of the highest marginal corporate tax rates in the OECD, although a cut in the headline rate has been proposed by the incoming Administration (Pomerleau and Potosky 2016). If the rates continue to remain out of line with those in other countries, the imposition of economic substance requirements could cause real economic activity to decline in the United States, leading to a loss of jobs and investment in the United States. From the perspective of the United States, the implications, as laid out in this paper, should offer yet more motivation for reform of the corporate income tax code.

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