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Forensic Approaches to Transfer Pricing Compliance and Enforcement

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Introduction

"Transfer pricing" refers to the pricing of intercompany transactions between the related affiliates of a commonly controlled multinational enterprise that are located in different taxing jurisdictions.[1] Intercompany transactions include sales of services and tangible goods, the transfer of intellectual property (IP) such as trademarks, technology, know-how, processes, systems, and other IP, the sharing of research and development costs, the provision of intercompany loans and guarantees and myriad other transactions–whether such transactions are found in the open market or not. Transfer prices are often constructed prices involving complex calculations that incorporate management's estimates, judgements and biases, together with proprietary information and economic modelling that may be beyond the capabilities of IRS resources to decipher. Detecting avoidance or confirming compliance is difficult because of high levels of subjectivity, complex pricing methodologies, intensive research requirements, vague or loose regulatory principles—some of which ignore or even conflict with the laws of economics—and various audit biases such as information and resource asymmetry, adverse selection, confirmation bias and bounded rationality.

The internal revenue code requires intercompany transactions to be priced at "arm's length" or "market" prices based on comparable uncontrolled market transactions to the extent possible. Regulations governing transfer pricing are found in Title 26 of the Code of Federal Regulations, Chapter I, Subchapter A, Part 1, section 482, which prescribe various methods for pricing these transactions.[2] Regulations section 1.482-1(c) allow taxpayers the freedom to choose any transfer pricing method that can be represented as the "best method." This provides taxpayers significant flexibility in both pricing and structuring transactions, but can lead to controversy if the Service takes a different approach or views the transfer prices as aggressive.

The IRS disclosed in 2014 that it was investigating transfer pricing issues (covering perhaps two to four audit years on average) for which proposed tax adjustments totaled as much as $194 billion (BNA 2015a). Estimates of annual U.S. federal and state corporate income tax losses due to improper transfer prices by academic and governmental sources appears to be around $100 billion per year (Congressional Research Office 2015, Zucman 2014, Clausing 2003, 2011 and 2016, and supporting information found in Audit

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[1] These are also referred to as "controlled" transactions. Treasury Regulations section 1.482-1(i)(4) defines control as "any kind of control, direct or indirect, whether legally enforceable or not, and however exercisable or exercised, including control resulting from the actions of two or more taxpayers acting in concert or with a common goal or purpose . . . A presumption of control arises if income or deductions have been arbitrarily shifted."

[2] Unless otherwise noted, all "Section" references hereafter are to the U.S. Internal Revenue Code of 1986, as amended (Code), and all "Regulations section" references are to the Treasury regulations promulgated under the Code.

Analytics 2015 and OECD 2015a).[3] Including profit shifting from transfer pricing and other international tax planning, these estimates would equate to almost three times the most recent IRS annual net tax gap estimate for large corporations.[4] Assuming that the inventory of IRS proposed tax adjustments for transfer pricing has resulted from a long term average audit rate of around eighteen percent for large taxpayers (defined as having annual revenues exceeding one billion dollars), then it is possible that audit experience and external research could reach similar conclusions if IRS audit results were extrapolated to the entire population of large multinational taxpayers.[5] This supports the argument that expanded audit coverage would identify more alleged tax underpayments. Importantly however, the IRS only sustains around thirty percent of corporate tax adjustments on average once taxpayers appeal them (IRS 1999, TIGTA 2003). More recent information indicates that these rates may have declined even further by 2014 (BNA 2015b). Therefore, improvements in enforcement appear to rely on increasing both audit coverage and audit quality. Both dimensions appear to be impacted by resource constraints, since the IRS has struggled in recent years to examine transfer pricing as the population of experienced international examiners has declined by as much as forty percent between 2011 and 2014 alone, with as many as half of the remaining examiners becoming eligible to retire in the very near future, while the International division as a whole has lost twenty-three percent if its workforce in the same period (Miller 2012, BNA 2015b). Indeed, the IRS commissioner announced at a conference in 2014 that the IRS has insufficient resources to process transfer pricing related information soon to be filed by U.S. MNEs as part of the OECD BEPS initiative.[6]

The IRS uses sophisticated data analytics models to evaluate individual tax returns, including discriminant function (DIF) and other models which are updated by its National Research Program (NRP) and designed to improve audit selection and reduce IRS audits of compliant taxpayers (IRS 2010). No such technical approaches appear to be employed in the selection or auditing of corporate tax returns for transfer pricing—processes which rely almost exclusively on manual, subjective reviews of taxpayer-prepared documentation and public information, often by a single non-specialist examiner, without access to specialized technical support (IRS 2013, 2014). Indeed, multinational corporate taxpayers are not assessed on their transfer pricing risk until they are selected for audit via other criteria, such as size (BNA 2016), and only about eighteen percent of large corporate taxpayers are typically audited (IRS 2016). Former IRS officials have described existing corporate audit techniques as primitive "hunt and peck" type audits and have sought to improve upon them using various staffing and operational reorganizations together with enhanced information sharing mechanisms and more procedural guidance (Elliott 2015, BNA 2015c). The IRS has also recently created a data management group, international practice

[3] An extrapolation of maximum 2012 estimates of international tax avoidance presented in Clausing 2016 to the present year using growth rates in Audit Analytics 2015, and attributing three quarters of this to transfer pricing based on Congressional Research Office 2015, produces an estimate of transfer pricing related tax adjustments of approximately $104 billion by the end of 2015. This would also imply state tax losses on the order of seventeen billion dollars, using an average state tax rate of six percent, leading to possible U.S. federal and state tax underpayments of as much as $120 billion per year from transfer pricing.

[4] Estimates of federal tax underpayments from offshore profit shifting are not reported separately, and are not estimated by the IRS pursuant to a methodological study. Estimates of corporate tax underpayments are based in part on formulas and proposed assessments resulting from audits of multinational taxpayers (TIGTA 2013). One issue raised by the TIGTA report was the inability of the Service to distinguish between aggressive but legal international tax avoidance and tax evasion given the asymmetry between taxpayer and IRS resources and capabilities, and variances in the skill level and experience of individual examiners. It would appear that the combination of high levels of complexity and subjectivity in transfer pricing, asymmetric taxpayer and IRS resources, and low audit rates on which the tax gap estimates are based could bias the tax gap estimates substantially downward from what might be estimated with greater IRS capabilities and resources, more accurate risk assessment and issue identification, and higher audit rates.

[5] Both TIGTA 2013 and IRS 2016 support that this rate has been approximately eighteen percent in recent years.

[6] Comments given at the Twenty Seventh Annual Institute on Current Issues on International Taxation, December 11, 2014 in Washington D.C.

networks, and other administrative processes and reorganizations in its Large Business and International (LB&I) division that is responsible for transfer pricing enforcement (Danilack et al., 2015). However, without innovative forensic and data analytics capabilities it is unclear whether such organizational changes can by themselves improve enforcement in light of diminishing resources. Notably, taxpayers are not required to maintain documentation showing how intercompany prices were computed or even whether such prices are compliant with Section 482, though taxpayers can avoid penalties of up to forty percent in the event of an IRS adjustment, to the extent that such studies are prepared and available contemporaneously with their corporate tax filing [IRC Sections 6662-6(e) and 6662(h)]. Most cases of substantial profit shifting alleged by the Service involve comprehensive documentation by taxpayers purporting compliance in ways the Service has found difficult to examine or challenge.

The current approaches to transfer pricing compliance and enforcement appear to result in both Type I (mistakenly identifying tax evasion when it does not exist) and Type II (failing to detect tax evasion when it exists) errors. These Type I and Type II errors (which represent a "false positive" and "false negative" respectively—assuming the null hypothesis of compliance) have likely contributed to the incidences of auditing and challenging compliant transactions, leading to low sustention rates and a continuing prevalence of reversals in federal tax court. These controversies are very expensive for both taxpayers and the U.S. government—regardless of their outcomes. Type I and II errors also appear to affect the IRS' Advance Pricing Agreement (APA) program, at least according to a congressional investigation initiated in 2003 that found that the IRS program often approved what the investigators considered to be noncompliant transfer prices (Tax Notes 2008). Indeed, APAs can provide substantial financial benefits to U.S. multinationals (benefits that are typically not available to domestic taxpayers), as illustrated by the following disclosure:

> *"Our provision for income taxes decreased to…an effective tax rate of thirteen percent, in the three months ended December 31, 2006…This decrease was primarily attributable to the effects of an Advanced Pricing Agreement (APA) we entered into with the Internal Revenue Service…"*[7]

In addition, a separate study of six taxpayers by the Joint Committee on Taxation in 2010 raised similar issues (JCT 2010), and highlighted the risks of attempting to value shared intangibles using one sided methods that the regulations appear to support in inappropriate circumstances. This uncertainty as to what constitutes compliant transfer pricing increases the burdens on compliant taxpayers who expend considerable resources documenting and defending their intercompany transactions on intensive audits and drawn out tax court battles, while other taxpayers may benefit from what appear to be "sweetheart deals" resulting from their audits or APAs. These dichotomies are compounded by, and perhaps enabled by antiquated and problematic regulations that often diverge from both the arm's length standard and economic theory. This is discussed below.

The False Premise Behind the Section 482 "Arm's Length Standard"

The U.S. transfer pricing regulations are based on the "arm's length standard" in which separate related entities within a common enterprise are treated as "stand alone" economic actors, and the enforcement exercise typically focuses on the examination of the transactions occurring between these related entities and the methods used to price them. A major problem with this approach is that often large multinational taxpayers are highly centralized and globally integrated; leveraging common supply chain networks, shared intangibles and centralized high value services involving transactions that may be invisible to the examiner if not disclosed by the taxpayer. In addition, no single related affiliate in these structures could truly operate independently as the regulations presume without the contributions of the corporate parent. These large taxpayers may centralize manufacturing globally in one tax jurisdiction, distribution in

[7] Google Inc. FY2006 Annual Report. Apple Inc. and other technology companies also have APAs from the IRS that are credited with substantial tax savings (see Reuters 2013).

another, with the corporate headquarters in another, and so on. These separate related party affiliates are therefore integrally related or interdependent slices of the global organization. Such operationally incomplete entities rely on the "corporate network" (sometimes referred to as a "management system") in order to access shared intangibles (know-how, technology, trademarks, operating processes, quality standards, retail store designs, and the like), management and direction, and globally integrated supply chains managed and coordinated by the corporate parent through policies, procedures, methods, standards and other control mechanisms. The Service has in the past defined certain corporate networks as a "system"—a unique intangible for which a holistic (i.e., two sided) transfer pricing exercise should be performed (emphasis by the author):

> *"the Network comprises a "system" within the meaning of section 936(h)(3)(B)(v)…The [related affiliates] are integrated because of the interrelationship among the worldwide locations through which Taxpayer conducts Business…the interrelated [transactions] must be analyzed for transfer pricing purposes in the aggregate."* [8]

Tax courts have also valued such integrated management systems/corporate networks very highly:

> *"This sharing of management expertise, technical skills, and human resources was one of the great strengths of petitioner's…management system…managerial expertise and experience which were readily available to and used by [foreign affiliate]…we have concluded and found as a fact that seventy-five percent of the taxable income of [foreign affiliate]…was attributable to [the use of U.S. parent taxpayer's management system]."*[9]

These two comments above touch on critical aspects of the organizational structure and supporting functions. Corporate networks and management systems enable management control and coordination over activities on which affiliates depend to conduct their operations, and also as a transmission mechanism for valuable shared intangibles. Centralized management systems/corporate networks applied to vertically and horizontally integrated organizations create many efficiencies compared to uncoordinated market interactions for similar functions. These include the elimination of hold-up problems that may be present in external transactions, economies of scope and scale and other benefits. This creates an "efficiency premium" that then distinguishes interdependent controlled affiliates from independent uncontrolled benchmarks for narrowly defined, disaggregated activities. These efficiencies are the very foundation behind the "nature of the firm," first postulated by Nobel Laureate Ronald Coase in 1937, and their potential as an Achilles heel to the U.S. regulatory focus on transactions and comparables was identified by the U.S. Treasury Office of Tax Policy Analysis in 1988 (emphasis by the author):

> *"…the flaw in an arm's length approach is that it does not allow a return to the form of organization. That is, because an integrated enterprise is presumably more efficient it will be able to execute an integrated economic activity at a lower cost than a series of independent firms whose joint efforts are necessary to execute the same series of transactions. The omission creates…a continuum price problem…arm's length prices may be unavailable…and their use, if they exist, may be inappropriate."*

The development and exploitation of differentiated proprietary capabilities through corporate networks involving centralized management systems also creates bargaining power—the determinant of most if not all uncontrolled market interactions. However bargaining power, corporate networks and management systems remain largely foreign concepts in U.S. transfer pricing regulations, whose methods can produce

[8] Internal Revenue Service 2008.
[9] *Hospital Corporation of America v. Commissioner* 81 T.C. 520 (1983).

outcomes that can bear no resemblance to an arm's length result.[10] Taxpayers—following rote regulatory guidance—may disaggregate their centralized and highly integrated high value and non-routine executive and supply chain functions for a one sided benchmarking exercise against "comparable" market based activities that often exhibit only routine, competitive returns. Atomizing the corporate network in this way can shift the non-routine profits of the corporate parent's integrated functions and shared intangibles to foreign related affiliates, as described by the Service: [11]

> *"Taxpayer's attempt to atomize the Network so that the vast majority of the value…would escape taxation…is inconsistent with sections…482, as well as the applicable regulatory framework."*[12]

This informal guidance to field examiners by the office of chief counsel cautioning against the use of one sided methods in the context of highly integrated corporate networks and non-routine activities is at odds with the regulatory guidance that recommends one sided, comparables-based methods in almost every circumstance (emphasis by the author):

> *"Therefore, the results of the methods based solely on results of [one sided] transactions between uncontrolled taxpayers will be selected under the best method rule unless the data necessary to apply them is relatively incomplete or unreliable. In this regard the residual profit split generally would be considered a method of last resort."* [13]

Note that the regulations define the "method of last resort" as:

> *"The basic approach of a profit split method is to estimate an arm's length return by comparing the relative economic contributions that the parties make to the success of a venture, and dividing the returns from that venture between them on the basis of the relative value of such contributions."*[14]

This regulatory bias for one sided methods can short circuit the use of two sided methods in situations in which they would provide at least a reliable result—if not (in terms of economic science) *the most* reliable result—if applied properly.[15] Far from disparaging two sided methods as methods of last resort, the regulations should probably require them as either a primary or corroborative method in every case of valuable shared IP, globally centralized functions, interdependent operations, integrated value chains, valuable management systems, substantial bargaining or monopoly power, and in the presence of a cost sharing arrangement. This is needed as a check on the (un)reliability of one-sided methods applied to

[10] Indeed, the words "bargaining power," "management system" or "corporate network" do not appear in the U.S. Treasury Regulations section 1.482, despite a recognition of their importance to profit generation by tax courts and in informal IRS guidance.

[11] Non-routine in this context means that these functions "non-benchmarkable" because no such comparable "partial entities" exist in the market that perform similar highly specialized activities, or which depend on valuable intangibles and services shared with other parties.

[12] IRS 2008.

[13] Preamble to the final regulations relating to intercompany transfer pricing under section 482 of the Internal Revenue Code (July 8, 1994).

[14] *Ibid*.

[15] It is routine for transfer pricing documentation studies to rely on these comments in order to assert that because a one-sided method was "possible" a "less reliable" two-sided profit method was therefore not considered. While the U.S. transfer pricing regulations include only two specified two sided methods (comparable profit split and residual profit split methods), more methods are possible, including: 1) profit split based on importance of factor contributions to profit; 2) profit split based on value chain analysis; 3) formulary apportionment; 4) distribution of profit according to Shapley Value; and 5) transactional profit split based on intensity of physical and financial capital and their respective returns (Reichert and Urken 2015), and possibly others. A discussion of these techniques is beyond the scope of this paper, though many of these methods have been used by taxpayers.

situations in which they are wholly inappropriate. These flaws can result in grossly unreliable transfer prices that can be shown to violate economic principles when this mismatch occurs. This short circuit would explain for instance why a monopolistic taxpayer possessing nearly 100% of its productive capabilities in the U.S. but reporting the majority of its pre-tax profit in a tax haven with few or no employees could possibly conclude that this is the "most reliable" result under Section 482. Lowell and Wells 2014 cite such distortions of economic reality as the natural outcome of poorly designed regulations, whose bias for one sided methods constitutes a fundamental defect, or "mistake":

> *"Thus, the[s]e…fact patterns bring into focus the fundamental failure within section 482, and that failure lies at the feet of One-Sided Transfer Pricing Methodologies and CSAs that allow residual profits to be allocated to an affiliate other than in accordance with that affiliate's functional contribution towards the creation of those residual profits. Under either a one-sided transfer pricing methodology or a CSA, the result is the same: residual profits are shifted under current law to an offshore risk-taker affiliate without explanation and without relationship to the contribution of their substantive functional activities…this basic section 482 mistake…fail[s] to address…profit-shifting."*

Kleinbard 2011 cites more directly another aspect of this false premise, in which controlled foreign affiliates (such as a tax haven entity with no substance other than a routine, easily benchmarked cash contribution to a cost sharing arrangement, and certainly no bargaining power) are treated as stand-alone economic actors with tax positions that would indicate substantial non-routine capabilities and bargaining power exceeding that of the corporate parent—the opposite of what a true market based transaction would produce:

> *"In a sense, the most remarkable aspect of the entire structure…is the ready acceptance by countries of the fantastic notions that…a wholly-owned subsidiary has a mind of its own with which to negotiate "arm's-length" contractual terms with its parent…and [that] a multinational enterprise that exists as a global platform to exploit a core set of intangible assets [is] best…analogized to wholly independent actors…because the global assets and synergies that a multinational group exploits are attributes of the group as whole, not any one member."*

These regulatory shortcomings result in the attribution of bargaining and/or monopoly power to entities that have none of these attributes. This permits non-routine returns for only routine contributions, and sanctions the use of one sided methods for transactions for which they are inappropriate (with virtually no guidance on when two sided methods might be more reliable or should be required). The current regulatory system provides U.S. based MNEs many opportunities to transfer U.S. profits offshore while remaining immune to IRS challenge if the taxpayer can show that it followed existing regulations procedurally (Lowell and Wells 2014).[16]

This situation has led to calls for reforming the U.S. transfer pricing rules, to make them less prescriptive regarding one-sided comparability and the procedural requirements thereof, and more focused on reliability according to economic principles. Such changes would make it more difficult to support as compliant transfer prices that are in stark violation of fundamental economic principles. Recommendations have included the complete abandonment of one-sided methods in favor of formulary apportionment, which simply allocates profit in accordance with actual economic activity (Avi-Yonah and Benshalom 2011, Naegele 2010, Avi-Yonah, Clausing and Durst 2009). Lowell and Wells 2014 recommend an alternative approach that would require the application of the residual profit split method of Regulations section 1.482-6(c)(3) to all highly integrated global MNEs. Brauner 2010 advocates for

[16] Notable examples are *United States Steel Corp. v. Commissioner*, 617 F.2d 942, 945 (2d Cir. 1980), *Westreco, Inc. v. Commissioner*, T.C.M. 1992-561, 64 T.C.M. (CCH) 849 (1992), and *Compaq Computer Corp. v. Commissioner*, 78 T.C.M. (CCH) 20 (1999).

the repeal of Section 482-7 for cost sharing, which arguably permits a transaction devoid of any economic substance or business purpose (this is discussed later).[17] Fleming, Peroni and Shay 2014 and 2015 recommend the elimination of deferral on foreign income with restricted cross-crediting of foreign taxes, increased use of the residual profit split method and limited formula apportionment for earnings attributed to certain IP and trading income.

Establishing Economic Reliability Through Forensic Analysis

Assuming that there is only one true economically compliant result, and only one true, unbiased best method that confirms this result (whether one- or two-sided), is there a way to reach this result decisively under current regulations? In law enforcement similar questions involving the provability of guilt given an assumption of innocence were addressed most decisively with DNA technology, and more broadly by advancements in forensic science and use of dedicated forensic laboratories. In tax enforcement and compliance, the corollary might be data analytics incorporating methods and models of forensic accounting and economics, whose conclusions involve economic versus procedural reliability, established through scientific inquiry. Economic reliability must trump, and possibly dictate the applicable procedure (i.e., the choice of the "best method"). When a procedurally "compliant" one sided approach produces results that violate economic principles, the economic violations should be considered, and should inform the selection of another method that does not violate economic principles. The U.S. transfer pricing regulations in fact can be interpreted to allow for this explicitly in the best method rule of section 1.482-1(c) (emphasis by the author):

> *"The arm's length result of a controlled transaction must be determined under the method that, under the facts and circumstances, provides the most reliable measure of an arm's length result…no method will invariably be considered more reliable than others. An arm's length result may be determined under any method without establishing the inapplicability of another method…primary factors to take into account are…the quality of the data and assumptions used in the analysis…an additional factor that may be taken into account in selecting a method is whether any of the competing methods produce results that are consistent with the results obtained from the appropriate application of another method…"*

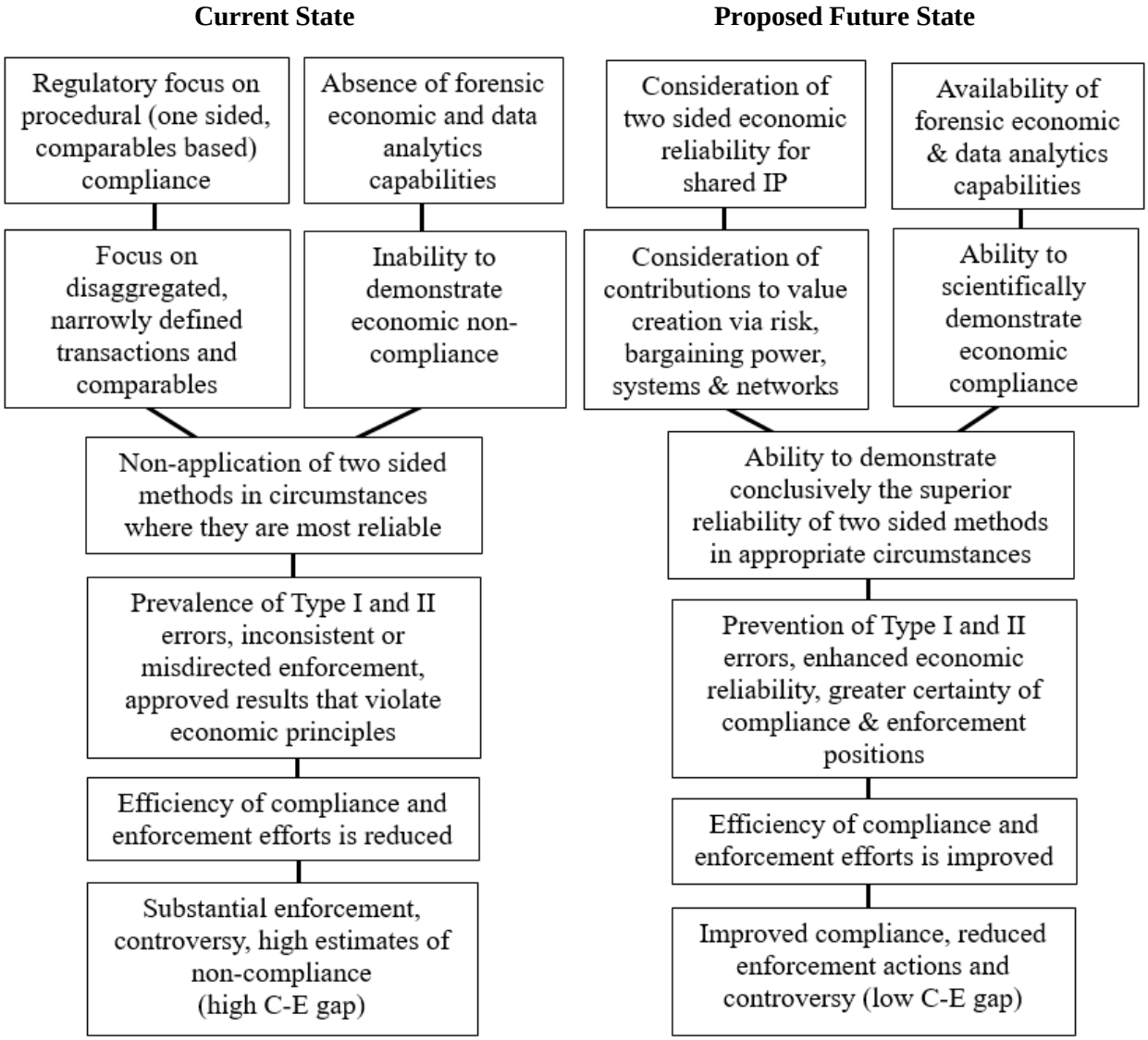
Note that in these comments: 1) "reliability" is not explicitly defined, and therefore could include economic considerations versus purely procedural prescriptions; 2) economic data, analyses and assumptions (which can include evidence of differences in bargaining power, presence or absence of market competition for the affiliate's functions, the relative value and uniqueness of contributions, differences in capability and risk bearing, and relative reliance on shared intangibles versus whether they are provided or enhanced by the affiliate) can impact the reliability of one method versus another; 3) the establishment of two-sided methods as the best methods do not require the Service or taxpayers to invalidate the use of one sided methods—only to show that two sided methods are more reliable (i.e., more compliant with economic principles, or at least do not violate them); and 4) the use of two or more applications of two sided methods that produce highly consistent results could be used to overcome one or more one-sided methods whose results are outliers to multiple corroborating profit methods for the same transaction. The use of economic principles to measure reliability are in fact supported by existing guidance (emphasis by the author):

[17] Another regulation that appears to result in profit shifting by design is Regulations section 1.482-2(a), which allows for instance a U.S. taxpayer to borrow funds from third parties at high market interest rates, and then lend the same funds to their foreign affiliates at the Applicable Federal Rate (AFR), booking the difference between low government borrowing rates and much higher market rates as a taxable loss in the U.S. This is deemed to be a "safe harbor" that is exempt from IRS challenge.

> *"…the district director will evaluate the result achieved rather than the method the taxpayer used to determine its prices."* [18]

> *"The best method rule requires a determination of the arm's length result of controlled transactions under the method, and particular application of that method, that provides the most reliable measure of an arm's length result. Under the regulations, the reliability of the measure depends on the economics of the controlled transactions, not their formal character."*[19]

The use of data analytics and forensic accounting and economics can contribute to more reliable transfer prices by demonstrating the alignment or misalignment of different outcomes with economic principles. The potential for such improvements to reduce the C-E gap is shown below, in comparison with the current state.



[18] U.S. Treasury Regulations section 1.482-1(f)(2)(v)(A).
[19] Internal Revenue Bulletin 2015-40 (October 5, 2015).

While the Treasury should alter existing guidance to remove the bias for one sided methods in inappropriate circumstances and better define reliability to incorporate economic principles, this is not strictly necessary. With more reliable DNA-like forensic and economic evidence, two-sided methods should prevail under the existing best method rule in the presence of highly integrated value chains, shared intangibles, and cost sharing arrangements whose operations through a shared corporate network can be shown to be economically interdependent. Forensic approaches appear consistent with the work of the OECD BEPS Action Plan (2015) in particular the recently published action items eight, nine, and ten ("Aligning Transfer Pricing with Value Creation"). These recommendations focus on the establishment of transfer prices incorporating more detailed analyses of shared intangibles, value creation, functional as well as financial risk bearing, and globally interdependent value chains, in order to address the perceived "misallocation-via-contract" of profits away from the sources of their creation. In particular, the OECD BEPS guidance focuses on the investigation of the economic aspects of intercompany relationships versus merely their legal construction or procedural compliance (OECD 2015b). This recognizes that increasingly sophisticated forensic approaches are needed to support the ability of examiners and taxpayers to support two-sided profit allocations as more reliable than the use of myriad one sided methods applied to highly atomized transactions stripped of their non-routine properties. Likewise, taxpayers may use such methods to reduce their examination risk, avoid intensive audits of their transfer pricing or rebut "false positive" examinations. The remainder of the paper focuses on the illustration of two forensic economic approaches (of perhaps many) that could be used to support the reasonableness of transfer pricing arrangements, and to evaluate the appropriateness of one sided methods under different scenarios.

Forensic Economic Analysis of Risk-Taking and Returns

One of the key principles underlying transfer pricing is that the related party bearing the majority of risk in an economic relationship should earn the higher expected return and that this return should be positively correlated with the risk it is bearing. The OECD Transfer Pricing Guidelines for Multinational Enterprises (2010) states this emphatically in Paragraph 1.45:

> *"In the open market, the assumption of increased risk will also be compensated by an increase in the expected return."*

U.S. transfer pricing regulations do not address this as directly, but Treasury Regulations section 1.481-5(c)(2)(ii) imply a similar position:

> *"An operating profit represents a return for the…assumption of risks."*

Internal Revenue Manual Section 4.61.3.5.3 (05-01-2006) provides more direct audit guidance to examiners, even if the regulations are not as explicit (emphasis by the author):

> *"If a company takes on more risk, <u>it will</u> have a greater expectation of profit."*

U.S. Regulations section 1.482-1(d)(3)(iii) define risk as "fluctuations" or variance in the sources of profit (emphasis by the author):

> *"Relevant risks to consider include…Market risks, including <u>fluctuations</u> in cost, demand, pricing, and inventory levels…and…General business risks related to the ownership of property, plant, and equipment…"*
>
> *"In considering the economic substance of the transaction, the following facts are relevant…the extent to which each controlled taxpayer exercises managerial or operational control over the business activities that directly influence the amount of income or loss realized. In arm's length dealings, parties ordinarily bear a greater share of those risks over which they have relatively more control."*

It is clear from these regulations and audit guidance that transfer pricing risk is associated with fluctuations or volatility in costs and revenues (and presumably profits), and that related affiliates should

earn the additional returns for which these additional risks were undertaken, and should not be earning returns on risks or functions that they do not control or bear. This would be especially true if the risks in question were the core risks that have the largest impact on the taxpayer's overall profitability. The regulations can be interpreted to define risk as the volatility of returns and/or their underlying inputs—a conventional approach that is consistent with the principles behind widely accepted financial theories and models including the Capital Asset Pricing Model, the Black-Scholes Option Pricing Model, the Sharpe Ratio, and many others.[20] The assumption of a linear positive relationship between changes in risk (volatility of returns) and resulting changes in the expected reward is a sound one, supported by empirical research of U.S. stock and bond market results (Curtis and Ruhashyankiko 2003). Therefore, the requirement for a positively-correlated risk-reward relationship does have theoretical and empirical support in both the parameters and their relationship. The economics and law appear in concert.

Unfortunately, the regulatory preference for one-sided transactional comparability severs the relationship between risk and reward. Without a post-pricing evaluation of the resulting profit outcomes, one cannot evaluate whether the interactions of myriad one-sided transfer pricing exercises at the transaction level applied to highly atomized transactions have achieved—or instead distorted—"overall" compliance (i.e., whether the entities bearing and controlling the greatest risks are earning the greatest returns on average, or whether the opposite is true). This evaluation is necessary however due to the potential presence of undocumented or unpriced transactions, flawed assumptions, and the application of procedural guidance and interpretations in ways that conflict with economic principles. By testing the mean and variance over time of the segmented intercompany operating profit (or possibly the profit before tax) instances where procedural compliance may have departed from economic compliance can be identified and investigated.

One type of risk that appears particularly important is operating leverage, or the proportion of fixed versus variable costs borne by an entity. High fixed costs often represent barriers to entry, and economic studies have found that higher fixed costs are often associated with greater profit volatility and often higher expected returns (Lev 1974 and Lee and Park 2014). Such fixed costs would normally include the costs of high value activities and investments that do not vary with production or revenues, such as the operation of corporate headquarters, laboratories and data centers, expenses associated with a sales force, and the operation of property, plants and equipment, such as manufacturing, distribution and retail sites. A simple theorem is developed based on the U.S. transfer pricing regulations to illustrate how this relationship can be tested as a form of risk assessment.

Theorem 1: *All else equal, greater relative proportions of fixed costs will be associated with higher expected relative returns.*

Proof: Consider two profit functions:

$$(1) \qquad \pi_1 = R_V - C_V .$$

$$(2) \qquad \pi_2 = R_V - C_F .$$

The term π_1 is the pre-tax profit of firm one in each period, where R_V is the randomly fluctuating period revenue and C_V is the correlated fluctuating period costs associated with this revenue. The term π_2 denotes the pre-tax profit of firm two, and C_F is the cost associated with firm two revenues, consisting almost exclusively of fixed costs in each period together with a small marginal cost that fluctuates with revenue, with the same expected value as C_V. Assume the distribution of R_V is approximately normal with a mean value of $\mu_R = 200$ and standard deviation $\sigma_R = 100$, and C_V and C_F both have a mean of 100. C_V is normally distributed with a standard deviation of fifty, and C_F has a standard deviation of

[20] This is another example of where the regulations could be improved—to better define "risk" and the required economic and financial relationships with expected return, versus merely defining their contractual form.

approximately zero. The correlation coefficient between R_V, C_V and C_F is one. These assumptions lead to the following relationships between the mean and variance of the profit outcomes:

(3) $\mu_{\pi_1} = \mu_{R_V} - \mu_{C_V} = 100$ and $\sqrt{\sigma_{\pi_1}^2} = \sqrt{\left(\sigma_{R_V} - \sigma_{C_V}\right)^2} = 50$.

(4) $\mu_{\pi_2} = \mu_{R_V} - \mu_{C_F} = 100$ and $\sqrt{\sigma_{\pi_2}^2} = \sqrt{\left(\sigma_{RV} - \sigma_{C_F}\right)^2} = 100$.

If x represents a profit of 0, the probability of a loss for each profit function is calculated based on the relevant standard score for each function:

(5) $\Pr_{\pi_1}\left(x < \mu_{\pi_1} - 2\sigma_{\pi_1}\right) \approx 1 - 0.977 \approx 0\%$.

(6) $\Pr_{\pi_2}\left(x < \mu_{\pi_2} - \sigma_{\pi_2}\right) \approx 1 - 0.841 \approx 16\%$.

The profit function for π_2 exhibits a greater risk of loss than that of π_1, when both functions exhibit the same expected return and the only difference between them is that the costs in π_2 are fixed versus variable. In general, the addition of any fixed costs to the profit function π_1 will increase the risk of loss, because the addition of such costs will increase the variance of the profit function, all else being equal. Given the fixed value of C_F, the only way to reduce the risk of loss for function π_2 is to increase the expected value of R_V – which results in an increase in the expected return of profit function π_2 above that of π_1.

The implication from this analysis is that higher relative operating leverage should lead to higher expected returns, all else being equal. To test this implication in practice, a simple model is constructed and applied to simulated results over a short period of time, where the parties each have fixed and variable costs in different proportions. While the model below may be exceedingly simplistic, its goal is merely to identify substantial anomalies where additional investigation may be warranted to better understand the observed risk-reward relationships. In the simulation, both affiliates in the model below start with the same revenues and total costs, but the fixed and variable costs are in the opposite. The variable costs move in the same proportion of their base as revenues, and revenues are identical in each period for both firms. After seven periods, several statistical indicators of risk and return are compared.

Table 1: Comparison of Different Ratios of Fixed and Variable Costs

High FC / Low VC

Co. A	1	2	3	4	5	6	7	Total	Average
Revenues	$ 100	$ 50	$ 80	$ 200	$ 400	$ 600	$ 1,000	$ 2,430	$ 347
Fixed Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 420	$ 60
Variable Costs*	$ 30	$ 15	$ 24	$ 60	$ 120	$ 180	$ 300	$ 729	$ 104
Profit Before Tax	$ 10	$ (25)	$ (4)	$ 80	$ 220	$ 360	$ 640	$ 1,281	$ 183

** VC = 30% x Revenues*

Low FC / High VC

Co. B	1	2	3	4	5	6	7	Total	Average
Revenues	$ 100	$ 50	$ 80	$ 200	$ 400	$ 600	$ 1,000	$ 2,430	$ 347
Fixed Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 210	$ 30
Variable Costs**	$ 60	$ 30	$ 48	$ 120	$ 240	$ 360	$ 600	$ 1,458	$ 208
Profit Before Tax	$ 10	$ (10)	$ 2	$ 50	$ 130	$ 210	$ 370	$ 762	$ 109

*** VC = 60% x Revenues*

	Proportion of Total Fixed Costs							Average	A / B
Co. A	67%	67%	67%	67%	67%	67%	67%	67%	
Co. B	33%	33%	33%	33%	33%	33%	33%	33%	200%

	Δ PBT / Δ REV						Average	A / B
Co. A	70%	70%	70%	70%	70%	70%	70%	
Co. B	40%	40%	40%	40%	40%	40%	40%	175%

	Profit Margins							Average	A / B
Co. A	10%	-50%	-5%	40%	55%	60%	64%	25%	
Co. B	10%	-20%	3%	25%	33%	35%	37%	17%	143%

As can be seen above, the entity with higher fixed costs experiences higher volatility of profits (risk) and this higher risk is accompanied by a higher expected (mean) return—consistent with the proposed theorem. All of the shaded figures exceed 100%, indicating directional consistency with the risk-return expectations of the U.S. transfer pricing regulations. Entity A experiences earnings volatility that is seventy-five percent greater than entity B, but also earns margins that are forty-three percent higher. In order to test such a crude model under different assumptions, entity B's variable costs are adjusted downward to only thirty-five percent of revenues (keeping total costs the same in Period One) and similar results are apparent. Entity A now has only slightly greater fixed costs than B, and both its volatility of profits and expected profit margins remain higher than those of entity B—consistent with theoretical relationships.

Table 2: Comparison of Different Ratios of Fixed and Variable Costs

High FC / Low VC

Co. A	1	2	3	4	5	6	7	Total	Average
Revenues	$ 100	$ 50	$ 80	$ 200	$ 400	$ 600	$ 1,000	$ 2,430	$ 347
Fixed Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 420	$ 60
Variable Costs*	$ 30	$ 15	$ 24	$ 60	$ 120	$ 180	$ 300	$ 729	$ 104
Profit Before Tax	$ 10	$ (25)	$ (4)	$ 80	$ 220	$ 360	$ 640	$ 1,281	$ 183

** VC = 30% x Revenues*

Low FC / High VC

Co. B	1	2	3	4	5	6	7	Total	Average
Revenues	$ 100	$ 50	$ 80	$ 200	$ 400	$ 600	$ 1,000	$ 2,430	$ 347
Fixed Costs	$ 55	$ 55	$ 55	$ 55	$ 55	$ 55	$ 55	$ 385	$ 55
Variable Costs**	$ 35	$ 18	$ 28	$ 70	$ 140	$ 210	$ 350	$ 851	$ 122
Profit Before Tax	$ 10	$ (23)	$ (3)	$ 75	$ 205	$ 335	$ 595	$ 1,195	$ 171

*** VC = 35% x Revenues*

Proportion of Total Fixed Costs								Average	A / B
Co. A	52%	52%	52%	52%	52%	52%	52%	52%	
Co. B	48%	48%	48%	48%	48%	48%	48%	48%	109%

Δ PBT / Δ REV							Average	A / B
Co. A	70%	70%	70%	70%	70%	70%	70%	
Co. B	65%	65%	65%	65%	65%	65%	65%	108%

Profit Margins							Average	A / B
Co. A	10%	-50%	-5%	40%	55%	60%	64%	25%	
Co. B	10%	-45%	-4%	38%	51%	56%	60%	24%	105%

In another iteration below, entity B's revenues are reduced to seventy-five percent of entity A's revenues, and the expected result continues to hold. These few simulations are obviously not exhaustive, but do provide some support for the usefulness of the proposed model. Many variables could bias these results, including non-recurring charges, material differences in the value and uniqueness of functions, assets, and risks such as currency exchange rate risks, political and market risks, and myriad other factors. In addition, other indices are possible, such as measurement of the standard deviation of returns as the risk indicator. This model is proposed as a possibly crude—but still useful—diagnostic tool, for which further empirical testing and refinement are recommended.

Table 3: Comparison of Different Ratios of Fixed and Variable Costs

High FC / Low VC

Co. A	1	2	3	4	5	6	7	Total	Average
Revenues	$ 100	$ 50	$ 80	$ 200	$ 400	$ 600	$ 1,000	$ 2,430	$ 347
Fixed Costs	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 60	$ 420	$ 60
Variable Costs*	$ 30	$ 15	$ 24	$ 60	$ 120	$ 180	$ 300	$ 729	$ 104
Profit Before Tax	$ 10	$ (25)	$ (4)	$ 80	$ 220	$ 360	$ 640	$ 1,281	$ 183

** VC = 30% x Revenues*

Low FC / High VC

Co. B	1	2	3	4	5	6	7	Total	Average
Revenues (.75*A)	$ 75	$ 38	$ 60	$ 150	$ 300	$ 450	$ 750	$ 1,823	$ 260
Fixed Costs	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 30	$ 210	$ 30
Variable Costs**	$ 45	$ 23	$ 36	$ 90	$ 180	$ 270	$ 450	$ 1,094	$ 156
Profit Before Tax	$ -	$ (15)	$ (6)	$ 30	$ 90	$ 150	$ 270	$ 519	$ 74

*** VC = 60% x Revenues*

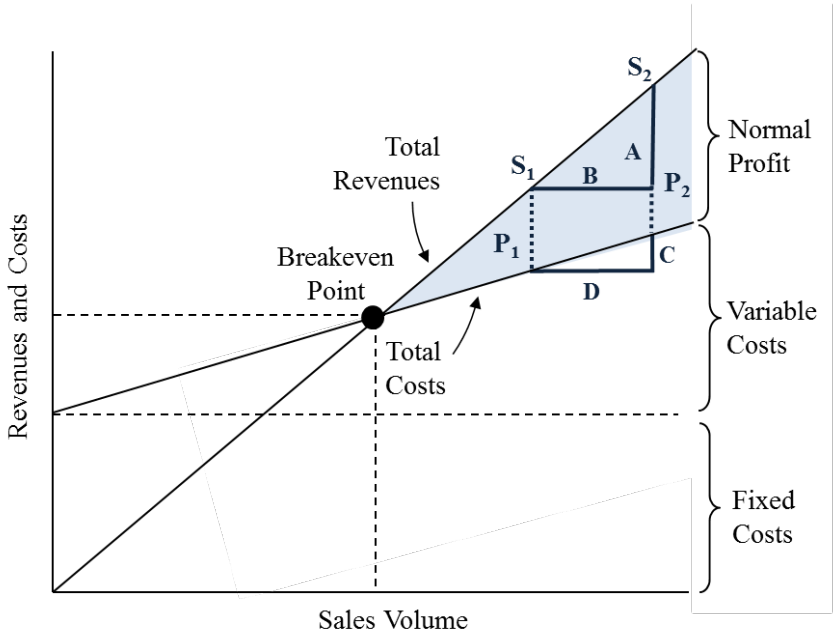
	Proportion of Total Fixed Costs							Average	A / B
Co. A	67%	67%	67%	67%	67%	67%	67%	67%	
Co. B	33%	33%	33%	33%	33%	33%	33%	33%	200%

	Δ PBT / Δ REV						Average	A / B
Co. A	70%	70%	70%	70%	70%	70%	70%	
Co. B	40%	40%	40%	40%	40%	40%	40%	175%

	Profit Margins							Average	A / B
Co. A	10%	-50%	-5%	40%	55%	60%	64%	25%	
Co. B	0%	-40%	-10%	20%	30%	33%	36%	10%	251%

A second theorem involves the relationship between differences in the growth rates of the underlying variables (revenues, costs, and profits). This relationship is shown graphically below using a breakeven diagram.

Figure 1: Profit Impact of Marginal Fixed and Variable Costs



Theorem 2: *If revenues are increasing at a rate greater than costs, then ceteris peribus the rate of increase in profits must exceed the rate of increase in sales, or*:

$$If\ \frac{A}{B} > \frac{C}{D}\ then\ \left(P_2 - P_1\right) > \left(S_2 - S_1\right).$$

Proof: The profit function for the firm in each period is given as the following equation:

$$(7) \qquad \pi_{t+1} = (1+\alpha)R_t - (1+\beta)C_t .$$

π_{t+1} is the period profit, where R_t is the prior period revenue, C_t is the prior period total costs associated with that revenue, α is the static growth rate of revenues, and β is the static growth rate of costs. This implies the following regarding the growth rate in profits:

$$(8) \qquad \frac{\pi_{t+1}}{\pi_t} = \frac{\pi_t + \alpha R_t - \beta C_t}{\pi_t} \quad = \quad 1 + \frac{\alpha R_t - \beta C_t}{\pi_t} .$$

Consider the case where revenues grow at a rate greater than costs $(\alpha > \beta)$. This implies that the second term in (8) will exceed α. If the amount by which the growth rate in revenues exceeds the growth rate in costs is reflected as *x*, or $\beta = \alpha - x > 0$, equation (8) becomes:

$$(9) \qquad \frac{\pi_{t+1}}{\pi_t} = 1 + \frac{\alpha R_t - \alpha C_t + x_t C}{\pi_t} .$$

Equation (9) can be rearranged as:

$$(10) \qquad \frac{\pi_{t+1}}{\pi_t} = \frac{\alpha(R_t - C_t)}{\pi_t} + \frac{xC_t}{\pi_t} \quad = \quad \alpha + \frac{xC_t}{\pi_t} .$$

As long as x > 0, the second term in (6) will be positive. Further, if both α and β are static, and recognizing that all variables are cumulative, the following would also be true:

$$(11) \qquad \lim_{t \to T} \frac{C_t}{\pi_t} = 0 \cdot$$

Equation (11) states that over time, given static growth rates in revenues and costs consistent with Figure 1, the growth rate in profits will approach the growth rate of sales, but will not fall below it. The diagrams below illustrate how mispricing of intercomany transactions can create distortions in these relationships and vary from these predictions if not sufficiently tested or monitored.

Figure 2: U.S. Parent Company Marginal Cost Expansion

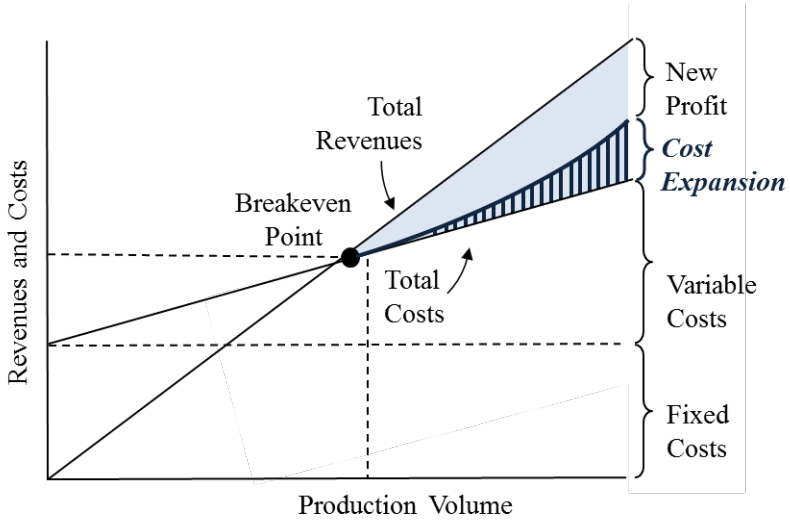
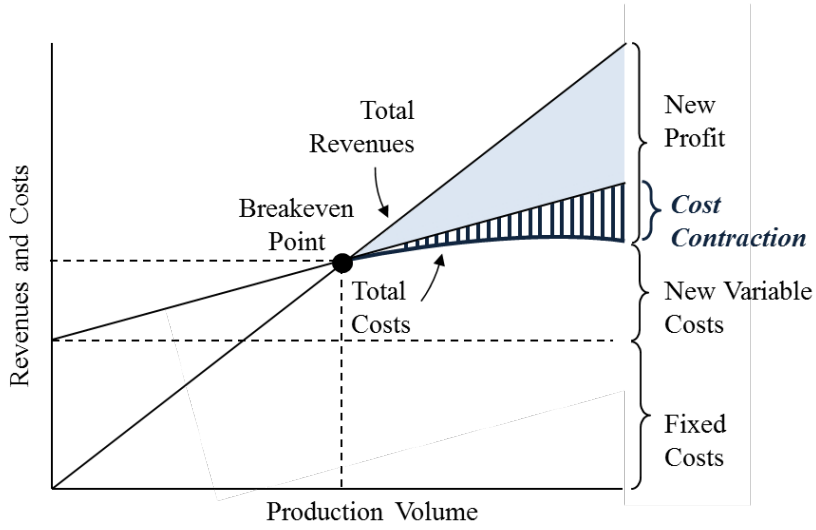


Figure 3: Foreign Affiliate Marginal Cost Contraction



While at the consolidated level these accounting relationships may appear conventional, at the subsidiary level such relationships may be distorted due to intertemporal changes in transfer prices and asymmetric cross-distributions of risks and returns. One can measure and compare the differences in these accounting relationships between the parent and affiliate, and between each affiliate, to discern anomalies in the expected risk-reward relationships. Both of the analyses, above, based on Theorems 1 and 2 appear to be allowed by existing U.S. transfer pricing regulations as "valid statistical techniques" with which to test

the arm's length nature of the distribution of profits between multiple interrelated affiliates (emphasis by the author):

> *"The combined effect of two or more separate transactions…may be considered, if such transactions, taken as a whole, are so interrelated that consideration of multiple transactions is the most reliable means of determining the arm's length consideration for the controlled transactions…"*[21]
>
> *"…the arm's length results of all related party transactions entered into by a controlled taxpayer may be evaluated by employing sampling and other valid statistical techniques."*[22]

Current U.S. corporate tax forms contain most, if not all, of the required inputs in order to use such a model for risk assessment and possibly auditing of transfer prices.

Illustration of Risk Assessment Model Using Financial Reporting Information[23]

This model is designed to be used with statutory results found in tax filing information, which contains financial information by legal entity, including the results of intercompany transactions. However, because individual tax filing information is proprietary to the IRS and taxpayer, the application of the model is illustrated using information contained in SEC filings. Deficiencies in the use of public financial information for tax research are well known—intercompany transactions are omitted, results often involve estimates (such as provisions for taxes) that can change in later reports, and financial reporting utilizes GAAP accounting conventions that differ from tax accounting requirements. Therefore, any conclusions from this analysis are illustrative only, and any use of this model for tax compliance analysis should be based on statutory financial results. All numerical entries have been rounded to the nearest hundred million dollars, and results modified based on qualitative disclosures in financial reporting where appropriate. The following U.S. multinational taxpayer has a highly developed and centralized corporate network/management system, and also has a publicly disclosed APA with the IRS. Table 4 first provides information on the relative U.S. and foreign external revenue and total cost dynamics.

[21] U.S. Treasury Regulations section 1.482-1(f)(2)(i)(A).
[22] U.S. Treasury Regulations section 1.482-1(f)(2)(iv).
[23] Profit analyses for transfer pricing typically focuses on operating profit. Because none of the taxpayer results analyzed in this study contained any material debt or interest payments, pre-tax profits and operating profits were deemed to be the same.

Table 4: Taxpayer 1 Cost and Revenue Dynamics

Average Annual Change 2008-2012	Variable	Result
Global Revenues	(a)	44.3%
Global Total Costs	(b)	36.5%
Difference Between Revenue and Cost Growth Rates	(c) = a - b	7.8%
Rate of Growth in Costs vs. Revenues	(d) = b / a	82.4%
U.S. Revenues	(e)	31.8%
U.S. Total Costs	(f)	26.6%
Difference Between Revenue and Cost Growth Rates	(g) = e - f	5.2%
Rate of Growth in Costs as % Revenue Growth Rate	(h) = f / e	83.8%
Foreign Revenues	(i)	56.8%
Foreign Total Costs	(j)	46.8%
Difference Between Revenue and Cost Growth Rates	(k) = i - j	10.1%
Rate of Growth in Costs as % Revenue Growth Rate	(l) = j / i	82.3%
Foreign Difference - Multiple of U.S.	(m) = k / g	195%
Increase in U.S. Profit Shifted per Dollar of Incremental Foreign Revenues	(n) = (k/i) - (g/e)	$0.01

Table 4, above, contains two interesting results that may or may not persist if performing the analysis using statutory results by legal entity (that includes intercompany transactions omitted from this analysis): 1) the profitability per incremental dollar of foreign sales is about twice that of U.S. sales; and 2) the rate of annual increase in costs as a percentage of the rate of increase in revenues is higher in U.S. versus foreign jurisdictions. This appears to result in a shifting of approximately $.01 in U.S. profit to foreign affiliates per every dollar of incremental U.S. and foreign revenues. If these results persisted at the statutory level, then they could be explained perhaps by greater and/or increasing marketing, advertising, and logistics expenses in the U.S. market compared to foreign markets per dollar of sales, or violations of Theorem 2 consistent with situations depicted in Figures 2 and 3. Only an examination of the taxpayer's transfer pricing would determine which. One consideration is that the taxpayer centralizes the majority of manufacturing in low wage countries, with an estimated cost savings (according to an analysis by a business news organization) of as much as ten percent of product revenues compared to production in the U.S. Under the U.S. transfer pricing rules, such cost savings could represent incremental U.S. profits.[24] In addition, the U.S. taxpayer appears to own the majority if not all of the expensive technology-enabled production tools located in foreign countries—which may represent a substantial portion of global long term assets. Finally, the U.S. taxpayer owns the marketing intellectual property of the company, retail store designs, and manages the global organization through a centralized U.S. corporate network by function (versus division or geography), in which parts of each global organization are ultimately managed by a U.S. executive by function (according to an analysis by a business news organization). Related foreign operations appear to involve primarily routine production, distribution and retail operations that leverage U.S. supply chain, marketing, and technology based intellectual property, services, fixed assets and corporate networks.

[24] U.S. Treasury Regulations section 1.482-1(d)(4)(ii)(C).

Table 5, below, shows the analysis of risk and return based on Theorem 1 and Tables 1–3. The U.S. taxpayer appears to have the majority of long term assets and fixed costs in the enterprise, in addition to the core profit generating functions and ownership of IP, implying that it bears and manages the key profit risks of the global enterprise. However far from exhibiting a positive relationship between profits (return) and operating leverage (risk), the results of the U.S. taxpayer exhibit a *negative* relationship, while foreign results exhibit a strong positive relationship that is out of proportion to their associated routine functions and risks. Such results are the opposite of expectations imbedded in both Theorem 1 and Theorem 2.

Based on public documents, in a four-year period the taxpayer's foreign CSA participants provided approximately $5.5 billion in funding of U.S. R&D costs, and in the same years recorded as much as seventy-four billion dollars in pre-tax profit, for a return on costs of as much as 1,340%. Note that these foreign CSA contributions represent almost exclusively: 1) routine contributions; and 2) variable costs. The U.S. taxpayer appears to make virtually all of the non-routine (and non-R&D related) contributions that are critical to the generation of this profit, while bearing as much as eighty percent of the long term assets and possibly the fixed costs of the global business. In this transfer pricing arrangement, the foreign CSA affiliate profit is typically never tested, and therefore this foreign affiliate could earn the majority of the taxpayer's global profit in return for routine expenses representing as little as two percent of global costs. The consolidated U.S. and foreign financial results shown in Table 5, below, could be replaced with the U.S. and foreign statutory results to assess the reasonableness of the profit outcomes versus risks, and whether this impacts the reliability of the transfer pricing method(s) that produced them. A residual profit split method applied to these facts may also repatriate the majority of foreign CSA affiliate profit to the U.S. since these affiliates perform few if any non-routine activities. However for this to occur, the IRS would need to demonstrate that the residual profit split method was more reliable than the taxpayer's existing method(s), using statutory financial results.

Table 5: Measurement of Taxpayer 1 U.S. and Foreign Risk vs. Reward Indicators

Consolidated	2014	2013	2012	2011	2010	2009	Total
Revenues	$ 182,900	$ 170,900	$ 156,600	$ 108,300	$ 65,200	$ 42,900	$ 726,800
Fixed Assets	$ 21,500	$ 17,600	$ 15,900	$ 9,600	$ 5,700	$ 3,700	$ 74,000
Total Costs	$ 129,300	$ 120,700	$ 100,800	$ 74,100	$ 46,700	$ 30,900	$ 502,500
Pre-tax Profit	$ 53,500	$ 50,200	$ 55,700	$ 34,200	$ 18,500	$ 12,100	$ 224,200

U.S.							Total
Revenues	$ 69,000	$ 66,200	$ 61,000	$ 41,800	$ 28,600	$ 22,300	$ 288,900
Fixed Assets	$ 17,500	$ 13,900	$ 12,500	$ 5,000	$ 3,600	$ 2,800	$ 55,300
Total Costs	$ 49,000	$ 46,500	$ 42,000	$ 31,600	$ 23,100	$ 16,900	$ 209,100
Pre-tax Profit	$ 19,900	$ 19,700	$ 18,900	$ 10,200	$ 5,500	$ 5,500	$ 79,700

Non-U.S.							Total
Revenues	$ 113,900	$ 104,700	$ 95,600	$ 66,500	$ 36,600	$ 20,600	$ 437,900
Fixed Assets	$ 4,000	$ 3,700	$ 3,400	$ 4,600	$ 2,100	$ 900	$ 18,700
Total Costs	$ 80,300	$ 74,200	$ 58,800	$ 42,500	$ 23,600	$ 14,000	$ 293,400
Pre-tax Profit	$ 33,600	$ 30,500	$ 36,800	$ 24,000	$ 13,000	$ 6,600	$ 144,500

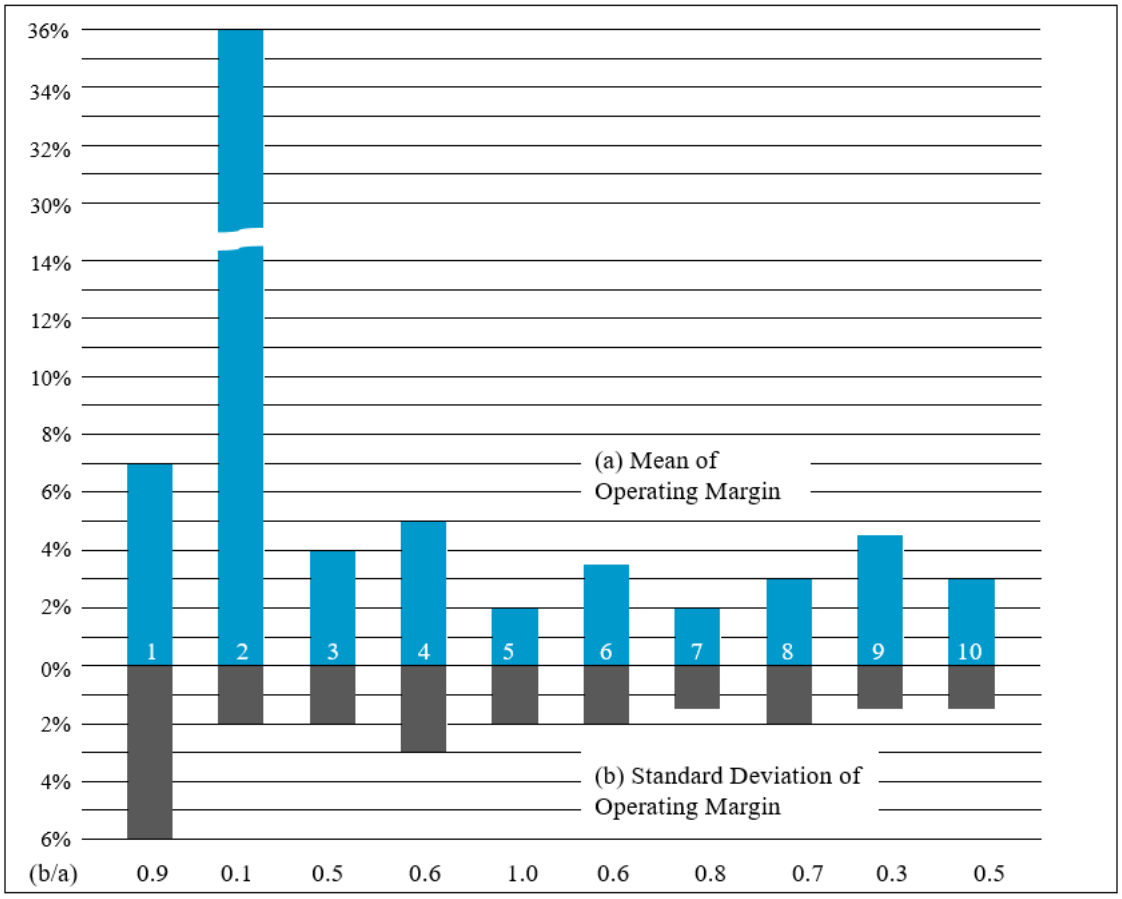
	Proportion of Fixed Assets (Proxy for Fixed Costs)						Average	U.S. / Foreign
U.S. Taxpayer	81%	79%	79%	52%	63%	76%	72%	
Foreign Taxpayers	19%	21%	21%	48%	37%	24%	28%	253%

	Annual Percentage Change in Pre-tax Profit (Absolute Values)						St. Dev.	U.S. / Foreign
U.S. Taxpayer	1%	4%	85%	85%	0%	28%	41%	
Foreign Taxpayers	10%	17%	53%	85%	97%	43%	35%	117%

	Pre-tax Returns on Total Costs						Average	U.S. / Foreign
U.S. Taxpayer	41%	42%	45%	32%	24%	33%	33%	
Foreign Taxpayers	42%	41%	63%	56%	55%	47%	55%	60%

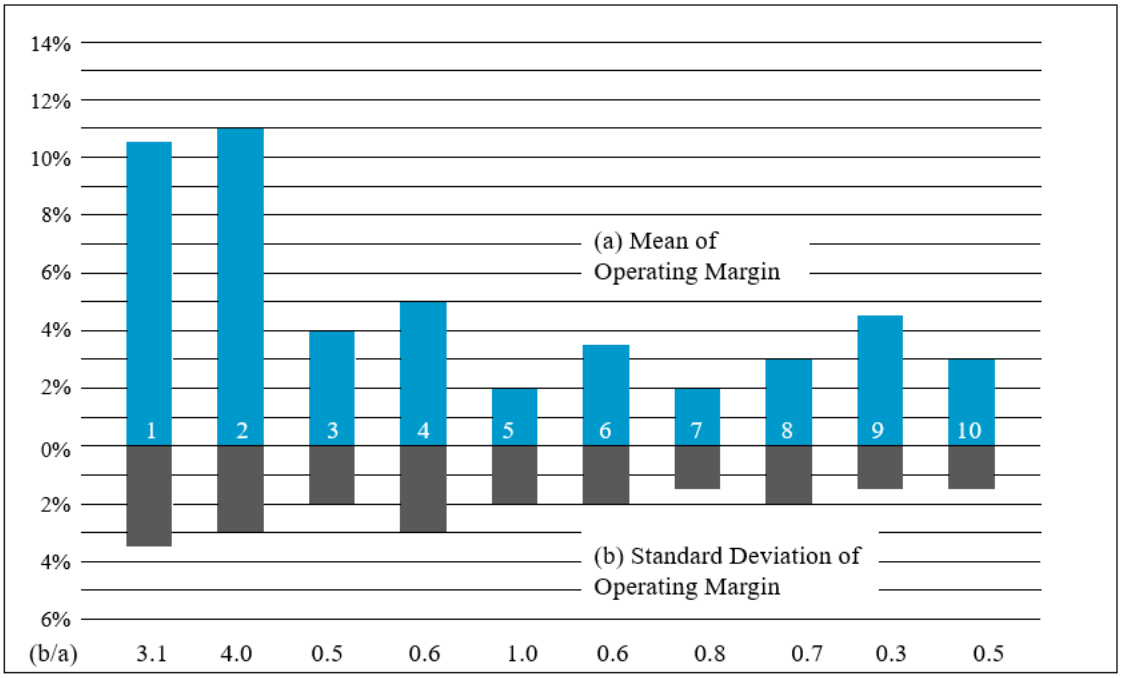
One variant of this analysis would be to apply a version of this test to each major affiliate within an MNE, comparing the relative levels of risk per increment of return over the same time period. An illustrative example of such a table is shown below (not necessarily related to the taxpayer discussed above).

Figure 4: Example Comparative Risk and Associated Returns by Affiliate



In the diagram above, assume that Affiliate 1 is the U.S. parent, and Affiliate 2 is a foreign cost sharing affiliate with few operating assets or personnel, earning primarily passive residual returns for its routine cash contributions to a CSA arrangement, while all other affiliates are foreign subsidiaries with operating assets and personnel, that earn only limited-risk returns for local exploitation activities. The question is whether the Affiliate 2 returns are arm's length, given the very high returns and very low risk compared to other affiliates—including the U.S. parent from which it obtains the economic rights to the intangible assets and core exploitation functions. If Affiliate 2 were earning only twenty-five percent of the combined operating profit of the foreign operations (an observed result among unrelated parties discussed later), and the difference between this result and its reported operating profits was largely due to the exploitation contributions of Affiliate 1, then the table may look as follows:

Figure 5: Example Comparative Risk and Associated Returns by Affiliate—With Adjustments



Because Affiliates 1 and 2 are considered to be the entrepreneurial cost sharing participants (though Affiliate 2 makes only routine contributions), and the U.S. and foreign operations leverage intangible assets and services shared among a global value chain, their relative levels of return should reflect the value of their respective contributions, capabilities, risks, and bargaining power. Using such an approach, the foreign cost sharing participant's returns could be adjusted to incorporate these considerations, and its returns would no longer reflect windfall non-routine profits for making only routine contributions in the absence of any operational functions. The next section describes a different forensic examination strategy for cost sharing arrangements under Regulations section 1.482-7 that utilizes elements of value chain contribution analysis in combination with economic research.

Forensic Economic Analysis of Intercompany Cost Sharing Arrangements

Cost sharing arrangements under Treasury Regulations section 1.482-7 are often cited as a contributing factor to offshore profit shifting, and is one of the most difficult types of transactions to audit. Section 482-7 allows a U.S. multinational corporation to share the expenses of its R&D activities among its U.S. and foreign affiliates as an alternative to charging license fees for the resulting innovations by the developer (typically the U.S. parent company). The thinking is that by sharing in the risks of development, the foreign affiliate can become an "economic owner" of the rights to the resulting intellectual property in its respective jurisdiction. The foreign affiliate can then exploit the developed intellectual property without paying a royalty or license fee to the U.S. parent. If both alternatives (cost sharing or licensing) were priced correctly, each related participant would be indifferent between the two alternatives. There are generally two components to this arrangement: 1) a buy-in payment at the time the agreement is entered into for the value of existing technology; and 2) a continuing payment of a share of the ongoing R&D expenses to improve or replace the existing technology, or create new technology. The regulations require that the shares of the ongoing research costs borne by the participants to the CSA be proportional to the "reasonably anticipated benefits" or "RAB" shares of each participant from exploiting the IP in their respective jurisdictions. This RAB share can be based on shares of revenue, operating profit or other indices, but is often tied to the territory share of global revenues. In a typical arrangement between a U.S. parent company and a single foreign cost sharing participant, the foreign entity earns the foreign/territorial profits of the enterprise as a condition of joining the CSA arrangement—assuming that

all other non-R&D related intercompany transactions (i.e., supply chain/exploitation functions) are conducted at "arm's length" prices pursuant to a conventional transfer pricing exercise.

The cost sharing arrangement described above has no market-based counterpart, and its procedural application likely conflicts with a number of economic principles (hence the mismatch between earning non-routine profits in return for only routine contributions that would otherwise be exposed to substantial market competition). The closest market-based transaction to a CSA arrangement might be a "joint development agreement," in which two unrelated companies form a joint venture, where each participant contributes valuable operational resources and shares in the profit according to the proportion of the costs of their respective operational contributions. A particularly useful example of such an arrangement is one that was entered into by Bayer AG and CuraGen Corporation in 2001. Almost breathtaking in its simplicity, the agreement stated that CuraGen would be responsible for identifying a number of gene and protein targets for which Bayer would then develop small molecule compounds that could bind to these targets, and the parties would split the profits of the venture in proportion to the costs represented by these contributions (Schohl 2004). Several differences between this arrangement and that of Regulations section 1.482-7 are immediately apparent:

Question	Third Party Joint Development Agreement	Related Party CSA per Reg. § 1.482-7	Explanation
Do both parties typically perform research and development and/or exploitation functions?	Yes	No	The CSA regulations allow the U.S. participant to contribute all development and exploitation functions, and the foreign participant may have no employees and exist only on paper.
Are profits typically split according to the value or costs of the functional contributions of each party to the arrangement?	Yes	No	In a typical CSA arrangement, only R&D costs are split, and the location of profits often bears little or no relationship to the respective contributions by each party, and may be in the opposite.
Does the arrangement always have a valid business purpose?	Yes	No	Without valuable non-routine functional contributions by the foreign affiliate that would give it bargaining power, there may be no valid business reason for the U.S. party to enter into the arrangement, apart from the fact that it is allowed by regulation.
Does the arrangement change the economic substance of both parties?	Yes	No	In a typical CSA arrangement, there may be no change to the value chain or functions before or after the arrangement, only a change to cash flows.

Unlike a third party arrangement where profits are split in proportion to the value of contributed capabilities and resources, the U.S. cost sharing regulations ignore this, and can result in windfall profits to the foreign CSA participant for bearing only routine financial risk. Because the regulation basically assigns all foreign/territory revenues and profits to the foreign CSA participant as a condition of the

arrangement, this can potentially assign returns to the foreign CSA affiliates for operational risks they do not manage, control or bear, and profits which are out of proportion to their routine contributions and risks. Section 482-7. This requires an IRS examiner to examine all possible intercompany transactions and supply chain operations that contribute to this profit. These include non-CSA covered IP development functions as well as product IP exploitation functions and services, in addition to CSA-covered IP development functions. This is a very difficult, labor intensive task for which the IRS likely has inadequate human and technical resources. The fact that the parent taxpayer could borrow the same funds externally at much lower rates of return than ultimately paid to the foreign CSA affiliate, or would never enter into a similar transaction with a third party for lack of business purpose and detrimental financial impact to investors is of course irrelevant, since the regulation allows this transaction explicitly.

One of the key assumptions imbedded in Regulations section 1.482-7 are that: 1) all other non-R&D related intercompany transactions (whether related to the CSA arrangement or not) are conducted at arm's length prices; and 2) the CSA arrangement itself provides the foreign affiliate nothing more than "rights of economic ownership" for the controlled IP in its jurisdiction—i.e., the right to exploit the cost-shared IP in the foreign territory. These two concepts can be used to develop an examination strategy, based on how third parties tend to split the profits between the IP owner and the IP exploiter. There is substantial research on this topic, which has been accepted for decades as the basis for determining damages in IP litigation, and this research shows that risky exploitation functions tend to earn a greater percentage of value chain or "system" profit than passive IP ownership. This is because while an innovation can be developed with minimal financial risk, the exploitation and monetization of this IP requires significant capital investments in production plants, retail stores, data centers and offices, as well as expenses associated with personnel, training, production, marketing and advertising, and so on. In other words, product development is just one of several contributors to overall profits and risks—not the sole source of profitability or risk or possibly even the primary source. Economic research shows that a greater proportion of the overall or system profits tend to go to these very risky and financially intensive "exploitation" or "supply chain" functions compared to the ownership rights of the CSA covered IP (Lu 2011, Goldscheider, Jarosz and Mulhern 2002). Likewise, exploitation functions can also involve non-routine contributions and risks—such as supply chain or management intangibles, high value services and high levels of fixed costs, which may have a greater impact on period profits than simply the occurrence of intangible development costs covered by the CSA arrangement, which are often only a fraction of the exploitation costs.

Interestingly, IRS examinations of CSA arrangements can often ignore these exploitation functions that—according to economic research—explain the majority of system profits arising from such arrangements. The procedural bias of the U.S. transfer pricing rules for one sided methods in combination with asymmetric treatment applied to intangible development costs versus other types of costs, together with the IRS examination focus on buy-in payments at the expense of exploitation activities can result economically unreliable enforcement positions. Only a two-sided analysis that considers respective non-routine contributions and risks borne in both IP development and exploitation in their proper proportions to value creation would overcome these deficiencies. This is especially true if the controlled foreign entities contribute few or no non-routine activities or contributions and depend on the U.S. taxpayer for both IP development and exploitation functions. Figure 8 in Goldscheider, Jarosz and Mulhern 2002 summarizes an analyses of as many as 1,533 license agreements between 1990 and 2000, to estimate the split of system profits between IP ownership and IP exploitation. These results are reproduced below in Table 6.

Table 6: Profit Shares of IP Exploitation vs. Ownership by Industry

Industry	Median Royalty Rate	Average Operating Profits	Royalty as % of Pre-Royalty Profit Rate	Exploitation Return as % of System Profit
Chemicals	3.0%	12.0%	20.0%	80.0%
Computers	2.8%	8.3%	25.2%	74.8%
Consumer goods	5.0%	18.4%	21.4%	78.6%
Electronics	4.5%	13.1%	25.6%	74.4%
Energy & Environment	3.5%	9.2%	27.6%	72.4%
Food	2.3%	14.2%	13.9%	86.1%
Healthcare Products	4.0%	18.5%	17.8%	82.2%
Internet	5.0%	10.4%	32.5%	67.5%
Machine/Tools	3.4%	9.6%	26.2%	73.8%
Pharma & Biotech	4.5%	25.8%	14.9%	85.1%
Semiconductors	2.5%	31.9%	7.3%	92.7%
Software	7.5%	25.1%	23.0%	77.0%
Telecom	5.0%	14.5%	25.6%	74.4%
Average	4.1%	16.2%	21.6%	78.4%

This research shows that in the open market, based on average licensing rates and margins by industry, the product IP owners in aggregate appear to recover about twenty-two percent on average of the system profit as a return to its passive ownership of the covered IP. The remaining seventy-eight percent of system profit is recovered by the exploiters (i.e., licensees) of that IP. These results can provide an insight into the reasonableness of the amounts of profit earned by the foreign passive IP funder in CSA arrangements compared to the profit attributed to the active exploitation activities (i.e., supply chain contributions that benefit from U.S. networks and management systems, services and IP, and the management and bearing of risks such as fixed costs). Regulations section 1.482-1(d)(2) disallows the use of "unadjusted industry averages" as the basis for testing intercompany prices, which would prevent the use of this data in isolation as the basis for setting transfer prices. However, it would appear reasonable that this research can be used in setting transfer prices to the extent that it: 1) is adjusted to conform to the facts at issue; and 2) it is used in a way that meets the Daubert standard of scientific reliability. Recent litigation outcomes have been supportive of these conclusions.[25] Likewise these research-based results could be used to establish a safe harbor. For instance, there are no observations in the Table 6 where the IP owner earns more than thirty-five percent of the system profit. Allowing for exceptionally profitable IP, a safe harbor limitation of forty percent as a maximum share for a passive IP owner with no functional contributions to IP development could be one approach.

In this application of forensic economics, the reasonableness of the passive IP ownership return in the foreign location is investigated by examining its return to the total return for both IP ownership and exploitation in the foreign market, to determine if there is enough profit "left over" to cover the required returns to each exploitation function given their expected value implied by research. The economic research presented earlier provides only an approximation to how these returns are generally split in

[25] *Uniloc USA, Inc. and Uniloc Singapore Private Limited v. Microsoft Corporation*, No. 2010-1035 (Fed. Cir. January 4, 2011). The Daubert standard is often employed by federal trial judges to assess the validity of scientific (including economic) analyses pertaining to facts at issue. Particular elements of this standard involve whether the theory has been tested to determine its accuracy and/or error rate; whether it has been validated through peer review and publication; whether it has been applied correctly; and if it has general acceptance within the relevant scientific community. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

uncontrolled transactions. This is a useful guide, but in the end it may become apparent for instance that certain U.S. or foreign exploitation functions are performed at a loss, or the foreign passive IP owner is earning more than 100% of the entire foreign value chain profit, leaving no profit for the other value chain functions, including foreign benefitting exploitation functions contributed by the U.S. parent. The cost sharing regulations themselves hint at an audit strategy based exactly on this approach, by addressing "exploitation" functions explicitly as an "operating contribution" requiring separate valuation in accordance with arm's length principles. Regulation section 1.482-7(a)(3)(iii) states the following (emphasis by the author):

> *"Controlled transactions between controlled participants that are not PCTs or CSTs and are not described in paragraph (a)(3)(ii) of this section (for example, provision of a[n]…operating contribution, as defined in paragraph (j)(1)(i) of this section),…require arm's length consideration under the rules of §§ 1.482-1 through 1.482-6, and 1.482-9 as supplemented by paragraph (g)(2)(iv) of this section."*

The term "operating contribution" is defined by Regulations section 1.482-7(j)(1)(i) [Definitions] as (emphasis by the author):

> *"Operating contributions—An operating contribution is any resource or capability or right…that is reasonably anticipated to contribute to the CSA Activity within the controlled participant's division."*

The term "CSA activity" is further defined by Regulations section 1.482-7(j)(1)(i) [Definitions] as follows (emphasis by the author):

> *"CSA Activity is the activity of…exploiting cost shared intangibles."*

The U.S. regulations therefore contain a framework for the application of a forensic analysis that measures how the system profit is shared between the passive product IP ownership and active IP exploitation functions in a value chain.

Illustration of System Profit Contribution Analysis Using Financial Reporting Information

The following table was estimated as one possible scenario based on SEC filings of a U.S. multinational taxpayer, following similar conventions as the prior illustration. This taxpayer has a globally integrated business, with approximately 100% of its R&D, executive leadership and revenue generating operations located within the U.S., as well as the majority of its long term assets, and has a publicly disclosed Section 482-7 cost sharing arrangement covered by an APA with the IRS.

Table 7: Segmented Results of U.S. Taxpayer 2 in 2012

($ millions)	United States	Foreign Total	Foreign CSA Affiliate Only
Revenues*	$ 21,300	$ 24,700	$ 19,200
Pre-tax Profit**	$ 5,300	$ 8,100	$ 7,800
Return on Revenues	25%	33%	41%
Total Costs***	$ 16,000	$ 16,600	$ 3,300
Approximate Employees****	33,400	20,400	3,000
Return on Total Costs	33%	49%	236%
Percentage of Global Profit	40%	60%	58%
Ratio of Passive IP Return to Total Foreign Return			96%

** CSA affiliate revenues assumed to represent royalty payments from other related foreign affiliates*

*** SEC filings state that "substantially all" foreign pre-tax income was earned by the CSA affiliate*

**** CSA affiliate costs are assumed to represent revenue share of R&D expenses + 2%*

***** Estimate based on SEC filings and other public information*

The question raised by Table 7, above, is whether the ninety-six percent share of total foreign pre-tax profit earned by the foreign CSA affiliate for its almost purely routine capital contributions is reasonable, and whether the U.S. activities performed for the benefit of foreign exploitation are properly remunerated.[26] The returns earned by the foreign CSA affiliate as a percentage of its total costs are more than seven times the U.S. returns on its total costs—though the U.S. activities and assets alone physically generated the non-routine profits in this time period, as the U.S. parent performed all non-routine and revenue generating functions in the company via U.S. fixed assets.[27]

According to the taxpayer's segmented financial results as hypothesized in this illustration, passive IP ownership by a tax haven affiliate earns about ninety-six percent of all foreign system profit and the active foreign "exploitation" or supply chain functions earn only about four percent of the foreign system profit. This compares to thirty-two percent and sixty-eight percent respectively as measured among third parties in the same industry as shown in Table 6. Missing from the table above however, are the profits (or losses) earned by the U.S. affiliate for its contributions of exploitation activities to foreign profits. If the U.S. parent were earning losses on these contributions then the foreign CSA participant could theoretically earn more than 100% of the actual foreign system profits, despite its dependence on the U.S. parent for both IP development and IP exploitation functions. Whether this is happening cannot be discerned from the SEC filings—which only present consolidated results for U.S. and foreign jurisdictions. However, if the U.S. returns for IP ownership and exploitation were in the same proportion to total costs as observed within the foreign CSA affiliate (forty-nine percent), the U.S. profits just for IP ownership would be $7.8 billion. However, the U.S. taxpayer earned much less than this—only $5.3 billion in total profit for: 1) its share of passive IP development returns in the U.S. market; 2) its return on exploitation functions for the U.S. market; 3) its return on exploitation activities for the foreign market;

[26] While U.S. tax rules generally exempt foreign income from U.S. taxation until repatriated, rules enacted in 1962 under Subpart F impose immediate U.S. taxation of passive foreign profits such as royalties and interest. However, this rule does not apply if the foreign affiliate is "disregarded" on the U.S. tax return pursuant to a "check-the-box" (CTB) election under Section 7701. This election causes the foreign affiliate to be treated as a branch of another foreign related entity, that is typically located in a low or no tax jurisdiction, where the passive income royalty payments escape U.S. taxation under Subpart F. As a result, CSA arrangements of the sort described here are almost always accompanied by CTB planning to prevent U.S. taxation of the CSA affiliate's passive profits.

[27] This conclusion is based on public testimony of the taxpayer in a government proceeding, information on its website, and other public sources.

and 4) the returns to the U.S. provided corporate network/management systems [which may or may not be included in item (3)]. This highlights a possible examination risk, in that either the U.S. parent's IP ownership return in the U.S. market is much less than the foreign IP ownership return in the foreign market—or the foreign IP ownership return is overstated at the expense of forgone U.S. returns for exploitation activities performed for both the U.S. and foreign markets.[28] To further investigate these findings, one can measure profitability of each dollar of marginal cost incurred in each location (U.S. and foreign) over time, as shown in Table 8.

Table 8: Taxpayer 2 Marginal Profitability of Long-Term Assets and Total Costs

($ Mil)	Profit Growth per Growth in LT Assets from Previous Year		Profit Growth per Growth in Total Costs from Previous Year		Foreign Return on LT Assets / US RLTA
Year	U.S.	Foreign	U.S.	Foreign	
2008	-47%	121%	$ (0.37)	$ 0.68	997%
2009	433%	1103%	$ 1.58	$ 3.49	667%
2010	30%	267%	$ 0.92	$ 0.59	723%
2011	-18%	114%	$ (0.09)	$ 0.54	687%
2012	14%	5%	$ 0.14	$ 0.08	258%
2013	17%	35%	$ 0.19	$ 0.10	254%
Averages	72%	274%	$ 0.39	$ 0.92	598%

Table 8 above, implies that the taxpayer earned higher returns per each incremental dollar of total cost incurred in foreign jurisdictions versus the U.S. over a sustained time period. In this table, costs, long term assets and profits all increased in each year for foreign affiliates for the duration of the period. However, in 2009 U.S. profits increased, while assets and costs decreased (so the percentage was reversed from a negative to a positive in 2009), and in 2008 and 2011 U.S. profits declined, though costs increased (these negative percentages were left unchanged). The last column is provided as a check on these results, and is directionally consistent with the marginal profitability results, which illustrate a higher return for every dollar of incremental foreign versus U.S. expense with continually rising foreign costs, revenues and profits. This would indicate that the U.S. and foreign components of the business operate under different profit and cost dynamics (though both of their revenues and cost of services are generated on the same global platform). In addition, foreign affiliates experience less volatility risk of earnings but higher overall incremental margins, while U.S. margins on incremental costs fluctuate from positive to negative, with lower relative marginal returns. Noting that foreign total costs are largely the product of allocations of costs from the U.S., it would appear that these cost allocations are being managed to target a certain level of stable foreign profitability, which appear to cause (possibly in combination with other factors) U.S. costs and therefore profits to fluctuate wildly. In other words, the much higher U.S. risks appear to be compensated with much lower returns than experienced by foreign affiliates with much lower risks. This may be an instance of the type of differential risks described in Regulations section 1.482-1(d)(3)(iii) that require differential returns. An analysis of the risk-return multiples for Taxpayer 2 demonstrates a similar result to that observed in Taxpayer 1. This is shown below in Table 9.

[28] This is based on the assumption that the foreign exploitation returns are compliant in each country, which is often the case in CSA-related tax planning, which involves limiting the risks and profits of foreign exploitation functions in high tax countries. Such arrangements generally require meticulous planning and comprehensive foreign documentation.

Table 9: Measurement of Taxpayer 2 U.S. and Foreign Risk vs. Reward Indicators

Consolidated	2013	2012	2011	2010	2009	2008	Total
Revenues	$ 59,700	$ 50,200	$ 38,000	$ 29,300	$ 23,700	$ 21,900	$ 222,800
Fixed Assets	$ 38,000	$ 33,400	$ 19,900	$ 16,300	$ 11,300	$ 11,600	$ 130,500
Total Costs	$ 45,300	$ 36,800	$ 25,700	$ 18,500	$ 15,300	$ 16,000	$ 157,600
Pre-tax Profit	$ 14,500	$ 13,400	$ 12,200	$ 10,800	$ 8,400	$ 5,900	$ 65,200

U.S.							Total
Revenues	$ 26,700	$ 23,500	$ 17,600	$ 14,000	$ 11,200	$ 10,700	$ 103,700
Fixed Assets	$ 24,000	$ 21,000	$ 16,000	$ 14,000	$ 9,400	$ 9,800	$ 94,200
Total Costs	$ 20,900	$ 18,200	$ 13,000	$ 9,100	$ 7,600	$ 8,600	$ 77,400
Pre-tax Profit	$ 5,800	$ 5,300	$ 4,600	$ 5,000	$ 3,600	$ 2,100	$ 26,400

Non-U.S.							Total
Revenues	$ 33,000	$ 26,700	$ 20,400	$ 15,300	$ 12,500	$ 11,200	$ 119,100
Fixed Assets	$ 14,000	$ 12,400	$ 3,900	$ 2,300	$ 1,900	$ 1,800	$ 36,300
Total Costs	$ 24,400	$ 18,600	$ 12,700	$ 9,400	$ 7,700	$ 7,400	$ 80,200
Pre-tax Profit	$ 8,700	$ 8,100	$ 7,600	$ 5,800	$ 4,800	$ 3,800	$ 38,800

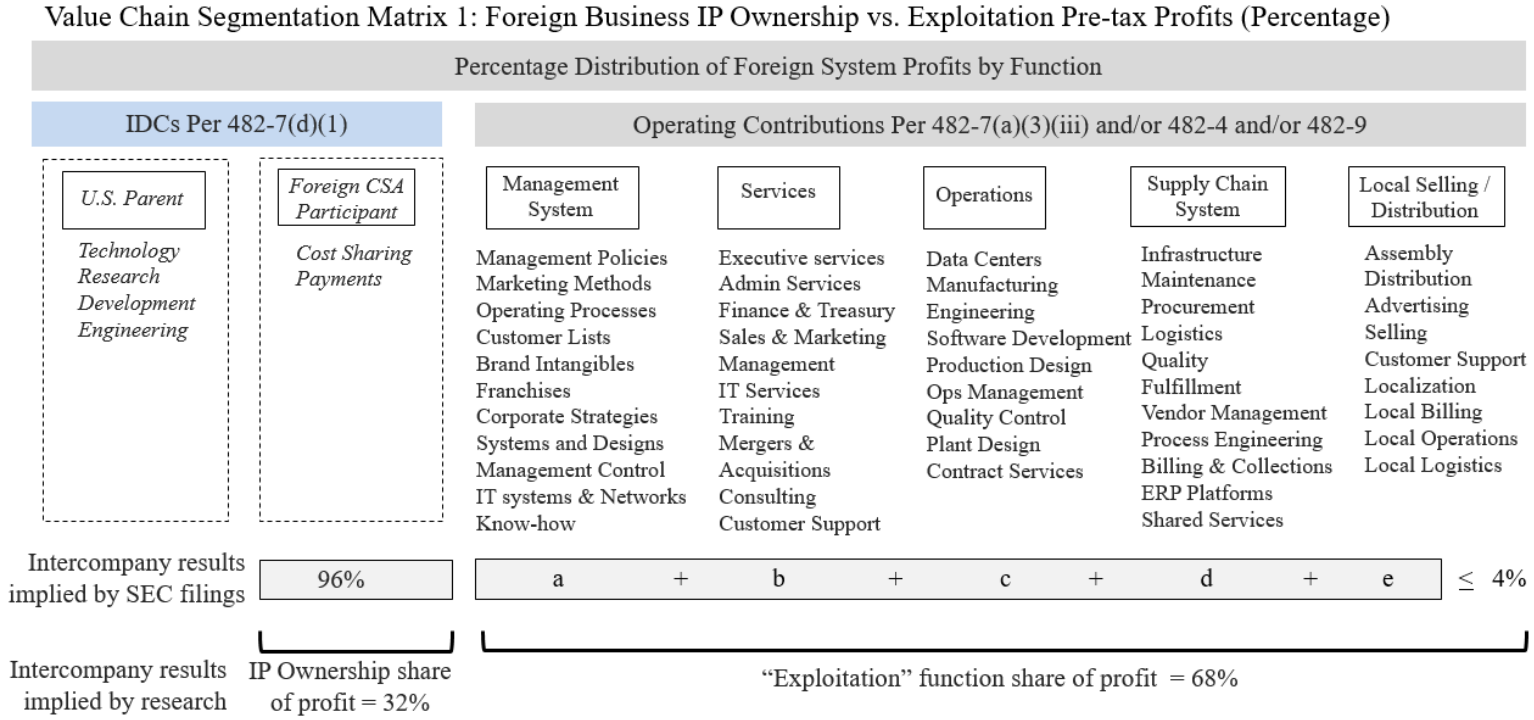
	Proportion of Fixed Assets (Proxy for Fixed Costs)						Average	U.S./ Foreign
U.S. Taxpayer	63%	63%	80%	86%	83%	84%	77%	
Foreign Taxpayers	37%	37%	20%	14%	17%	16%	23%	329%

	Annual Percentage Change in Pre-tax Profit (Absolute Values)						St. Dev	U.S./ Foreign
U.S. Taxpayer	9%	15%	8%	39%	71%	34%	24%	
Foreign Taxpayers	7%	7%	31%	21%	26%	52%	17%	143%

	Pre-tax Return on Total Costs						Average	U.S./ Foreign
U.S. Taxpayer	28%	29%	35%	55%	47%	24%	41%	
Foreign Taxpayers	36%	44%	60%	62%	62%	51%	59%	69%

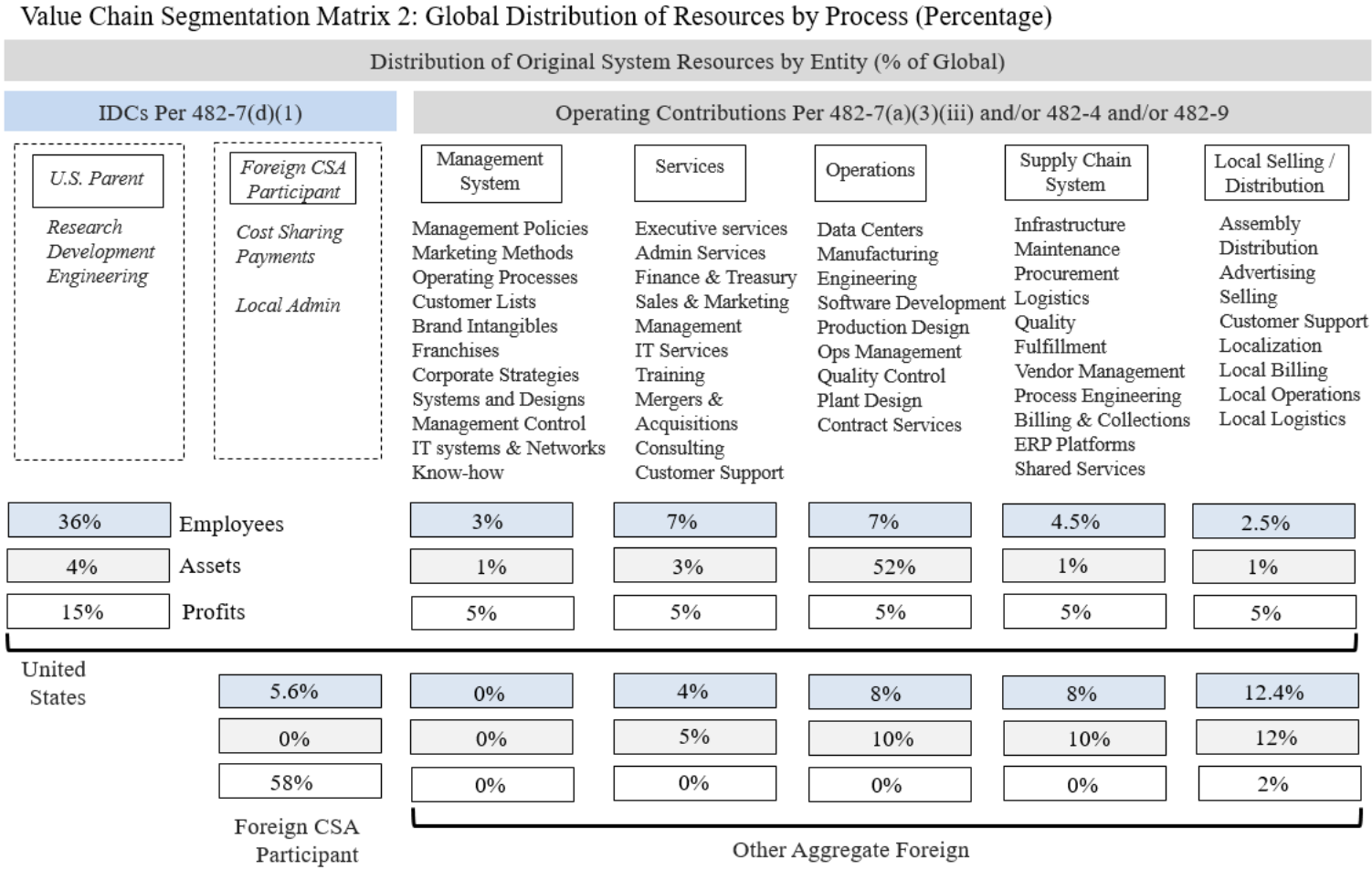
The first step in analyzing these returns involves dividing the foreign system profit between the IP exploitation and IP ownership functions. This is shown in the following diagram, representing a scenario based on financial results reported in SEC filings—from which no conclusions are drawn regarding transfer pricing compliance for reasons cited earlier. Note that in Figure 6 below, a substantial portion of the exploitation activities that are necessary to the generation of foreign profit (that appear to earn only four percent of the foreign system profit) are performed by the U.S. parent, according to public information. The foreign CSA affiliate returns are assumed for this purpose to be almost exclusively passive IP ownership returns, consistent with public disclosures that virtually all of the taxpayer's foreign pre-tax profits were earned in the country of domicile of the foreign CSA affiliate. In this example, it appears that the U.S. exploitation functions may indeed earn a loss, because there is so much profit in the foreign CSA principal for its passive IP ownership that there is not enough profit "left over" to compensate all of the foreign benefitting exploitation functions contributed by the U.S. parent. The numbers shown in these charts are illustrative only, because the actual transfer pricing results can only be derived using statutory financial results that include intercompany transactions—information that is proprietary to the taxpayer and the IRS.

Figure 6: Segmented Value Chain and Foreign Profit Analysis for CSA Arrangement



The diagram above shows that the exploitation functions that should be earning sixty-eight percent of system profits may only earn four percent. Given that foreign exploitation functions have been priced based on third party benchmarks, this implies that as much as sixty-four percent of the foreign system profit could be attributable to U.S. contributions, such as the management system, corporate networks, supply chain functions, marketing, and/or other routine and non-routine exploitation contributions and functions. Investigating this hypothesis would involve a detailed examination of the value chain functions and search for facts that would either confirm or disprove the hypothesis on which this analysis is based. These facts could include information shown in Figure 7, which shows a more detailed view of the taxpayer's information, this time showing the productive factors on a global basis for both the U.S. and aggregated foreign related taxpayers (as hypothesized by the author). Note in this view the foreign IP owner earns fifty-eight percent of the global profit, while possessing 5.6% of the global employees and zero percent of revenue-generating operating assets. This diagram provides a more nuanced view of the taxpayer's supply chain, through which the examiner and taxpayer can better see the interactions between the value-creating functions of the enterprise, their interdependence and the location of profits resulting from those functions by location. This diagram is illustrative only, and involved substantial assumptions and estimates and relationships that may not be accurate but which could be tested as part of an examination using statutory information.

Figure 7: Segmented Value Chain and Global Profit Analysis for CSA Arrangement

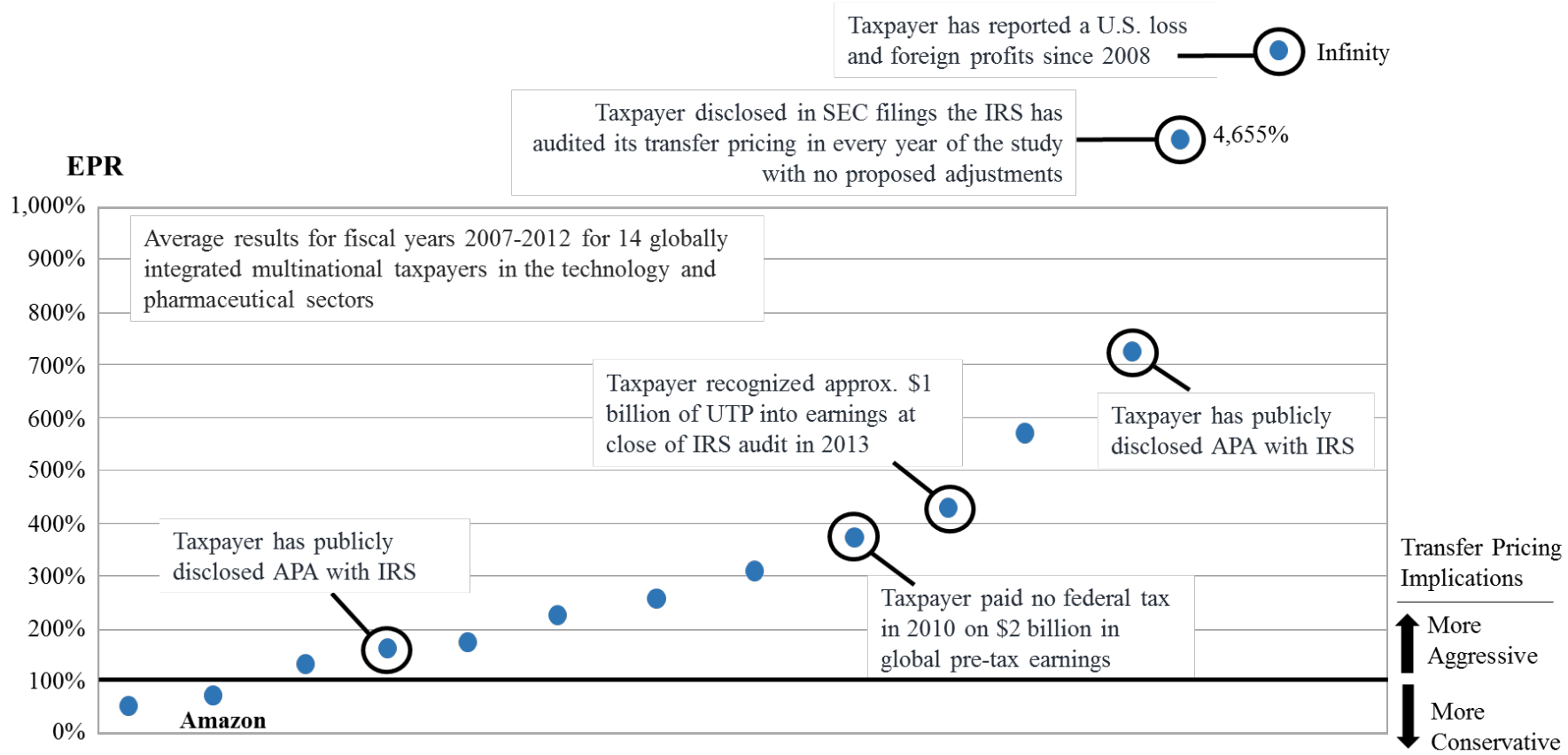


Application of Risk-Return Analysis to Type I Errors

The forensic models presented in this paper have focused primarily on potential Type II errors (failing to detect non-compliance). However, the same models could also help reduce Type I errors (mistaking compliance for non-compliance). In this regard the risk-return models presented earlier are applied to the IRS audit of Amazon.com—again using financial reporting information that may or may not be corroborated by use of statutory tax filing information. The IRS in 2012 issued a notice of proposed tax deficiency to this taxpayer for transfer pricing of as much as $1.5 billion for tax years after 2005. This adjustment is currently under challenge in federal tax court.[29] Figure 8 first compares Amazon.com to thirteen large U.S. technology and pharmaceutical firms with publicly disclosed cost sharing arrangements with foreign tax haven affiliates between 2005 and 2012. The table compares the profitability of U.S. and foreign employees. According to this table Amazon has what might be considered among the most "conservative" transfer pricing among its peers, as it is one of only two firms falling below the 100% line, indicating that its profits per U.S. employee are greater than its profits per foreign employee over the period (noting that Amazon.com is a labor- and asset-intensive business compared to many other internet-based retailers). Notably, several firms whose transfer pricing might be deemed "more aggressive" according to this analysis received APAs, tax refunds and "no change" audits from the IRS, including one taxpayer that recognized as much as one billion dollars of UTP into earnings at the close an IRS audit, and another whose foreign profits per employee are 4,600% times its U.S. profits per employee over a sustained period without an IRS adjustment. According to these results, an argument could be made that these taxpayers face widely divergent enforcement standards (which apparently differ by examination team), in which "more conservative" transfer pricing may be challenged, and "more aggressive" transfer pricing may be rewarded. This of course would be the opposite of what taxpayers should expect from a tax enforcement system.

[29] *Amazon.com, Inc. v. Commissioner*, T.C. Docket 31197-12.

Figure 8: Employee Profitability Ratios of Fourteen Multinational Technology and Pharmaceutical Firms With Publicly Disclosed CSA Arrangements



EPR = Foreign pre-tax profit per foreign employee divided by U.S. pre-tax profit per U.S. employee. Numbers reflect the average for years 2007-2012.

One useful forensic approach is to perform a pairwise comparison within an industry or set of competitors to establish benchmark levels of compliance or enforcement according to various attributes. Tables 10 and 11 that follow, provide a single instance of a direct pairwise comparison of the relative U.S. and foreign returns and their associated riskiness for both Amazon.com and a direct competitor in the same primary industry. In 2011 this competitor had an uncertain tax position (UTP) approximately twice that of Amazon.com, and had recognized approximately the equivalent of this UTP balance into earnings over the prior three years at the close of each IRS exam.[30] At about the same time that Amazon was issued a deficiency of $1.5 billion, the competitor settled positions with U.S. and foreign tax authorities paying approximately $260 million. The cumulative operating/pre-tax earnings of this taxpayer were four times that of Amazon.com over the period.[31] This competitor noted in its FY2011 financial reports that it had saved almost one billion dollars in taxes resulting from tax rulings in tax haven countries applying to profits shifted to these locations, and in the year prior paid no U.S. federal income tax. In that same year Amazon paid federal income taxes of $311 million on only a fraction of the worldwide income of this competitor. The risk-return analysis in Tables 10 and 11 indicates that Amazon earned profits in the U.S. that appeared commensurate with, if not far in excess of the profits that would be expected based on its U.S. risks compared to foreign risks. The competitor however appeared to earn only a small fraction of the profit predicted by the model as commensurate with its U.S. risks. This is despite the fact that the competitor's ratio of U.S. to foreign risks are more than double those of Amazon's. Finally, Amazon reported more U.S. operating profits over the period than the competitor, despite the fact that its global profits were less than thirty percent of the competitor's global profits, and ratios of U.S. and foreign revenues were similar for both taxpayers. One could characterize the Service's position as basically arguing that Amazon's foreign losses were not large enough, and that U.S. profit margins should have been even greater than the 400% multiple of its combined foreign affiliates—U.S. profits that far exceeded their risk multiple according to this analysis. The same standard did not apply to Amazon's competitor however, whose U.S. profit margins were only $1/10^{th}$ of the margins implied by its U.S. risk multiple, with maximum estimated IRS adjustments totaling only seventeen percent of those proposed against Amazon in the comparable period. As with prior examples, these results are based on consolidated public financial reporting and may differ from results obtained using statutory information.

Non-compliant intercompany transactions can certainly be found at otherwise compliant taxpayers, and challenging a taxpayer with U.S. profits and foreign losses and what appears to be more than reasonable transfer pricing at the profit level is not *ipso facto* evidence of a Type I problem. However, these results based on financial reporting do appear supportive of the idea that scarce IRS resources could be deployed in ways that are better aligned with their potential value from a revenue perspective, and with risk assessment indicators and principles of tax fairness. Likewise, the IRS could use forensic approaches and technologies to achieve more consistency across audit teams, which could be deployed based on indicators of tax underpayment risk and employing consistent processes and standards of quality. This could reduce the probability of both Type I and Type II errors, thereby increasing the efficiency and effectiveness, as well as the fairness of tax enforcement efforts, while reducing examination burdens for taxpayers whose transfer pricing results appear reasonable if not compliant at the profit level.

[30] UTP balances reflect the amount of profits withheld from earnings because they are attributable to tax positions for which compliance is uncertain. Such amounts can generally be recognized into earnings upon completion of a tax audit of the relevant years in which such positions are not detected or challenged by tax authorities. See Financial Accounting Standards Board (FASB) Interpretation No. 48 (FIN 48), Accounting for Uncertainty in Income Taxes, and Topic 740 of FASB's Accounting Standards Codification for a definition of UTP.

[31] Neither Amazon nor its competitor had any material debt financing or interest payments in the period under review, and therefore operating profit and pre-tax earnings were deemed to be equivalent for each taxpayer for this analysis.

Table 10: U.S. and Foreign Risk vs. Reward Indicators—Amazon.com

Consolidated	2015	2014	2013	2012	2011	2010	2009	Total
Revenues	$ 107,006	$ 88,988	$ 74,452	$ 61,093	$ 48,077	$ 34,204	$ 24,509	$ 438,329
Fixed Costs	$ 21,838	$ 16,967	$ 10,949	$ 7,060	$ 4,417	$ 2,414	$ 1,290	$ 64,935
Total Costs	$ 105,438	$ 89,099	$ 73,946	$ 60,549	$ 47,143	$ 32,707	$ 23,348	$ 432,230
Pre-tax Profit	$ 1,568	$ (111)	$ 506	$ 544	$ 934	$ 1,497	$ 1,161	$ 6,099

U.S.								Total
Revenues	$ 70,537	$ 54,717	$ 43,959	$ 31,332	$ 24,035	$ 16,836	$ 11,545	$ 252,961
Fixed Costs	$ 6,707	$ 5,373	$ 8,447	$ 5,481	$ 3,413	$ 1,958	$ 1,059	$ 32,438
Total Costs	$ 68,351	$ 54,425	$ 43,255	$ 30,450	$ 23,377	$ 15,950	$ 11,016	$ 246,824
Pre-tax Profit	$ 2,186	$ 292	$ 704	$ 882	$ 658	$ 886	$ 529	$ 6,137

Non-U.S.								Total
Revenues	$ 36,469	$ 34,271	$ 30,493	$ 29,761	$ 24,043	$ 17,368	$ 12,964	$ 185,368
Fixed Costs	$ 15,131	$ 11,594	$ 2,502	$ 1,579	$ 1,004	$ 456	$ 231	$ 32,497
Total Costs	$ 37,087	$ 34,674	$ 30,691	$ 30,099	$ 23,767	$ 16,757	$ 12,332	$ 185,406
Pre-tax Profit	$ (618)	$ (403)	$ (198)	$ (338)	$ 276	$ 611	$ 632	$ (38)

Proportion of Fixed Assets (Proxy for Fixed Costs)								Average	U.S. / Foreign
U.S. Taxpayer	31%	32%	77%	78%	77%	81%	82%	65%	
Foreign Taxpayers	69%	68%	23%	22%	23%	19%	18%	35%	189%

Annual Change in Pre-tax Profit (Absolute Value)								St Dev	U.S. / Foreign
U.S. Taxpayer	649%	59%	20%	34%	26%	67%	21%	232%	
Foreign Taxpayers	53%	104%	41%	222%	55%	3%	36%	72%	321%

Pre-tax Mark-up on Total Costs								Average	U.S. / Foreign
U.S. Taxpayer	3%	1%	2%	3%	3%	6%	5%	3%	
Foreign Taxpayers	-2%	-1%	-1%	-1%	1%	4%	5%	1%	402%

Table 11: U.S. and Foreign Risk vs. Reward Indicators—Amazon Competitor

Consolidated	2015	2014	2013	2012	2011	2010	2009	Total
Revenues	$ 8,592	$ 17,902	$ 16,047	$ 14,072	$ 11,652	$ 9,156	$ 8,727	$ 86,148
Fixed Assets	$ 1,784	$ 2,996	$ 2,996	$ 2,949	$ 2,331	$ 1,651	$ 1,566	$ 16,274
Total Costs	$ 6,186	$ 14,371	$ 12,581	$ 10,988	$ 7,742	$ 7,058	$ 5,848	$ 64,774
Pre-tax Profit	$ 2,406	$ 3,531	$ 3,466	$ 3,084	$ 3,910	$ 2,098	$ 2,879	$ 21,375

U.S.								Total
Revenues	$ 3,624	$ 8,495	$ 7,712	$ 6,778	$ 5,484	$ 4,214	$ 3,985	$ 40,292
Fixed Assets	$ 1,668	$ 2,756	$ 2,756	$ 2,727	$ 2,203	$ 1,465	$ 1,221	$ 14,796
Total Costs	$ 3,228	$ 8,322	$ 7,118	$ 6,173	$ 3,738	$ 3,366	$ 3,836	$ 35,781
Pre-tax Profit	$ 396	$ 173	$ 594	$ 605	$ 1,746	$ 848	$ 149	$ 4,511

Non-U.S.								Total
Revenues	$ 4,968	$ 9,407	$ 8,335	$ 7,294	$ 6,168	$ 4,942	$ 4,742	$ 45,856
Fixed Assets	$ 116	$ 240	$ 240	$ 222	$ 128	$ 186	$ 345	$ 1,478
Total Costs	$ 2,958	$ 6,049	$ 5,463	$ 4,815	$ 4,004	$ 3,692	$ 2,012	$ 28,993
Pre-tax Profit	$ 2,010	$ 3,358	$ 2,872	$ 2,479	$ 2,164	$ 1,250	$ 2,730	$ 16,864

Proportion of Fixed Assets (Proxy for Fixed Costs)								Average	U.S. / Foreign
U.S. Taxpayer	93%	92%	92%	92%	95%	89%	78%	90%	
Foreign Taxpayers	7%	8%	8%	8%	5%	11%	22%	10%	916%

Annual Change in Pre-tax Profit (Absolute Value)								St Dev	U.S. / Foreign
U.S. Taxpayer	129%	71%	2%	65%	106%	470%	55%	156%	
Foreign Taxpayers	40%	17%	16%	15%	73%	54%	47%	23%	690%

Pre-tax Mark-up on Total Costs								U.S. / Foreign
U.S. Taxpayer	12%	2%	8%	10%	47%	25%	4%	15%	
Foreign Taxpayers	68%	56%	53%	51%	54%	34%	136%	64%	24%

Conclusion

This paper investigated the applicability of data analytics and forensic economic analysis to the examination and documentation of transfer pricing outcomes. Just as forensic DNA technology has improved the effectiveness and certainty of criminal investigation, forensic economics and data analytics research, capabilities and technologies could improve the effectiveness and certainty of tax compliance and enforcement efforts. While several analytic techniques were illustrated, many more techniques are possible, including comparative analyses of bargaining power, operational responsibility, human capital, functional capability and competitive advantage, process contribution analysis, difference in differences analysis, activity based costing analysis, hypothesis testing, and other scientific approaches. These analyses may involve the use of statistics, econometrics, financial analysis, managerial and financial forensic accounting, operations management, game theory, microeconomics and other disciplines applied to intercompany economic relationships. Some of these techniques can be automated with data analytics and forensic economic modelling software.

In order to fully leverage these and other forensic techniques the Service may consider the creation of a forensics organization to develop and use such methods for: 1) more efficient and accurate risk analysis and audit selection; 2) new and improved audit approaches incorporating forensic economic research, methods, models and technologies, possibly as a standardized set of diagnostics and testing procedures; 3) training of examiners and economists in relevant forensic investigative techniques; 4) work with counsel to ensure the alignment of economic and legal interpretations, arguments and evidence; and 5) regulatory reform removing the bias for one sided methods, incorporating guidance on economic reliability and the conditions necessitating a two-sided corroborative or primary transfer pricing method, modifying cost sharing rules to afford only routine returns to routine CSA-related contributions, and addressing other regulatory loopholes and violations of economic principles. Forensic and data analytics based approaches can also be applied to the analysis of BEPS country by country reporting, in order to better inform these reports. Taxpayers may also find such approaches useful for assessing their compliance and examination risk, to inform their choice of the best method, and also for challenging extreme or possibly non-compliant IRS examination positions.

While many regulatory improvements are possible that could promote better compliance and enforcement, such regulatory improvements do not appear to be strictly required in order for the Service and taxpayers to employ forensic and data analytics based approaches in accordance with the best method rule. Indeed, the use of innovative forensic economic methods and technologies appears to be one way to improve both compliance and enforcement outcomes in the absence of regulatory reform.

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