

FORCING MULTINATIONALS TO PLAY FAIR: PROPOSALS FOR A RIGOROUS TRANSFER PRICING THEORY

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INTRODUCTION

Perhaps the greatest problem facing the international tax system is the taxation of transfer pricing within related groups of corporations. By guaranteeing that the allocation of profits among related parties reflects the economic reality of underlying transactions, many of the problems with controversial issues, such as tax havens, tax competition, and corporate expatriations, would be greatly reduced or eliminated entirely.¹

Transfer pricing refers to the prices that related parties charge one another for goods and services passing between them.² The most common application of the transfer pricing rules is the determination of the correct price for sales between subsidiaries of a multinational corporation. These prices can be used to shift profits to tax-favored jurisdictions. If, in a transaction between a subsidiary in a high-tax jurisdiction and another in a low-tax jurisdiction, the high-tax subsidiary charges a price below the “true” price, some of the group’s economic profit is shifted to the low-tax subsidiary.³ Obviously, taxpayers would want to engage in this sort of behavior, because it can significantly reduce their taxes.

If there were no limitations on this behavior, the entire income of multinational corporations would be taxed at the lowest tax rate in the world—currently a zero rate of taxation.⁴ Consequently, most countries have some set of tax rules that regulate the prices that related persons can charge one another.⁵ The U.S. transfer pricing system, as well as almost all other sys-

1. For discussion of this proposition, see Terrence R. Chorvat, *A Different Perspective on International Tax Competition*, 35 GEO. WASH. J. INT’L. L. & ECON. (forthcoming 2003).

2. See 26 U.S.C. § 482 (2002).

3. See U.S. INTERNATIONAL TRANSFER PRICING § 1.01 (2003).

4. See Chorvat, *supra* note 1.

5. Most industrialized countries have adopted the arm’s length principle, which is the standard set forth in the section 482 regulations, the OECD Transfer Pricing Guidelines, most tax treaties, and in the model treaties issued by the United Nations and the OECD. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, TRANSFER PRICING GUIDELINES FOR MULTINATIONAL ENTERPRISES AND TAX ADMINISTRATIONS (1995) [hereinafter OECD GUIDELINES]. The member countries of the Organisation for Economic Co-operation and Development (OECD) are Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

tems, is based on what is known as the arm's length principle,⁶ the idea that the prices charged by related parties to one another should be consistent with the price that would have been charged if both parties were unrelated and negotiated at arm's length.⁷

This system can work well if the goods and services traded are standardized and commonly traded between third parties (e.g., oil, steel, and other, similar commodities). However, as most of the goods and services traded between related parties are non-standardized or unique, applying an arm's length standard becomes more difficult.

Under the current U.S. transfer pricing system, multinationals can effectively allocate profits to low-tax jurisdictions based on the mere appearance of activity within a jurisdiction. Often, little actual economic activity need be allocated to a low-tax jurisdiction in order to claim that profit should be allocated there.⁸ By strategic planning under the existing system, many multinational corporations have been able to significantly reduce their taxes,⁹ allowing these corporations to benefit from the public goods provided by the jurisdictions in which they operate, including the United States, without paying their fair share of tax. This opportunity for exploitation of the U.S. tax rules exists because the current transfer pricing system is administered as a facts and circumstances test with the majority of the information in the hands of the multinational corporation (MNC) rather than the government.¹⁰ As such, cross-border transactions can be arranged—or perhaps merely described—so as to minimize U.S. tax. Richard Caves has described the transfer pricing problem as inducing multinational firms “to raise or lower prices on any interaffiliate transaction until all profits have been shifted to the lowest-tax jurisdiction.”¹¹

Commentators who focus on the shortcomings of the arm's length standard generally propose that taxing authorities impose some form of formulary apportionment.¹² Under a formulary apportionment system, the income

6. See U.S. INTERNATIONAL TRANSFER PRICING § 1.02 (2003); see also 26 U.S.C. § 482 (2002).

7. See U.S. INTERNATIONAL TRANSFER PRICING § 1.02 (2003).

8. See OECD GUIDELINES, *supra* note 5.

9. See Reuven S. Avi-Yonah, *The Structure of International Taxation: A Proposal for Simplification*, 74 TEX. L. REV. 1301 (1996); see also Michael J. Graetz, *Taxing International Income: Inadequate Principles, Outdated Concepts, and Unsatisfactory Policies*, 26 BROOK. J. INT'L L. 1357, 1417, 1420 (2001) (stating that “recent years have witnessed, for example, the rise of e-commerce, the expanded use of financial derivatives, the invention of e-money, the increased mobility of capital, and a rise in the use of tax-haven financial centers and more sophisticated cross-border legal and financial arbitrage, all of which have helped render archaic (or easily manipulated) the longstanding core concepts used worldwide to implement international income tax arrangements and policies,” and describing the international tax community, including most first-world governments, the OECD, and many businesses, as “embracing the fairy tale that the transfer-pricing problem is pretty much under control”); Vito Tanzi, *Globalization, Technological Developments, and the Work of Fiscal Termites*, 26 BROOK. J. INT'L L. 1261 (2001) (citing tax competition and the growth of offshore financial centers and tax havens for an impending decline and potential collapse of the tax systems of industrial nations).

10. See U.S. INTERNATIONAL TRANSFER PRICING § 2.03 (2003).

11. RICHARD E. CAVES, *MULTINATIONAL ENTERPRISE AND ECONOMIC ANALYSIS* 251 (1st ed. 1982).

12. See generally Avi-Yonah *supra* note 5; see also Paul R. McDaniel, *Formulary Taxation in the North American Free Trade Zone*, 49 TAX L. REV. 691 (1994) (arguing for formulary apportionment);

is allocated to the various members of a related group of corporations based on a set of factors such as labor costs in the jurisdiction, sales, and value of assets.¹³ However, these formulaic methods of taxation will almost certainly lead to inaccurate taxation and, very likely, over-taxation of multinational corporations, which is itself undesirable as an inefficient solution.¹⁴ Using simple formulary methods to apportion taxation effectively converts the income tax into a tax on the factors used in the formula.¹⁵ Moreover, formulary methods are likely to lead to a decrease in productivity.¹⁶

Instead of an inaccurate and simplistic formula¹⁷ or a largely open-ended system based upon comparables and promoting prolonged controversy as to whether a particular transaction is or is not comparable, a better response would be to adopt a system which attempts to accurately derive an allocation of income based on the best valuation theories available. Such a system would have the benefits of both a formulary apportionment system and the arm's length standard.

This Article examines the use of the capital asset pricing model (CAPM), arbitrage pricing theory, option pricing theory, and other modern valuation pricing theories to derive better allocations of income between or among related parties.

Part I of this Article examines the main problem that transfer pricing rules attempt to solve and how almost all of the current proposals fall short of solving this problem. Part II discusses how the most prominent modern valuation theories differ from those inherent in the current transfer pricing system. Part III demonstrates how we can use the lessons from modern valuation theories to improve the transfer pricing system.

I. THE PROBLEM OF TRANSFER PRICING

A. *The Setting: What Standard Should Govern?*

Governments recognize that transfer pricing is an effective tool for the manipulation of income to defer taxation.¹⁸ Reasonable claims to tax the

Peyton H. Robinson, *U.S. Federal Use of Formulary Apportionment to Tax Income from Intangibles*, 9 *Tax Mgmt. (BNA)* No. 35, at 9 (Rep. Supp. Nov. 1, 2000) (developing the three-factor formula); William J. Wilkins & Kenneth W. Gideon, *Memorandum to Congress: You Wouldn't Like Worldwide Formula Apportionment*, 65 *TAX NOTES* 1259 (1994) (describing Senator Byron Dorgan's position).

13. See OECD GUIDELINES, *supra* note 5, ¶ 4.06.

14. Robert Ackerman & Elizabeth Chorvat, *Modern Financial Theory and Transfer Pricing*, 10 *GEO. MASON L. REV.* 637 (2002).

15. Charles McClure, Jr., *The State Corporate Income Tax: Lambs in Wolves' Clothing*, in *THE ECONOMICS OF TAXATION* 327, 341-46 (Henry J. Aaron & Michael Boskin eds., 1980).

16. Ackerman & Chorvat, *supra* note 14.

17. See *Nat'l Westminster Bank, PLC v. United States*, 44 Fed. Cl. 120, 126 (1999) (stating that "where the books of account of a permanent establishment are, with adjustments, adequate to determine the profits . . . of the permanent establishment as a separate entity, then those books should be used (and presumably not some substituted formula)").

18. See Harlow N. Higinbotham et al., *Effective Application of the Section 482 Transfer Pricing Regulations*, 42 *TAX L. REV.* 295, 300-02 (1987).

business income of multinational enterprises arise from both source and residence jurisdictions.¹⁹ Ceding primary taxing authority to another jurisdiction means that one country's lost revenue is another country's gain. As a consequence, countries have attempted to resolve the transfer pricing problem in a manner that accurately allocates income among contributing business entities and is fair and equitable to the various jurisdictions in which the members of a multinational group operate.

1. The Arm's Length Standard

Two approaches to transfer pricing have received almost all of the focus in the literature. Most industrialized countries have adopted the arm's length principle,²⁰ which is the standard set forth in the section 482²¹ regulations,²² the OECD Guidelines for transfer pricing,²³ most tax treaties,²⁴ and in the model treaties issued by the United Nations and the OECD.²⁵ The arm's length standard is almost universally accepted because it is thought to be the model under which revenue authorities are most likely to calculate the proper amount of income subject to taxation within their jurisdiction.²⁶

19. The source of income is where the activities that generate income are conducted. Terrence R. Chorvat, *Taxing International Corporate Income Efficiently*, 53 TAX L. REV. 225, 227 (2000). The source country is the country that is the source of the income. *Id.* The residence country of a corporation is the country in which the corporation is managed or where it is incorporated. *Id.* Further complicating the issue of the allocation of business income, the United States taxes the worldwide income of its residents while most of its important trading partners have adopted territorial systems. *Id.* Under a territorial system, the resident country exempts foreign source income from taxation. *Id.* This includes, for example, Canada, the Netherlands, France, and Germany, while Japan and the United Kingdom have worldwide credit systems. See HUGH J. AULT, *COMPARATIVE INCOME TAXATION: A STRUCTURAL ANALYSIS* 401-06 (1997).

20. The authoritative statement of the arm's length principle is found in paragraph 1 of Article 9 of the *OECD Model Tax Convention*, which forms the basis of bilateral tax treaties involving OECD member countries and an increasing number of non-member countries. Article 9 provides:

[When] conditions are made or imposed between . . . two [associated] enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which would, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly.

OECD Committee on Fiscal Affairs, *Model Tax Convention on Income and on Capital*, Apr. 29, 2000.

21. All section references are to the Internal Revenue Code of 1986, as amended, unless otherwise indicated.

22. Treas. Reg. §§ 1.482-0 to -8 (1994).

23. OECD GUIDELINES, *supra* note 5.

24. Avi-Yonah, *supra* note 9, at 1339.

25. *Id.*; see also Brian D. Lepard, *Is the United States Obligated to Drive on the Right? A Multidisciplinary Inquiry into the Normative Authority of Contemporary International Law Using the Arm's Length Standard as a Case Study*, 10 DUKE J. COMP. & INT'L L. 43, 76-69 (1999).

26. Issued by the League of Nations in 1923, the Report on Double Taxation addressed the allocation of income taxing rights between countries and introduced the idea of arm's length allocation. *Report on Double Taxation*, League of Nations Doc. E.F.S. 73 F.19 (1923), reprinted in LEGISLATIVE HISTORY OF UNITED STATES TAX CONVENTIONS 4005 (1962). In 1927 and 1928, the League of Nations considered and rejected formulary apportionment. Graetz, *supra* note 9, at 1420. A draft multilateral convention for the allocation of business income was issued by the League of Nations in 1933, which included the adoption of the arm's length principle. *Draft Convention Adopted for the Allocation of Business Income Between States for the Purposes of Taxation*, League of Nations Doc. C.399 M.204 1933 II.A (1933), reprinted in LEGISLATIVE HISTORY OF UNITED STATES TAX CONVENTIONS 4241, 4243-46

Moreover, by incorporating the separate entity concept, the arm's length principle places related and unrelated enterprises on an equal footing for tax purposes, avoiding the creation of tax advantages or disadvantages that would otherwise distort the relative competitive positions of either form of entity.²⁷ In the public marketplace, gains to trade are divided by arm's length bargaining. The essence of the transfer pricing problem is that there is no public marketplace when trade occurs between related parties. The arm's length standard imposes an approximation of the results that would have occurred in an open market where goods and services are transferred between unrelated enterprises.²⁸

2. *Formulary Apportionment*

The other, formulary apportionment, in which each subsidiary is treated as a branch or division of one enterprise, involves the simple allocation of profit and loss based on pre-set formulas that may or may not account for the particular circumstances of the individual multinational groups.²⁹ Traditional formulary apportionment, as applied within the United States, involves the allocation of profit and loss based on the relative proportions of property, payroll, and sales.³⁰ However, this approach is often criticized because allocation should be based on the value of the economic realities brought by the participating related entities to the group rather than a formula based on the placement of hard assets, employees, and sales.³¹ Arm's length principles, properly applied, require economic reality to govern the determination of the transfer price. Simple allocation techniques such as formulary apportionment do not account for the value properly allocable to nontraditional assets such as intangibles (e.g., trade secrets, processes, or proprietary methods) or contract rights, or risks associated with both the traditional and nontraditional assets of the business entity.³²

(1962).

27. OECD GUIDELINES, *supra* note 5, ¶ 1.7. One goal of any transfer pricing regime should be the adoption and administration of a set of rules that promotes economic neutrality. That is, transfer pricing rules should reflect the economic arrangement among members of a multinational enterprise operating in different countries in the same manner as if the related members were in fact unrelated parties dealing at arm's length. Transfer pricing rules should not impose economic penalties upon multinationals that conduct business between or among related parties instead of between or among unrelated parties. Global economic efficiency is fostered if business decisions about whether to operate in an integrated manner are not distorted by transfer pricing rules.

28. *Id.* ¶ 1.13.

29. Graetz, *supra* note 9, at 1420.

30. See McDaniel, *supra* note 12, (arguing in favor of formulary apportionment); Robinson, *supra* note 12, at 9 (discussing the development of the three-factor formula); Wilkins & Gideon, *supra* note 12 (describing Senator Dorgan's position).

31. See Wilkins & Gideon, *supra* note 12, at 1260-61 (discussing the problems with formulary apportionment). This criticism can be applied, although not with equal force, to both the current application of the arm's length standard and to formulary apportionment.

32. See *id.* at 1260.

*B. Implementing the Arm's Length Standard:
Current Transfer Pricing Methods*

The current paradigm for the determination of true taxable income for transactions between related parties is the arm's length standard. The arm's length result of a controlled transaction is assumed to be that result which would have occurred between uncontrolled taxpayers in the same transaction under the same circumstances. Because identical transactions can rarely be identified, the arm's length standard must typically be applied using unrelated-party transactions under similar or comparable circumstances as benchmarks. These unrelated-party transactions are referred to as comparable transactions.

The current methods for implementing the arm's length standard for property transfers may be divided into two categories: transactional methods and profits-based methods. Transactional methods are generally preferred by taxing authorities because these methods determine the transfer price by reference to the consideration paid in comparable uncontrolled transactions.³³

1. Transactional Methods

There are three traditional specified transactional methods set forth in the U.S. transfer pricing regulations: comparable uncontrolled price (CUP)³⁴ (or in the case of intangibles transfers, comparable uncontrolled transaction (CUT)),³⁵ cost-plus,³⁶ and resale price.³⁷ The CUP method relies on prices in comparable transactions between or with unrelated third parties.³⁸ Cost-plus is applied when the costs incurred for supplying a product are known.³⁹ The transfer price is determined by adding a reasonable markup to the cost.⁴⁰ Alternatively, the resale price method is used when the ultimate sales price to arm's length third parties is known. In that case, the transfer price is determined by reducing the price by a reasonable markup.⁴¹

Data based on comparable unrelated transactions is presumed to provide the most objective measure for judging whether the results of controlled transactions are arm's length.⁴² However, these methods require information about comparable transactions between unrelated parties that is usually not publicly available. In debating the 1986 Tax Reform Act, Congress noted

33. Treas. Reg. § 1.482-1(c)(2)(i) (1994); *see also* Robinson, *supra* note 12, at 3, 5-6.

34. Treas. Reg. § 1.482-3(b)(1).

35. *Id.* § 1.482-4(c).

36. *Id.* § 1.482-3(d).

37. *Id.* § 1.482-3(c)(1)-(2).

38. *Id.* § 1.482-3(a), (b)(1).

39. Treas. Reg. § 1.482-3(d).

40. *Id.* § 1.482-3(d)(1)-(2); *see also* ROBERT COLE, PRACTICAL GUIDE TO U.S. TRANSFER PRICING § 7.01 (2d ed. 2001).

41. Treas. Reg. § 1.482-3(c)(2).

42. *Id.* § 1.482-1(c)(2); *see also* Robinson, *supra* note 12, at 5.

the "recurrent problem [of] the absence of comparable arm's length transactions between unrelated parties, and the inconsistent results of attempting to impose an arm's length concept in the absence of comparables."⁴³

While it is generally agreed that transactional methods are theoretically superior to profits-based methods for implementing the arm's length standard, detailed information regarding comparable transactions is not always readily available.⁴⁴ Where no reliable data regarding comparables are available, or where adjustments cannot provide for sufficient comparability between controlled and uncontrolled transactions,⁴⁵ transactional methods are no longer feasible and profits-based methods are allowed.⁴⁶

2. Profits-Based Methods

The profits-based methods specified in the U.S. regulations are the comparable profits method (CPM) and the profit split. The CPM relies on comparable transactions, although the standard of comparability required for CPM is relatively lax and useful for measuring the returns to routine functions.⁴⁷ Profit splits are appropriate where both parties to the controlled transaction possess valuable, non-routine intangibles, and no method based on comparable transactions would be reliable.⁴⁸ The U.S. regulations prescribe two profit split methods.⁴⁹ The first is the comparable profit split, which essentially relies on comparable transactions.⁵⁰

The second profits-based method is described in the U.S. regulations is the residual profit split, which is based on the concept of valuing routine functions, subtracting an appropriate return for these functions, and allocat-

43. STAFF OF JOINT COMM. ON TAXATION, GENERAL EXPLANATION OF THE TAX REFORM ACT OF 1986, at 1014 (1987).

44. See Richard L. Kaplan, *International Tax Enforcement and the Special Challenge of Transfer Pricing*, 1990 U. ILL. L. REV. 299, 319.

45. If an uncontrolled transaction can be found that involves the transfer of the *same* product under substantially the same circumstances as in the controlled transaction, application of the CUP method, which is called an "exact" CUP, should be straightforward. However, the use of an "inexact" CUP, where differences are minor and have a definite and reasonably ascertainable effect on price for which adjustments can be made, can still provide a direct and reliable measure of arm's length price. See *Bausch & Lomb, Inc. v. Comm'r*, 92 T.C. 525 (1989), *aff'd*, 933 F.2d 1084 (2d Cir. 1991); see also Treas. Reg. § 1.482-3(b)(2)(ii).

46. COLE, *supra* note 40, § 10.03 [B].

47. The CPM evaluates whether the results in a controlled transaction are arm's length, based on objective measures of profitability⁴⁷ "derived from uncontrolled taxpayers that engage in similar business activities under similar circumstances." Treas. Reg. § 1.482-5(a). Under CPM, functions performed by the tested party are analyzed and the profit levels of the tested party are compared to the profit levels of parties performing comparable functions. *Id.* § 1.482-5(b)(4). Application of the CPM to produce a reliable result requires comparability with respect to "the relevant lines of business, the product or service markets involved, the asset composition employed (including the nature and quantity of tangible assets, intangible assets and working capital), the size and scope of operations, and the stage in a business or product cycle." Treas. Reg. § 1.482-5(c)(2).

48. COLE, *supra* note 40, § 10.03[B].

49. Treas. Reg. § 1.482-6(c)(1) (1994).

50. *Id.* § 1.482-6(c)(2)(i). The comparable profit split allocates a portion of the combined operating profit or loss to each company by reference to the combined operating profit or loss of unrelated companies engaged in similar activities under similar circumstances.

ing the residual profits.⁵¹ The first step allocates operating income to each relevant entity “to provide a market return for its routine contributions to the relevant business activity.”⁵² The second step allocates any residual combined operating profits by reference to the relative contributions of intangible property to the business activity that was not taken into account in the first step.⁵³

C. The Insufficiencies of the Current Transfer Pricing Regime

1. Arm’s Length Versus Formulary Apportionment

Transfer pricing methods should reflect the actual value that is transferred from one related party to another in the course of the sale of goods, performance of services, or transfer of intangibles. However, current transfer pricing methods are based on assumptions about valuation that often contradict modern financial theory. Because U.S. transfer pricing is based on the arm’s length standard,⁵⁴ and impliedly the separate entity concept, current transfer pricing methodologies fail to account for corporate behavior. Specifically, the U.S. transfer pricing rules do not account for the synergistic profits that accrue to an integrated enterprise. Moreover, transactional methods based on the evaluation of comparable unrelated transactions are inadequate to allocate profits among related parties where unique intangibles constitute a significant portion of the relevant goods or services.

The arm’s length standard treats each constituent business unit of a multinational group as an enterprise (the “separate entity model”),⁵⁵ allocating income based on comparable transactions between unrelated parties dealing at arm’s length.⁵⁶ The arm’s length standard implicitly assumes that each member of a multinational enterprise acts to maximize its own profit. However, this model of behavior, which is based on theories developed at the beginning of the twentieth century by Leon Walras,⁵⁷ does not take into account the motivation of multinational corporations to arrange their cross-

51. “Under this method, the combined operating profit or loss from the relevant business activity is allocated between the controlled taxpayers following [a] two-step process.” *Id.* § 1.482-6(c)(3)(i). “The first step allocates operating income to each party ... to provide a market return for its routine contributions [functions, risks and intangibles] to the relevant business activity.” *Id.* § 1.482-6(c)(3)(i)(A). Under the second step, “the residual profit generally should be divided among the controlled taxpayers based upon the relative value of their contributions of [valuable] intangible property to the relevant business activity that was not accounted for as a routine contribution [functions, risks, and intangibles].” *Treas. Reg.* § 1.482-6(c)(3)(i)(B).

52. *Id.* § 1.482-6(c)(3)(i)(A).

53. *Id.* § 1.482-6(c)(3)(i)(B).

54. *Treas. Reg.* § 1.482-1(b) (1994); *see also* U.S. INTERNATIONAL TRANSFER PRICING § 1.02 (2003).

55. *Avi-Yonah, supra* note 9, at 1339-40; *see also* *Treas. Reg.* § 1.482-1(b)(1) (1994).

56. *See* U.S. INTERNATIONAL TRANSFER PRICING § 1.02 (2003); *see also* *Avi-Yonah, supra* note 9, at 1339-40.

57. A common tool in general equilibrium analysis is the Edgeworth Box analysis, developed by the British economist Charles Edgeworth, which uses indifference curve analysis to study the interaction of two individuals trading two different commodities.

border transactions so as to shift profits to the lowest-tax jurisdiction.⁵⁸ Moreover, in recent years, businesses have increasingly formed strategic alliances or partnerships in order to maximize the economic interests of all members of the group. These strategic alliances allow all members of the group to increase the amount of profit they can expect to earn as well as reduce risk to any one member by allocating losses among the participants.⁵⁹

The methods specified in the U.S. regulations can fail to capture and allocate synergistic profits. This Article argues for the use of alternate valuation methodologies, in the absence of comparable transactions, in order to capture and accurately allocate gains to integration.

Even more important than the allocation of synergistic profits is the proper allocation of risk. Because current transfer pricing methods depend upon comparable transactions, the allocation of risk is inadequately addressed for transactions involving intangibles. Historically, commentators have not thought it possible to include a risk factor in the transfer pricing of intangibles. This Article proposes the use of financial models (e.g., CAPM, arbitrage pricing theory, and so forth) to allocate profits among related parties. The use of models like CAPM permits returns from intangibles to be allocated based on risks assumed. The allocation of income informed by risks undertaken by each entity is consistent with economic theory and corporate behavior.

2. *Problems with the Application of Transactional Methods*

Like any model, the arm's length standard has limitations when the underlying assumptions are not applicable to a particular intercompany transaction.⁶⁰ Although the arm's length standard is the most commonly accepted approach, its application does not adequately address the current business

58. Caves, *supra* note 11, at 251; *see also* Terrence R. Chorvat, *Ending the Taxation of Foreign Business Income*, 42 ARIZ. L. REV. 835, 858-59 (2000) (describing a transaction in which a multinational can allocate the entire risk of a transaction to a low-tax jurisdiction in order to shift a significant part of the income from the transaction to a jurisdiction where it will not be taxed). Such an allocation of risk may be achieved merely through a contractual arrangement among two or more affiliated entities utilizing financial instruments, such as swaps or derivatives, to move the burden of risk. *See also* Tanzi, *supra* note 9, at 1272-73.

59. There are numerous books on this topic including the following: ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* (1984); JOSEPH L. BADARACCO JR., *THE KNOWLEDGE LINK: HOW FIRMS COMPETE THROUGH STRATEGIC ALLIANCES* (1991); FAROK J. CONTRACTOR & PETER LORANGE, *COOPERATIVE STRATEGIES IN INTERNATIONAL BUSINESS* (1988); EUROPEAN CASEBOOK ON COOPERATIVE STRATEGIES (Johan Roos ed., 1994); BENJAMIN GOMES-CASSERES, *THE ALLIANCE REVOLUTION: THE NEW SHAPE OF BUSINESS RIVALRY* (1996); ROSABETH MOSS KANTER, *WORLD CLASS: THRIVING LOCALLY IN THE GLOBAL ECONOMY* (1995); JAMES F. MOORE, *THE DEATH OF COMPETITION* (1996); DAVID C. MOWERY, *INTERNATIONAL COLLABORATIVE VENTURES IN U.S. MANUFACTURING* (1988); WAYNE SANDHOLTZ, *HIGH-TECH EUROPE: THE POLITICS OF INTERNATIONAL COOPERATION* (1992); *STRATEGIC PARTNERSHIPS: STATES, FIRMS, AND INTERNATIONAL COMPETITION* (Lynn K. Mytelka ed., 1991); MICHAEL Y. YOSHINO & U. SRINIVASA RANGAN, *STRATEGIC ALLIANCES: AN ENTREPRENEURIAL APPROACH TO GLOBALIZATION* (1995).

60. Robert J. Peroni, *Back to the Future: A Path to Progressive Reform of the U.S. International Income Tax Rules*, 51 U. MIAMI L. REV. 975, 1002 (1997); Graetz, *supra* note 9, at 1419-20.

models employed by multinational enterprises.⁶¹ The transfer pricing rules used to simulate arm's length behavior among related parties partially break down when an MNE operates in an integrated fashion to achieve economic efficiencies.⁶²

An arm's length analysis will necessarily miss the synergistic profits that accrue to multinationals operating in an integrated manner. These profits may relate to reduced transactional costs or to integrated management processes such as administration, budgeting and planning.⁶³ Failure to capture these synergistic profits will distort earnings,⁶⁴ because gains to integration have not been properly allocated.⁶⁵

Perhaps an even more significant problem for the transfer pricing system is determining the proper prices for transfers of intangibles between related parties. Intangibles are an increasing portion of the value of every multinational corporation.⁶⁶ The current paradigm for multinational corporations is no longer a manufacturer but rather an integrated, high-value service provider.⁶⁷

Integrated multinational groups with high-value intangibles effectively preclude the identification of reasonably close comparables.⁶⁸ Reasonably similar CUPs that do not require a number of adjustments are rare.⁶⁹

When application of the CUP method is not feasible, the U.S. regulations provide for the resale price and cost-plus methods as alternative transactional methods.⁷⁰ The assumption underlying the application of these

61. See Tanzi, *supra* note 9 (arguing that the rise of electronic commerce transactions has promoted decentralization of MNEs, resulting in increasingly complex transfer pricing transactions which strain the applicability of transactional methods).

62. Even the commonly used residual profit split method, theoretically based on a model in which the parties are sharing profits, generally assumes that entities will earn some level of profit for routine activities and functions and that there is an ultimate residual profit-taker. These assumptions suggest the residual profit-taker is in competition with the other related entities because it could increase its profits (or reduce its losses) by extracting more favorable terms from the others.

63. COLE, *supra* note 53, § 10.03[B]. These synergistic profits can be significant. Since implementing process enterprise, Texas Instrument's calculator business quadrupled its return on investment in product development; IBM realized over \$9 billion in cost savings; and Owens Corning has experienced a twenty percent reduction in administrative costs and millions of dollars in logistics savings. Mike Hammer & Steven Stanton, *How Process Enterprises Really Work*, 77 HARV. BUS. REV. 108, 110-11 (Nov.—Dec. 1999). For a full discussion of gains attributable to synergistic profits, see Ackerman & Chorvat, *supra* note 14, at 649-60.

64. Dolan, *supra* note 101, at 215.

65. COLE, *supra* note 53, § 10.03[B] (stating that traditional methods utilizing profit level indicators may prove unreliable because they allocate gains from integration without consideration for the relative contribution to synergistic profits made by each party).

66. John M. McCann, *The Changing Nature of Consumer Goods Marketing and Sales*, Fuqua School of Business, Duke University (Mar. 10, 1995) (unpublished manuscript, on file with author); Graetz, *supra* note 9, at 1419-20.

67. Graetz, *supra* note 9, at 1419-20.

68. COLE, *supra* note 40, at § 10.03[B]. For a full discussion of the limitations of transactional methods in the context of integration economies, see Higinbotham et al., *supra* note 18, at 330-38.

69. Ron Schrottenboer, *Policy and Practical Considerations of Transfer Pricing: Focus of California Conference*, TAX NOTES INT'L, Nov. 13, 1991, at 46-47.

70. Treas. Reg. § 1.482-3(c)(1)-(2), (d)(1)-(2) (1994). More specifically, the alternatives of resale price and cost plus are specified in the regulations with respect to tangible property transactions. There are no alternatives to the CUT method offered by the regulations in the absence of comparable uncon-

methods is that they are applied to only one side of the controlled transaction and that any valuable intangible or risk that renders the transaction unique is properly attributed to the party not being tested.⁷¹ As a result, the tested party is presumed not to own valuable intangibles or unique assets that distinguish it from potential uncontrolled comparables.⁷²

This assumption effectively limits the application of these methods to those entities with only routine functions, risks, and assets, using either closely comparable third parties or the entities' own transactions with third parties. The resale price or cost plus methods are most appropriate to apply to distributors, manufacturers, or service providers that perform routine functions, bear normal risks, and employ readily available assets. Therefore, the absence of reliable comparable transactions essentially requires the use of profits-based methods.⁷³

3. *Problems with the Current Application of Profits-Based Methods*

The U.S. transfer pricing regulations authorize two profits-based methods: the comparative profit split and residual profit split. The underlying premises of these methods are inadequate for allocating profit and loss for today's fully integrated MNEs with significant self-generated intangibles throughout their global operations. The comparable profit split relies exclusively on external market benchmarks.⁷⁴ The residual profit split described in the U.S. regulations is appropriate where both parties contribute valuable intangibles. This allocation methodology does not accurately address the situation of an integrated business model, where the relevant contributions to profit may result from contributions of services,⁷⁵ assets, or intangibles. If profits result from services, for example, the regulations are inadequate to address the allocation of profits from these services.

II. MODERN VALUATION THEORY AND TRANSFER PRICING

This Part explores how modern valuation theory can be applied to the transfer pricing allocation issues related to synergistic profits, income from intangibles, and other non-traditional assets, as well as income from risk-taking. Moreover, this Part describes how basic economic theories, such as the Modigliani-Miller indifference proposition,⁷⁶ the no-arbitrage princi-

controlled transactions for setting a royalty rate in connection with the transaction of intangible property. Dolan, *supra* note 101, at 215-16. The factors offered for consideration in the absence of comparable transactions are of little practical value. *Id.* As a result, profit splits (or an alternate analysis unspecified in the regulations) have been the only alternative to taxpayers, revenue authorities and the courts. *Id.*

71. See Robinson, *supra* note 12, at 4.

72. *Id.*

73. COLE, *supra* note 40, § 10.03[B].

74. Treas. Reg. § 1.482-6(c)(2)(ii)(D). This Article focuses on the residual profit split because comparable profit splits are so rare. See Robinson, *supra* note 12, at 5, 8.

75. Intangibles are defined in the regulations exclusive of services. Treas. Reg. § 1.482-4(b).

76. See Franco Modigliani & Merton H. Miller, *The Cost of Capital, Corporation Finance and the*

ple,⁷⁷ and the corporation as nexus of contract theory⁷⁸ can be used to derive more accurate valuations of corporate assets. These modern valuation principles can aid in resolving the limitations of the arm's length standard with respect to issues presented by modern multinational businesses. This Part also describes the basic economic theory supporting the application of allocating income based on capital invested in a business unit and the risks to which that capital is subject. Finally, this Part discussed the current methods for valuing assets and determining the risks associated with an investment. Part III then describes how these valuation methods can be applied to create rules that more accurately allocate income among the various business units of multinational enterprises than the methods allowed under U.S. transfer pricing regulations.

As discussed in Part I, neither the arm's length standard nor formulary apportionment adequately address the allocation of income among the business units of a modern multinational enterprise. This Article attempts to create a new system for transfer pricing which incorporates the economic theories that support both as well as incorporating other basic economic notions, such as the Modigliani-Miller indifference proposition and the no-arbitrage principle. By incorporating a wider breadth of modern economic and financial theory, the transfer pricing system that results should more accurately reflect the underlying economic realities, and thus more accurate allocations of income.

A. Returns to Capital as a Basis for the Allocation of Income

To begin the analysis of this new approach, we must begin with the proposition that the profit that accrues to the corporation is simply the return to the capital invested in the corporation.⁷⁹ The income earned by a corporation accrues to the shareholders, whose sole contribution in their capacity as shareholders is capital.⁸⁰ Therefore, any returns earned by shareholders must necessarily be returns to capital.

Theory of Investment: Reply, 49 AM. ECON. REV. 655 (1959). The key idea of the Modigliani-Miller indifference proposition is that (but for tax and bankruptcy laws) the debt versus equity decision should not affect how an enterprise conducts its business. *Id.* In other words, the total value of the corporation is not affected by the firm's capital structure. The choice by suppliers of capital with respect to capital structure and how they choose to allocate profits should not affect the maximization of profits. It follows that capital structure should not affect transfer pricing.

77. Robert C. Merton, *The Theory of Rational Option Pricing*, 4 Bell J. Econ. & Mgmt., Science Vol. 4, No. 1 (Spring 1973). The no-arbitrage principle holds that, in an efficient market, it should not be possible to earn a supra-normal profit without taking on risk. The effects of this principle on valuation and transfer pricing are discussed *infra* at Parts II.C and III.

78. Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure*, 3 J. FIN. ECON. 305 (1976). The theory, which forms the basis of most modern analysis of corporation law, holds that a corporation is an artificial person that cannot make decisions on its own. Rather, it is best thought of as an aggregate of those who own it and those who interact with it.

79. See MICHAEL P. DOOLEY, FUNDAMENTALS OF CORPORATION LAW (1995); Ronald H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386 (1937).

80. Some shareholders may also contribute services, but they are compensated for these contribu-

Another approach to understanding the principle that the income of an enterprise is merely the return to invested capital would begin with the fact that an enterprise in and of itself does not exist. A corporation is merely a set of arrangements between individuals.⁸¹ To the extent that profits accrue to an enterprise, those profits are really earned by the members of the enterprise. Profits are then allocated among the individuals who have contributed to the profit in the manner agreed to among the contributors. Those earnings retained by the corporation itself are returns to equity holders of the corporation. The equity holders or shareholders have, in their capacity as shareholders, contributed only capital. Therefore, all earnings of the corporation are returns to capital.

As soon as one understands that all income earned by a multinational enterprise is derived from capital, it logically follows that income should be allocated among the members of the group based on the returns to capital earned by the group. This notion is somewhat similar to the principles that underlie formulary apportionment,⁸² i.e., that income should be allocated according to capital, labor, and sales. However, formulary apportionment does not allocate *solely* on the basis of capital and, therefore, allocations based on formulary apportionment do not approximate returns to capital.

Because the formulary apportionment factors are used to allocate income among members of a group and the income of the group is entirely the result of capital investment, one would expect that the factors would be closely related to the way that capital is allocated within the group. However, the apportionment factors do not approximate the allocation of capital. The apportionment formulas applied among the states in the U.S.⁸³ are based on two or three factors;⁸⁴ generally those factors are salary, sales, and tangible property.⁸⁵ The salaries or sales associated a given business unit may have only a tangential relationship with the amount of capital invested in that unit, and so may have little relation with the returns properly allocable to the business unit.⁸⁶

tions by salary, bonuses, fees, and the like. Income allocated to equity capital represents amounts earned only on the capital investments of shareholders.

81. This is essentially a statement of the "corporation as nexus of contract" theory. Stephen M. Bainbridge, *Contractarianism in the Business Associations Classroom: Kovacik v. Reed and the Allocation of Capital Losses in Service Partnerships*, 34 GA. L. REV. 631, 632 (2000).

82. Formulary apportionment allocates the income of an enterprise according to the factors of production.

83. Income of a business that operates in more than one state is allocated among the states (except Texas) based on the formulary apportionment UDITPA factors. Uniform Division of Income for Tax Purposes Act, § 9 ULA 336 (1985 & Supp. 1995).

84. Some states only apply two of the three factors from the UDITPA.

85. The salary factor measures the degree to which the other major factor of production, labor, is used in the business unit. There is no necessary correlation between the degree of capital used in a business unit and the degree of labor used. In fact, some economic models, such as the Cobb-Douglas production model, might indicate that these two factors have an inverse relationship rather than a positive one. See generally HAL R. VARIAN, MICROECONOMIC ANALYSIS (3d ed. 1991). Moreover, the sales factor may likewise bear no relationship to the allocation of capital within the group.

86. FERDINAND P. SCHOETTLE, STATE AND LOCAL TAXATION: THE LAW AND POLICY OF MULTIJURISDICTIONAL TAXATION 588 (2003).

While the other apportionment factor, capital, is clearly related to the allocation of *tangible* capital within the firm, apportionment formulas do not account for *non-traditional* capital such as intangibles, trade secrets, and business processes.⁸⁷ Finally, none of the formulary apportionment methods account for a major component of the returns to capital—risk.⁸⁸ By eliminating an analysis of risk, formulary apportionment methods generally do not address the specifics of any particular business, and are therefore unlikely to yield results that are consistent with the underlying economic realities of the multinational enterprise being analyzed.

The arm's length standard implicitly accounts for the allocation of capital among the members of a group. However, as discussed earlier, the arm's length standard does not incorporate a significant feature of multinational business, that is, many transactions would not occur unless they were between commonly controlled enterprises.⁸⁹ Thus, an inquiry into the arm's length nature of an agreement is futile if the transaction would not have occurred had the parties not been related. Furthermore, because transfer pricing concerns entities which are commonly controlled, a more precise approach would allocate income to the capital within an enterprise. That is, the transactions that occur are designed to maximize the income of the group rather than merely the income of any individual business unit.

B. Measuring Returns to Capital by Portfolio Allocation

Because all of the income earned by the enterprise is properly allocated to capital—more specifically, to equity capital—the economic theories that apply to portfolio allocation can be properly applied to the allocation of income among the members of an integrated enterprise. In addition, because the decisions of how the enterprise will conduct its business are made on an integrated basis,⁹⁰ we should address the allocation of income as if the allocation of capital between business units of the enterprise were made to maximize income of the enterprise as a whole, rather than merely income of each individual unit.

The question of how to allocate capital so as to maximize income has been studied by economists for decades, if not centuries.⁹¹ As long as one assumes that multinational enterprises are trying to maximize profits, the question of how to allocate income among members of an integrated group is very similar to the question of how the group should allocate capital among investments. If we assume that the enterprise is in fact maximizing

87. For an analysis of how risk can be incorporated into transfer pricing analysis, see Part II.C *infra*.

88. See Ackerman & Chorvat, *supra* note 14, at 651-54.

89. See *id.*

90. Decisions made at the firm level are generally made on a coordinated basis. If the decision could more profitably be done by competing agents, there is little reason that these separate agents should be joined together in a firm. See generally Coase, *supra* note 79. For a discussion of the integrated nature of the modern multinational enterprise, see Chorvat, *supra* note 14, at 652-60.

91. Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952).

its profits, we can assume that the risk-adjusted marginal return on capital will be equal for all the different business units within the group.⁹² Thus, if we can determine the amount of capital allocated to a business unit, and the degree of risk to which that capital is subject, we should be able to determine the amount of income that should be allocated to that business unit. The next Subpart explores the methods that are currently in use to value assets and the degree of risk to which they are subject.

C. Modern Valuation Methods

The most prominent modern pricing theories are CAPM, arbitrage pricing theory, options pricing theory, and dynamic pricing theory. They all allocate value based on capital and risk. The key difference among the theories is the way in which they measure risk. It is often very difficult to measure risk, or even understand what it is, yet it is arguably the most important factor for determining income from capital investments. This section discusses these models and analyzes their strengths and weaknesses.⁹³

One of the oldest models for valuation is the mean-variance model.⁹⁴ Although the mean-variance model is not particularly useful for allocating the income of multinational enterprise, all of the models to be discussed in this Article rely in part on the mean-variance model.

In the mean-variance model, an individual faces the problem of how to value investments for which he has calculated expected means⁹⁵ and expected covariances⁹⁶ of the asset returns and is interested in forming a portfolio that is optimal from the perspective of maximizing expected gains while minimizing risk.⁹⁷ The mean-variance model assumes that the distribution of asset returns around the expected return is described by a normal distribution.⁹⁸ This allows the analysis under the model to focus on the expected value of the returns to an asset and the variance associated with those

92. One of the standard conclusions of price theory is that if portfolios are maximized, the marginal returns on all investments will be the same. See VARIAN, *supra* note 85, at 32-35. In other words, if an investor is maximizing profits, he will continue to reallocate income to those investments with higher returns until no better return is found.

93. See generally ALON BRAV & J.B. HEATON, *Competing Theories of Financial Anomalies*, in REVIEW OF FINANCIAL STUDIES (2002); DARRELL DUFFIE, *DYNAMIC ASSET PRICING THEORY* (1992); DAVID G. LUENBERGER, *INVESTMENT SCIENCE* (1998); ROBERT NAU, *CHOICE THEORY* (2002); ROBERT NAU & KEVIN MCCARDLE, *Arbitrage, Rationality and Equilibrium*, in THEORY AND DECISION (1991); JAMES SMITH & ROBERT NAU, *Options Pricing Theory and Decision Analysis*, in MANAGEMENT SCIENCE (Cary Tengler ed., Wm. C. Brown Pub. 1990).

94. See discussion of valuation models in RICHARD BREALY & STEWART MYERS, *PRINCIPLES OF CORPORATE FINANCE* (6th ed. 2000); see also Markowitz, *supra* note 91.

95. Means are averages.

96. The covariance of any two variables is the degree to which they vary together. Therefore, the covariance between any two assets is the degree to which their returns vary together.

97. Maximizing gains while minimizing risk is also known as mean-variance efficient. Markowitz, *supra* note 91.

98. See PAUL A. SAMUELSON, *FOUNDATIONS OF ECONOMIC ANALYSIS* app. C at 540-61 (Harvard Univ. Press 1983) (1941) (discussing this problem). The technology of quadratic programming was the cutting edge in the 1950s.

returns. Given the expected returns and the covariances of all the assets, one can derive the set of optimal portfolios under the mean-variance model. The particular portfolio that any individual investor will choose will depend upon that investor's risk preferences.

The mean-variance model has its limitations, however. In the model, only primary securities can be held, derivative securities are not allowed. The assumption that asset returns have normal distributions is only empirically reasonable for rather short periods of time. During those short periods of time, any long-term upward trend in the value of primary securities, such as stocks, is obscured by the noise of price movements. If one were to look at the returns on assets over a longer time period, the distribution of returns would no longer resemble a simple normal distribution.

The mean-variance model is limited as a pricing model because it includes assumptions that materially diverge from the real world of capital markets. For example, in addition to assuming a normal distribution of returns, the model assumes that there is only a single investor in the market. However, from this model other more useful pricing models have been developed by introducing more reality to the assumptions. The main theories explored in the remaining portions of this section are CAPM, options pricing theory, arbitrage pricing theory, and dynamic pricing theory, which are all derived from mean-variance pricing theory.

1. The Capital Asset Pricing Model (CAPM)

CAPM is one of the most respected and most criticized pricing theories. The literature addressing CAPM is vast. This Subpart will discuss CAPM and some of the most prominent variations of it.

*a. CAPM with Homogeneous Expectations*⁹⁹

Adding the assumption of multiple investors to the Mean-Variance Model results in a model known as the capital asset pricing model (or CAPM) with homogeneous expectations. This model still includes the assumption that investors have investment preferences that depend on the expected return and the variance of the assets. The simplest case of multiple investors is where all investors have the same beliefs about the means and covariances of all potential investments, that is, homogeneous expectations. CAPM is a useful model for calculating returns to capital or, in theory, if the returns are known, for calculating the risks inherent in the asset or assets in a given portfolio.

99. See generally John Lintner, *The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets*, 47 REV. ECON. & STAT. 13 (1965); Jon Mossin, *Taxation and Risk Taking: An Expected Utility Approach*, 35 ECONOMIA 74 (1968); William F. Sharpe, *Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk*, 19 J. FIN. 425 (1964).

Assuming that investors allocate capital so as to maximize their risk-adjusted returns, they will value assets according to CAPM. Under CAPM, the expected return on any security equals the risk-free rate of return plus the “beta” of the security the risk premium from investing in the market portfolio (where beta is the covariance between the asset’s return and the market return, and the risk premium of the market is the total return on the market minus the risk-free rate), or algebraically:

$$R_a = R_0 + \beta_a (R_m - R_0)$$

where R_a is the total expected return on the asset, R_0 is the risk-free return, β is the covariance of the asset with the market, and R_m is the expected market return. This model breaks down returns for assets into the risk-free return and the risky return. Each of these returns must be allocated. However, the allocation may differ if the risks of the activities in which the assets are used are different. Under CAPM, the risk-free rate of return will be the same for all assets, but the rate of return based on risk will differ.

Under this analysis, the return of an asset will not depend on its own variance, but rather it will depend on its covariance with the market. The only risk that affects the price of an asset is the degree to which it exhibits “systematic risk.”¹⁰⁰ Because other “non-systematic risks” can be diversified away, they should not affect the price of the asset. If all investors agree on the expected returns and risks of all assets, then they will agree on the relative allocation of capital among risky assets. In equilibrium, this allocation must be the same as the allocation of capital in the market (often called the market portfolio) because, if this were not the case, the supply and demand for investment assets would not be equal, which is impossible in equilibrium.¹⁰¹

b. CAPM with Heterogeneous Expectations

It is highly unlikely that any large group of people will agree on very much, and therefore it is more realistic to assume that investors will differ on what they believe the means and the variances are of the assets in the market. Therefore, the next level of complication that has been added to the CAPM model involves incorporating heterogeneous expectations. In addition, those who add heterogeneous expectations to the model, generally also allow investors to hold not only primary securities (e.g., shares of stock, bonds, commodities, and so forth), but also derivative securities. This is because it is much easier to account for the prices of options in a CAPM with heterogeneous expectations¹⁰² than in either the mean-variance model

100. Systematic risk is risk to which all assets are subject.

101. One of the main definitions of equilibrium is the equality of supply and demand. See VARIAN, *supra* note 85.

102. See discussion *infra* at Subpart II.C.1.a.

or CAPM with homogenous expectations. If each investor has his or her own subjective probability distributions and his or her own utility functions and investors are permitted to trade both primary as well as derivative securities, then in equilibrium every agent will hold a different portfolio of securities and every agent will perceive that the CAPM formula applies to the individual's portfolio of primary securities according to the individual's subjective probabilities.

Even though this model would appear to be more in line with the investor behavior, it is difficult to determine the accuracy of the model. For any portfolio held by an individual investor, it is not possible to separate the expected return for the market from the risk premium, and the same is true at the market level. As a result, market analysts have been divided over how well CAPM predicts investor behavior.

One of the best arguments for CAPM is that is based on assumptions which are in accordance with rational investor behavior. It assumes investors want to reduce their exposure to risk and earn higher returns. If the assumptions of the model are accurate, then it should describe the prices of asset as determined by the market. Even with these potential problems, CAPM is the method most commonly used to value financial assets.

2. *Option Pricing Theory*¹⁰³

As described above, CAPM with homogeneous expectations does not really account for derivatives securities such as options particularly well. In response to this problem, Fischer Black and Myron Scholes, together Robert Merton, developed a theory for the pricing of options based on the idea that in an efficient market it should not be possible for someone to make a profit without taking a commensurate risk. This is generally referred to as the "no-arbitrage" principle.¹⁰⁴ Black and Scholes argued that the no-arbitrage condition must exist between the price of a stock, an option to buy the stock, and a risk-free bond which causes the prices of the three assets to be correlated with each other in a predictable fashion.

The Black-Scholes model can used to calculate the value of options from the value of the underlying security. Also, it can be used to calculate parameters used in other models, such as betas in CAPM. More advanced versions of the Black-Scholes model have been developed in order to address particular types of securities with unusual risk parameters. While these models may have a higher degree of sophistication than the simple Black-Scholes model, they are all derived from the same basic theory.

103. See Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637 (1973); see generally Robert C. Merton, *The Theory of Rational Option Pricing*, 4 Bell J. Econ. & Mgmt., Science Vol. 4, No. 1 (Spring 1973).

104. See Merton, *supra* note 103.

3. Arbitrage Pricing Theory¹⁰⁵

Arbitrage pricing theory developed from an alternate view of the no-arbitrage principle. Stephen Ross observed that, if the no-arbitrage principle applies, it should not be necessary to calculate the covariance of all assets with all other assets in order to derive the prices a particular asset. For example, in order to price shares of Exxon, one should not have to calculate the covariance of the returns to Exxon shares with every security that trades on every market in the world.¹⁰⁶ The systematic behavior of asset returns should be able to explained by a relatively small number of factors, which incorporate macroeconomic events as well as industry-specific events.

Ross argued that most asset prices move together, or in other words there was a high covariance among asset prices. From this he argued that one should be able to calculate returns from only a few common factors. As an example, if there are only two factors, the model would be:

$$R_a = b_{0a} + b_{1a}f_1 + b_{2a}f_2 + \varepsilon_a \text{ for } a = 1, \dots, A$$

where R_a is return on the asset, the factors f_n are macroeconomic factors that influence the entire economy and b_n s are various coefficients which tell the degree to which the price of the asset covaries with a factor, and ε_a is the factor specific risk. This model assumes that the factors in the equation are independent of each other. One can think of this as a multivariable version of CAPM, which can be more sensitive to factors specific to the assets at issue.

Obviously, the key to arbitrage pricing theory is the selection of the appropriate factors. One might select different factors for different types of assets, because for some assets the b_n 's of some factors might be quite small.

4. Dynamic Asset Pricing Theory

All of the above theories are based on a simple two-period model. In these models, the investor decides on an investment and in the next period, the investment's ultimate payoff is determined. At least initially, it might not seem that the altering these models from a two-period economy to an n -period economy or even a continuous-time economy would require any fundamentally new assumptions. The no-arbitrage principle together with mean-variance efficiency assumptions would still apply. However, the models do not support this analysis. First of all, the CAPM model does not work well in a multiperiod context because the investor would have to re-balance his portfolio after each period which would radically alter the origi-

105. Stephen Ross, *The Arbitrage Theory of Capital Asset Pricing*, 13 J. ECON. THEORY 341 (1976).

106. That is to say, in order to make an informed decision, an Exxon shareholder should not have to know the covariance of Exxon with ELF, Nippon Steel, Nokia, Zeiss Optics, and Daewoo.

nal assumptions about equilibrium.¹⁰⁷ Secondly, the Black-Scholes model, which is a continuous-time model, does not incorporate heterogeneous expectations.

Dynamic pricing theory models attempt to solve for multiperiod investment by the use of complicated mathematical techniques.¹⁰⁸ Moreover, multiperiod models raise new questions. For example, it is unclear how investors update their expectations as new information is revealed. A fundamental issue with dynamic asset pricing is that the further into the future one tries to estimate value, the larger the number of potential uncertainties that arise. The further one looks into the future, the more unforeseen events can occur, including events that entirely shift the paradigm by which investments are valued. One can argue that phenomena such as the equity premium puzzle are at least in part the result of considerations such as this.¹⁰⁹

III. THE APPLICATION OF MODERN VALUATION TECHNIQUES TO TRANSFER PRICING

As shown in Part II, the current transfer pricing methods do not adequately address synergistic profits that result from multinational enterprises, nor do they appropriately allocate income that derives from risk-taking. Therefore, this Article proposes applying the valuation techniques described above to determine the amount of income allocable to members of a group of related corporations. Under this proposal, the income would be allocated based on the value of the assets owned by a subsidiary and the risks to which these assets are subject. The value of the assets and the risks would be calculated under the valuation method most appropriate to the assets and the business in question. This approach to the allocation of income is not entirely unknown in the tax rules of the United States. An approach similar to this has been applied to cost sharing agreements.¹¹⁰

One could easily argue that transactional methods are more theoretically correct, and that where they can reasonably be applied they should be. However as discussed earlier, the degree to which transactional methods can be reasonably applied is declining.¹¹¹ As the flow of goods and services within multinational enterprises becomes more complicated, the transac-

107. If the price of investment has changed but the expectations for profit has not, then the demand for the asset will increase back to its old level; yet, this means that prices of assets should never change. Clearly such a model is inaccurate.

108. Louis Makowski, *Competitive Stock Markets*, 50 REV. ECON. STUD. 305 (1983).

109. Richard Thaler & Shlomo Benartzi, *Myopic Loss Aversion and the Equity Premium Puzzle*, 110 Q. J. ECON. 73 (1995).

110. For a discussion of how the principles that underlie the rules that apply to cost sharing agreements could be applied to a valuation-based transfer pricing method, see Ackerman & Chorvat, *supra* note 14, at 660-65.

111. See discussion *infra* Parts I.C.1-2. For a more thorough analysis of the problems associated with the application of transactional methods, see Ackerman & Chorvat, *supra* note 14, at 651-54.

tional methods will become more difficult to apply. We need a new approach to the allocation of income within a multinational group.

A methodology which is based on how each part of the organization contributes to the overall profit of the organization is clearly the most reasonable approach. If we assume that each organization allocates its capital in such a way as to maximize profit in a manner similar to the way investors allocate capital in ways to maximize profit, we can apply the valuation methods described in Part II to determine the amount of income that should be allocated to each member of the group.

This Part will first examine how the use of valuation methods can improve the allocation of synergistic profits. It discusses how the method used will depend on the assets in questions and business uses to which they are applied. It then examines how valuation based methodology could improve the allocation of profits from risk-taking and then allocation of losses.

A. The Allocation of Synergistic Profits: Selecting the Best Method

Even though the transactional based methods on which current transfer pricing rules are premised are quite thorough and specific, they can prove inadequate for allocating income earned by a multinational enterprise operating in a cooperative manner. They are based on notions that simply do not apply to much of the way modern business is conducted.

If we instead view the entity as an integrated whole, which is more consistent with modern business practices, we will derive a method for allocating income which is based on each member's contribution to the income and loss of the group as a whole. As discussed earlier, this is part of the motivation behind systems of formulary apportionment. However, as also discussed, the formulary apportionment methods that have been proposed to date have significant problems with the way they allocate income and the factors ignored such as risk and total capital owned by the member of an enterprise.

A method of transfer pricing which allocates income of an enterprise based on the assets owned by the enterprise is therefore theoretically the best way to approach the problem of synergistic profits. Such profits would not arise unless more than one member of the group participated in the transaction. If the transaction would not have occurred unless the parties involved were part of the same entity, then it makes no sense to ask to question of how would these profits have been allocated if the transactions had been between parties at arm's length. On the other hand, if we view the enterprise as allocating its capital in much the same way an investor would allocate capital to maximize profits, synergistic profits are automatically shared among the members of the group based on the capital allocated to the member and the risks to which that members capital are subjected. This approach to the allocation of synergistic profits within a group seems eminently reasonable. It assumes no party has greater bargaining power and that

income is allocated based on what each member contributes to the overall income of the enterprise.¹¹²

1. General Issues

In determining which method should be applied to determine the allocation of income with a group, one needs to account for the fact no single method applies perfectly to all situations. Rather, some methods apply very well to certain situations, while other methods are superior in other situations. Therefore, one needs to be careful to apply the best method available to the situation at hand.

As discussed above, each member's allocation of income should be based on that member's relative contribution to income of the group. Certain principles make this allocation easier. First, it makes sense to defer to the agreements that the members of the group have made among themselves concerning the allocation of risk. This follows both from a neutrality analysis (what would happen if they sold these assets) and from a freedom of contract analysis. In the absence of such agreements, or if the parties clearly did not abide by such agreements, then the Internal Revenue Service should conduct a factual inquiry into which member of the group bore the risk (e.g., how the allocation of capital would be altered if there were a loss on this business).

2. Application of the Models to Pricing Problems

As discussed earlier, there are a number of valuation methods that might be applied to allocate income among members of a multinational group. Each of them has various strengths and weaknesses. In this Subpart we discuss

112. The analysis of how separate entities would divide synergistic profits (*i.e.*, gains from cooperation) can be understood through the concept of Walrasian Equilibrium. Walrasian Equilibrium derives from the fairly intuitive notion that cooperation will only occur if all parties are made better off. This proposition was mathematically demonstrated in F.Y. Edgeworth, *The Rationale of Exchange*, 47 J. ROYAL STAT. SOC'Y 164 (1884). Knowing that all parties will be better off, however, does not determine exactly how the parties will divide the gains from cooperation, but only that each party will get a portion of the gains derived. Walrasian analysis states that, if there is some external standard (such as costs, market prices etc.), this standard will determine how the parties will divide the gains. See DAVID M. KREPS, A COURSE IN MICROECONOMIC THEORY 190-92 (1990). In essence, then, Walras concluded that one should look first to comparable transactions. See *id.* The resulting allocation is known as Walrasian Equilibrium. The current arm's length standard attempts to find this Walrasian Equilibrium by finding how other parties have divided gains in comparable situations, *i.e.*, by the use of transactional methods. However, because information regarding comparable transactions may not be readily available, it can be difficult to establish the Walrasian Equilibrium. One can use Game Theory, a branch of microeconomic theory, to attempt to divide the profits amongst the parties. Game theorists assumed for years that parties that have a long-term relationship will attempt to divide profits from dealings with each other according to which party provided more of the inputs, or which bore more of the risk associated with the transaction. *Id.* at 188-92, 504-06. This assumption is one of the so-called Folk Theorems that are foundational to Game Theory and was ultimately proven mathematically by James Friedman, *A Non-Cooperative Equilibrium for Supergames*, 38 REV. ECON. STUD. 1, 1-12 (1971). The application of Walrasian analysis, together with Game Theory, shows that synergistic profits will be allocated in the same manner as routine profits, *i.e.*, according to the inputs and risks.

each method and how it could be applied to allocate income among members of a multinational group. As discussed below, the different methods should be applied to different situations.

a. Capital Asset Pricing Model (CAPM)

All financial decisions involve the consideration of risk as well as return.¹¹³ The income of a corporation is the return to the assets it owns based on the risks the enterprise has undertaken with respect to these assets.¹¹⁴ Therefore, one might allocate the profits and losses of a multinational group to its various business units based on the expected rates of return¹¹⁵ or on the assets held by each unit.¹¹⁶ If two assets have the same expected return but have different risk, the lower-risk asset will have a lower expected return than the higher-risk asset of the same value. Therefore, the analysis of risk is essential to determining the expected return on assets.

The advantage of CAPM, for purposes of allocating income, is that it allocates income to individual assets according to returns on the asset irrespective of the organizational model of the multinational enterprise. Thus, CAPM is not effected by whether the multinational enterprise operates in an integrated manner and it is uniquely suited to capture gains to integration (i.e., synergistic profits).¹¹⁷

In allocating the risk-free rate of return among the business units, the key factor is the location of the assets, i.e., the capital of the enterprise. The risk-free rate of return will not differ within the group and will not depend on the activities in which the assets are used. To allocate risk-free returns, one would simply look to the total assets of the group, determine the risk-free rate of return, and allocate this return for the group to each business unit based on its ownership of assets.

The other portion of the return is the return to risk. This should be allocated based on the activities performed by each business unit and the risks inherent in those activities. These risks may be measured in part by the volatility of the revenues associated with the relevant activities.¹¹⁸

113. ROBERT C. HIGGINS, ANALYSIS FOR FINANCIAL MANAGEMENT 184-88 (3d ed. 1992).

114. The corporation is merely a legal form of ownership of assets. MYRON SCHOLES & MARK WOLFSON, TAXES AND BUSINESS STRATEGY: A PLANNING APPROACH 91-119 (1992).

115. The expected rate of return is the probability-weighted average of possible rates of return. See HIGGINS, *supra* note 113, at 199.

116. While formulary apportionment allocates profits based on factors that typically include assets, formulary apportionment does not take into account the risks to which assets are subject.

117. The application of CAPM to transfer pricing has been raised before, in the context of the BALRM method proposed in the 1988 *White Paper*. Daniel Frisch, *The BALRM Approach to Transfer Pricing*, 42 NAT'L TAX J. 261 (1989); Ann D. Witte & Tasneem Chipty, *Some Thoughts on Transfer Pricing*, 49 TAX NOTES 1009 (1990); U.S. TREASURY DEP'T & INTERNAL REVENUE SERV., A STUDY OF INTERCOMPANY PRICING, UNDER SECTION 482 OF THE CODE, NOTICE 88-123 (1998); see also Ackerman & Chorvat, *supra* note 14.

118. Loren W. Tauer, *Estimating the Risk-Adjusted Interest Rates for Dairy Farms*, 62 AGRIC. FIN. REV. 59 (2002) (describing a method for determining β for non publicly-traded assets).

In accordance with the arm's length separate entity concept, risks should be allocated to the particular business unit that bears the risk. For example, operations in certain countries are riskier because of the risks inherent in each location. Operations in developing countries such as Brazil are riskier than operations in developed countries such as Switzerland. These risks include both currency risk as well as general business risk and should not be divided among the group if the separate entity concept is to be taken seriously. Treating these risks as group risks and apportioning based on assets ignores the separate entity concept for the return risk, the most significant portion of the total return. Some of the risks borne by the Brazilian unit in economic reality would be inappropriately allocated to Switzerland. Hence, it is crucial to allocate the risks from operating in a particular location to the particular business unit operating in that location. The risk from operating in a particular location, the country risk premium, is routinely calculated by commercial services.¹¹⁹ The country risk premium is generally calculated so as to be able to be included in CAPM calculations, typically expressed as a number of basis points to be added or subtracted to or from the market rate of return used to calculate total return under CAPM. The country risk premium should be included in the determination of risk associated with a multinational's operations in a particular location.¹²⁰

CAPM measures risk (represented by a single beta) by the covariance of the return of the asset with the total market for capital. The measurement of risk by the CAPM model becomes more accurate as the "market for capital" becomes broader. For example, if the capital markets include the markets for real estate, gold, bonds, art, and precious metals in addition to the equities markets for domestic companies, the measurement of risk should be that much more accurate. CAPM would be a good pricing method for groups where at least the parent of the group is publicly traded or where the returns on the stock of the parent have a large covariance with the market.¹²¹ In this case, we would have a beta which we could then disaggregate into the betas for each of the separate business units.

b. Options Pricing Theory

As discussed earlier, options pricing theory measures risk of an option by disaggregating any asset into the embedded options. Options pricing theory is used by the IRS today to measure the value of compensatory stock options for cost sharing purposes.¹²² Options pricing theory would be best applied to groups where some of its members are highly leveraged. If a company is highly leveraged, that portion of the company's value repre-

119. BREALEY & MYERS, *supra* note 181, § 7-1.

120. BYUNG M. JEON, MACROECONOMIC INFLUENCES ON COUNTRY RISK (Rice Univ. Dep't of Econ., Working Paper, Oct. 16, 2001), available at <http://www.ruf.rice.edu/~bmjeon/icapm3.pdf>.

121. M. Ali Khan & Yeng Sun, *The Capital Asset Pricing Model and Arbitrage Pricing Theory: A Unification*, 4 PROC. NAT. ACAD. SCI. 4229 (1997).

122. See Treas Reg. § 1.482-4 (1994).

mented by equity becomes effectively a call option upon the company. This occurs because, where the capital structure of a company includes a significant percentage of debt, equity investors will receive the entire upside potential of the earnings of the corporation but have a limited downside potential, since they can lose only the amount of their investment. In this case, the equity in that business unit will be best valued as if it were a call option rather than by traditional valuation techniques.

Options pricing theory would also be particularly useful for valuing the equity of distressed corporations.¹²³ Even though a firm may be viewed as financially troubled, that does not mean that its equity is worthless. It is always possible that the value of the assets may increase above the face value of the bonds before they come due. Therefore, equity in a troubled firm may be described as a call option.¹²⁴

c. Arbitrage Pricing Theory

The application of arbitrage pricing theory would in many ways mimic that of CAPM. Because arbitrage pricing theory is a more general theory (it is multifactor), it can apply to many situations in which it might be difficult to derive a reliable beta for CAPM purposes. Different versions of this model could be used in different situations. That is, different factors might apply to different types of businesses (e.g., GDP, unemployment, the total market for capital). APT would be well applied to the allocation of income in a group where no member of the group is publicly traded or the members of the group are subject to highly idiosyncratic risks.¹²⁵

d. Additional Methods

The above methods of valuation are the most prominent and advanced models for valuation that have significant track records. New valuation models are always being developed. As these new models are developed and begin to acquire some degree of reliability, it would be optimal for the IRS to have an ability to adopt such new methods. Of course, such methods should have attained some degree of confidence before being used to price assets for tax purposes. There are at least two reasons for conservatism still allowing some room for flexibility. If a method were clearly wrong, even though it was in vogue for a short period of time, it would not seem to be sound reason to allocate tax revenue. However, if the businesses themselves alter the way that they value projects, then for the reasons discussed above, the tax system should reflect this change.

123. ASWATH DAMODARAN, INVESTMENT VALUATION: TOOLS AND TECHNIQUES FOR DETERMINING THE VALUE OF ANY ASSET 817-30 (1996).

124. *Id.*

125. Khan & Sun, *supra* note 121.

An example of a kind of model that may become prominent is dynamic asset pricing theory. As discussed earlier, it has not yet attained the stability that one would hope for as a basis of taxation, but if it can be developed further, it should be a better model of pricing than any of the models discussed above. However, as better dynamic asset pricing models are developed, they can be applied to transfer pricing problems. In particular, dynamic pricing theories might apply to enterprises that experience a large degree of volatility in their value and which are able to employ the sophisticated mathematics required for these models to be applied.¹²⁶

3. Choice of Methods

As discussed earlier, it appears that each of the methods examined has assets for which it seems more accurate and other assets for which it is less accurate. For example, the closer the asset being valued is to being a publicly traded asset, the easier it would be to apply CAPM. The closer the asset is to being an option, the easier it would be to apply options pricing theory. Finally, if the asset has only a few competitors in a relatively restricted market, arbitrage pricing theory would indicate that this is the most appropriate value. For example, if the asset prices vary significantly with GDP numbers (e.g., valuation of a building company), there is a significant superiority over applying these valuation methods to typical formulary apportionment. Clearly, in some sense the spirit of the two is the same. Both acknowledge that trying to apply an arm's length standard to a situation that could never arise between unrelated parties is not a good way to run a transfer pricing system. However, applying valuation theories is much more likely to approximate the economic realities than simply apportioning based on employment, sales, etc. Furthermore, if one of the factors in the formula is the value of assets, then formulary apportionment is really equivalent to these valuation methods, particularly if an attempt is made to value intangible assets in a particular location.

4. The Valuation Model Ex Ante Problem

One potential problem with the proposed methodology is that these valuation methods give the price for an asset based on ex ante calculations, whereas income for tax purposes is almost always determined by ex post calculations.¹²⁷ One could argue that such an ex ante calculation is unfair because it is possible for a particular business unit to incur a loss even when the group as a whole has net income. In this case, income could be allocated

126. See Alfredo Garcia et al., *Dynamic Pricing and Learning in Electricity Markets* (Univ. of Va. Working Paper Feb. 12, 2003) at <http://www.sys.virginia.edu/techreps/2002/sie-020005.pdf>.

127. Interestingly, the Netherlands recently introduced a tax on investment income that is based on expected returns rather than actual returns. See Sijbren Cnossen & Lans Bovenberg, *Fundamental Tax Reform in the Netherlands*, 8 INT'L TAX & PUB. FIN. 471 (2001).

to a business unit that actually had a net loss for the year. Thus, one might argue that these methods could yield an incorrect result.

The answer to the ex ante problem is to use expected returns as the default method. Presumably, income and loss are allocated based on expected returns. However, if the taxpayer prefers to argue the position that this allocation is incorrect, the burden should be on it to prove that the allocation is wrong and propose an alternative.¹²⁸ This will rarely be possible because, as discussed earlier, these methods will generally only apply to situations where other transfer pricing methods fail to yield reliable results.

Furthermore, over a period of years, the ex ante method is likely to yield the correct amount. So, if the tax rates are essentially flat (as they are on corporations), then over time something approximating the right result should occur. Furthermore, there is unlikely to be an investment distortion from this method. Because all investment decisions are made on an ex ante basis (i.e., you have to decide where you will invest your money before you know what the returns are) and the valuation method is correct on an ex ante basis, there should be little distortion of investment. In addition, for large multinationals that operate in many countries, the average in any given year will be approximately the correct worldwide tax rate.

It is important to point out that the total amount of income for the group will still be calculated on an ex post basis. It is only the allocation of income among the members that is based on the expected returns of the capital invested in the various business units.

B. The Allocation of Profits Attributable to Intangible Assets

One complicating factor is the allocation of intangible assets. Using business valuation models to allocate profits based on the returns to assets assumes that we have already determined which assets belong to which business units; however, intangible assets of the enterprise are often difficult to value and allocate.

While the majority of the tests of the various pricing methods have involved publicly traded assets, often the theory behind these methods applies just as strongly to assets not publicly traded.¹²⁹ The key to applying the CAPM is the degree to which the returns of the asset covary with the market. While this is more complicated for non-publicly traded assets than for publicly-traded assets, it can be achieved with reasonable accuracy by analyzing the variance of the returns to an intangible assets or group of assets.¹³⁰ This involves a two-step analysis. First, one examines the covariance

128. Under the current U.S. regulations, the taxpayer has the burden of proving that the Service's section 482 allocation is arbitrary, capricious, or unreasonable. See Treas. Reg. § 1.482-6(c)(3)(ii)(C) (1995).

129. Richard Roll, *A Critique of the Asset Pricing Theory's Tests, Part I: On Past and Potential Testability of the Theory*, 4 J. FIN. ECON. 129, 130 (1977).

130. Loren W. Tauer, *Estimating the Risk-Adjusted Interest Rates for Dairy Farms*, 62 AGRIC. FIN. REV. 59 (2002) (describing a method for determining β for non-publicly traded assets).

of the returns to the business unit as compared with the returns to the group as a whole. Second, one should compare the covariance of the return to the group with the return of the market as a whole. The returns to an intangible asset exploited or sold by the business unit will be measured in terms of the β of the business unit. For example, in order to determine the royalty rate on a brand name, one would examine the variance of the returns to the product into which the brand name is embedded.

C. Diversification of Risk and Allocation of Losses

The valuation models all divide returns into riskless and risky returns. The calculation of the return to risk is based on the functions performed in the various business units. A sophisticated approach to functional analysis would recognize that business processes affect the risks to which business assets are subject.¹³¹ The assets of riskier business units should earn a higher return than assets of business units subject to routine risk. For example, inventory assets in the hands of a distributor are not subject to as much risk as similar assets in the hands of local retailers. Once the assets are committed to a local market, the risk is higher, because the inventory is subject to the idiosyncratic risks of the local market whereas a distributor can diversify the risks over a number of markets.¹³² Inventory assets committed to a particular market are subject to idiosyncratic risk plus systematic risk.¹³³ While one cannot diversify systematic risk, diversification of assets (in the example, number of markets) will reduce idiosyncratic risk. Thus, with greater diversification in its inventory assets, the distributor should earn a lower return than a retail subsidiary. This is merely a simplified example of how business processes affect risk and return.¹³⁴

131. A process analysis identifies the business-driven risks and responsibilities of each business unit within the group. The identification of business processes involves more than the traditional functional analysis, in that it identifies elements of the value-added processes that contribute to profit. Business processes include, but are not limited to, the following: business strategy and management (*e.g.*, planning and resource allocation); support (*e.g.*, accounting, legal, information systems, human resources); sales and marketing (*e.g.*, telemarketing and electronic commerce); research and development (*e.g.*, product and process design); operations (*e.g.*, all functions from sourcing and procurement through delivery); and after-sales support.

132. It is well established that a diversified portfolio of investments has less risk than an undiversified portfolio. See Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952). This is because the variance of the diversified portfolio is less than the variance of the undiversified portfolio. See BREALEY & MYERS, *supra* note 181, § 7-2, at 153-56. Diversification (*i.e.*, minimization) of risk can be expressed as minimization of portfolio variance where portfolio variance equals:

$$\sum_{i=1}^N \sum_{j=1}^N x_i x_j \sigma_{ij}$$

where N is the number of assets in the portfolio, x_i is the amount of the portfolio allocated to the i^{th} asset, x_j is the amount of the portfolio allocated to the j^{th} asset, and σ_{ij} is the covariance of the i^{th} and j^{th} asset. For the purposes of this Article, the import of this definition of portfolio variance is that, by diversifying markets, asset risk is minimized since, as long as the covariance is less than 1 where there are two or more markets, inventory risk will decline because total market variance is reduced.

133. See BREALEY & MYERS, *supra* note 181, § 7-2, at 156 (noting that idiosyncratic risk is sometimes called unique risk or diversifiable risk).

134. See Bob Turner, *Economic Downturn Planning* (Nov. 30, 2001) (unpublished manuscript, on file with author); see also Robert Miall, *Business Process Analysis: A New Approach to Client Solutions*

Under the current U.S. regulations, application of the residual profit split can lead to the creation of income, called "system income," because it is possible to allocate more than the business unit's share of profit and loss. For example, if there is a business unit that would have operated at a loss if it were owned by an unrelated third party, the residual profit split method might treat it as having earned a profit if the enterprise as a whole has earned a profit. A profit and loss sharing method is more conceptually sound, because application of profit and loss sharing will not create system income.

CONCLUSION

If a transfer pricing system is to operate correctly, it must accurately reflect the economics of the interactions between related parties. The transfer pricing methods which have either been adopted or proposed to date have used overly simplified models of how businesses operate. While these oversimplified models may not have done a bad job of allocating profits in the past, the increasing complication of multinational business should cause us to reexamine our transfer pricing methods. By incorporating a broader array of economic theory into our analysis, we can derive transfer pricing methods which more accurately reflect the underlying economics of the transactions at issue.

This Article has incorporated the principles of modern corporate finance and valuation theory into the transfer pricing rules. In particular, it has argued that the problem of allocating income among members of a multinational group should be based on the same principles that underlie portfolio allocation. This leap only requires us to assume that multinational enterprises are attempting to maximize profit of the group as a whole rather than maximizing the profit of each individual member. Because the problem of portfolio allocation has been extensively studied, incorporating this body of literature into the analysis of transfer pricing can significantly increase both the sophistication of the analysis and well as the accuracy of the resulting allocations.

This Article has shown how we can incorporate the most recent advances in valuation theory into our transfer pricing rules. As our knowledge of portfolio allocation becomes more developed, we should incorporate those developments into our transfer pricing system as well.