

# **A Formulary Approach for Attributing Measured Output to Foreign Affiliates of U.S. Parents<sup>\*</sup>**

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## Abstract

Consistent with international guidelines, the U.S. Bureau of Economic Analysis measures and attributes output to foreign affiliates of U.S. parents based on data determined under separate accounting according to generally accepted accounting principles. If a multinational company is structured in a way that attributes accounting measures to an affiliate based partially or solely on economic activity resulting from shared inputs that are not employed by the affiliate, measured output may be attributed to an affiliate with relatively few or no local inputs and relatively little or no economic activity. In this paper, we use formulary apportionment, which is also consistent with international guidelines, as a substitute for separate accounting to attribute measured value-added to majority-owned foreign affiliates (MOFAs) of U.S. parents. Formulary apportionment attributes output based on factors that reflect economic activity. We find overall reattribution from MOFAs to U.S. parents is relatively small—less than 5 percent of value-added attributed to all MOFAs and U.S. parents under separate accounting. However, reattributions across global regions and industry sectors are relatively large. In addition, preliminary work to apply formulary apportionment to imports and exports between U.S. parents and their foreign affiliates yields a relatively large decrease in imports—approximately 3 percent of published total private service imports—but no meaningful change in exports. The overall effect on GDP is only a small increase—approximately 0.1 percent. We conclude that formulary apportionment yields a picture of measured output by industry sector and country that is more congruent with economic activity and more consistent with expectations than related measures generated under separate accounting.

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## 1. Introduction

The *Balance of Payments and International Investment Position Manual, Sixth Edition*, (*BPM6*) and the *System of National Accounts 2008* (*SNA*) both recommend attributing output to countries based on the residence of productive entities. The residence of an entity is generally determined as the country in which a significant amount of production takes place. In cases where an entity has little or no physical presence, residence is determined as the country in which the entity is legally incorporated or registered. In the case of multinational enterprises (MNEs), the residency-based framework of *BPM6* and the *SNA* requires that the activities of affiliates resident in different countries be measured separately in order to accurately attribute the economic activity of each affiliate to the country in which it is resident. Likewise, the residency-based framework requires that cross-border transactions between affiliates resident in different countries be included in balance of payments statistics.

For practical reasons, statisticians generally measure output and other attributes of MNEs based on accounting data. While *BPM6* and the *SNA* recommend the residency-based framework for attributing measured output to an affiliate, attribution under the framework is not limited to a specific accounting treatment. In this paper, we focus on formulary apportionment as an alternative treatment to separate accounting, which is the basis for current measures of output. Under separate accounting, accounting records are maintained separately for each entity within an MNE. As a result, accounting measures such as costs and profits are attributed to an affiliate based on the affiliate's purpose within the structure of the MNE and not necessarily on the economic activity of the affiliate. In other words, accounting measures recorded under separate accounting may not accurately reflect the economic activity of the affiliate. In contrast to separate accounting, formulary apportionment is based on consolidated accounting measures. Formulary apportionment is commonly required by state corporate income tax regulations to determine the income attributable to the state for a corporation that operates in multiple states. Rather than keeping separate accounting records for operations in each state, the corporation keeps consolidated records and attributes income to a state based on prescribed apportionment factors such as employment, property, and sales that reflect where income is actually earned. Likewise, formulary apportionment is an alternative to separate accounting for attributing measured output to an entity within an MNE as long as the apportionment factors reflect economic activity specific to the entity.

Residency-based separate accounting may be particularly problematic for statisticians in cases where output is produced with inputs that are shared by multiple entities within the same MNE. Shared inputs may include intangible property such as patents, trademarks, formulas, processes, etc. or headquarter services such as accounting, finance, marketing, etc., and they do not need to be located at an entity in order to provide service (Helpman, 1984; Markusen, 1984, 1997, 2002). If a statistician is able to directly observe economic activity of the entity in order to determine actual output, residency-based separate accounting may pose no particular problem. However, given the statistician's reliance on accounting data reported for the entity, identifying the location of production, which is the essence of the residency-based framework, is particularly difficult when the entity employs relatively few or no local inputs such as labor or property, plant, and equipment (PPE) but reports relatively significant accounting measures for other balance sheet and income statement items. As a result, distortions are possible in measured output attributable to the entity due to a lack of actual production at the entity identified as resident based solely on legal incorporation or registration. As shared inputs become more common and as MNE activities increase, challenges encountered under the residency-based framework become more important in the U.S. international transactions accounts (ITAs) and the U.S. national income and product accounts (NIPAs) (Lipse, 2009, 2010; United Nations, 2011).

Consistent with the residency-based framework, the U.S. Bureau of Economic Analysis (BEA) attributes output to a foreign affiliate of a U.S. parent according to the country in which the affiliate is resident. If the affiliate has little or no physical presence in the country, BEA follows *BPM6* and the *SNA* recommendations to attribute output to the affiliate as long as the affiliate is legally incorporated or registered in the country. In addition, BEA measures output based on accounting measures reported for the affiliate, and the accounting measures are determined under separate accounting according to generally accepted accounting principles. Thus, if an MNE is structured in a way that attributes accounting measures to an affiliate based partially or solely on economic activity resulting from shared inputs that are not employed by the affiliate, measured output may be attributed to an affiliate with relatively few or no local inputs and relatively little or no economic activity.

In this paper, we use formulary apportionment, which is also consistent with the residency-based framework, as a substitute for separate accounting to attribute measured value-added to foreign affiliates of U.S. parents. In particular, we use operations data collected by

BEA for 2009 on majority-owned foreign affiliates (MOFAs) to reattribute measured value-added to the MOFAs based on formulary apportionment. BEA measures value-added as the sum of costs incurred and profits earned in production, which are determined under separate accounting. We consolidate the shared-input components of measured value-added for an MNE and reattribute the shared-input components based on apportionment factors that reflect economic activity. We define shared-input components as those components that may reflect returns for shared inputs (i.e., components of value-added other than compensation and depreciation).

We find overall reattributions from MOFAs to U.S. parents are relatively small—less than 5 percent of total value-added attributed to all MOFAs and U.S. parents under separate accounting. In contrast, reattributions across global regions including Africa, Asia, Europe, Latin America, and Middle East are relatively large. In addition, reattributions across industry sectors are relatively large. In particular, reattributions are large for select service sectors including administration, finance, insurance, management, miscellaneous, professional, and leasing. Reattributions are also relatively large for all other industry sectors. The magnitude of reattributions across industry sectors depends whether we apply formulary apportionment only to MOFAs classified in the same industry sector or whether we apply formulary apportionment to MOFAs across all industry sectors.

In addition to applying formulary apportionment to value-added for MOFAs and U.S. parents, we report preliminary work to apply formulary apportionment to reattribute service imports and exports between U.S. parents and their foreign affiliates. We find overall reattributions are relatively large as a percentage of published total private service imports and as a percentage of published private service imports from affiliated parties—approximately 3 percent and 13 percent, respectively. However, attributing U.S. service imports and exports with foreign affiliates based on formulary apportionment results in only a small increase in GDP—approximately 0.1 percent. Imported insurance services reattributed from affiliates in Europe and Latin America to U.S. parents are a large percentage of the total imports reattributed to U.S. parents. Based on our preliminary results, we expect to have a complete picture of the U.S. current account under formulary apportionment in a forthcoming paper.

Based on ratios of value-added to compensation and net PPE, we conclude that value-added attributed to MOFAs and U.S. parents under formulary apportionment yields a picture of

measured output by industry sector and country that is more congruent with economic activity and more consistent with expectations than related measures generated under separate accounting. Thus, formulary apportionment appears to be a viable alternative to separate accounting under the residency-based framework of *BPM6* and the *SNA*. However, further work needs to be done to determine whether formulary apportionment should be applied by industry sector or across industry sectors and to determine the combination of apportionment factors that yields the highest quality statistics.

The paper is organized in five sections that follow. The next section provides an overview of related literature. The third section outlines BEA's current framework for measuring output based on residency-based separate accounting and outlines the proposed framework for attributing output based on residency-based formulary apportionment. The fourth section describes BEA's survey data on the operations of MNEs. The fifth section presents the results of the formulary apportionment. The last section concludes.

## **2. Related Literature**

To provide context for our work, we draw upon four distinct but related lines of literature. First, we borrow features from the industrial-organization (IO) literature on foreign direct investment (FDI) and trade to outline a simple production model for foreign affiliates, which underlies our choice of formulary apportionment. Second, we describe the international guidelines that provide a framework for organizing official statistics on FDI and trade. In particular, we focus on the definitions and concepts underlying the residency-based framework, which under separate accounting may result in production attributed to foreign affiliates with very little or no physical presence. Third, we review the literature that identifies challenges encountered under the residency-based framework and proposes alternative frameworks for organizing official statistics on FDI and trade. Finally, we discuss the literature on formulary apportionment as it is applied in international taxation and identify features of formulary apportionment as a tool for attributing measured output to entities within an MNE.

### *2.1. Industrial-Organization Literature*

The IO literature on FDI and trade focuses on adapting general equilibrium trade models to include endogenous MNEs. Early work explains the origination of MNEs based on the organization of production into one of two types: vertical and horizontal. Vertical integration results when firms divide the production process among affiliates in order to take advantage of

relative factor prices. Horizontal integration results when firms replicate production at affiliates in order to serve local markets. Caves (1971) discusses both vertical and horizontal organization and argues that FDI results only in certain industries based on market structure. Helpman (1984) constructs one of the first theoretical models of vertical integration, and Brainard (1993) offers an empirical assessment of the model in which she finds very little MNE activity is explained by differences in factor prices. Markusen (1984) constructs one of the first theoretical models of horizontal integration, which is supported by empirical evidence in Brainard (1997). Markusen (1997, 2002) argues that the outcomes identified by vertical and horizontal models face limitations based on underlying assumptions and constructs an alternative knowledge-capital model, which explains a more comprehensive set of outcomes. Estimates in Carr et al. (2001) and Markusen and Maskus (2001) lend empirical support to the knowledge-capital model.

Regardless of how production is organized, a useful feature of each of the IO models of FDI and trade is the inclusion of a local input and a firm-specific shared input, which can be used jointly by multiple affiliates. In Helpman (1984) and Markusen (1984), the firm-specific input is immobile but can serve multiple affiliates remotely. In Markusen (1997, 2002), knowledge is a firm-specific input that is both geographically mobile and shared. In either case, firm-specific inputs do not need to be physically present for production to take place, but firm-specific inputs cannot generate output without the local input. In addition to a firm-specific input in the production function, general equilibrium in each model results under assumptions that include foreign affiliates that produce with constant returns to scale and operate in perfectly competitive markets. The models also assume production is separable across affiliates and markets are segmented.

## 2.2. *International Guidelines*

The objective of the international guidelines is to construct official FDI and trade statistics for each national economy. In paragraph 4.11 of *BPM6*, an economy is defined as “...all the institutional units that are resident in a particular economic territory.” As a result, the following concepts of economic territory, institutional units, and residence in *BPM6* and the *SNA* are designed to ensure that an institutional unit is associated with a single economic territory for statistical purposes (*BPM6*, para. 4.6; *SNA*, para. 4.12):

*Economic territory.* An economic territory is defined broadly to include any geographic area or jurisdiction for which statistics are required (*BPM6*, para. 4.3; *SNA*, para. 4.10). The most

commonly used concept of economic territory is the area under the effective economic control of a single government (*BPM6*, para. 4.4; *SNA*, para. 4.10).

*Institutional units.* Institutional units are determined according to a broad list of attributes that includes separate legal entities, such as corporations, as well as other entities that may not be separate legal entities, such as branches and notional units (*BPM6*, para. 4.13; *SNA*, para. 4.2). Thus, institutional units include entities that are organized for financing and insurance purposes, virtual manufacturing purposes, auxiliary purposes, and tax and other regulatory purposes that may not require a physical presence (*BPM6*, paras. 4.27, 4.50; *SNA*, para. 4.7).

*Residence.* For enterprises, the residency concept corresponds to the economic territory in which an entity is engaged in a significant amount of production of goods or services (*BPM6*, para. 4.131; *SNA*, para. 4.10). In addition, for entities with little or no physical presence, residency is based on the economic territory in which the entity is incorporated or registered, and in the absence of incorporation or registration, legal domicile is used as the criterion for determining residence (*BPM6*, para. 4.134-4.135; *SNA*, para. 4.14).

One of the attributes of an institutional unit is the existence or feasibility of a complete set of accounting records (*BPM6*, para. 4.13(d); *SNA*, para. 4.2(d)), which implies the possibility of separate accounting is required under the residency-based framework. In addition, the international guidelines consider the possibility that production may be located somewhere other than the economic territory under which an entity is legally incorporated or registered. In particular, paragraph 4.134 of *BPM6* states: “A legal entity is resident in [the] economic territory under whose laws the entity is incorporated or registered...it must not be combined with entities resident in other economies. If [the entity] has substantial operations in another economy, a branch may be identified there.” In this case, the branch is treated as an institutional unit subject to the criterion for accounting records (*BPM6*, para. 4.27(a)), and the operations of the branch are to be attributed to the corresponding economic territory (*BPM6*, para. 4.26). Thus, consistent with the IO literature on FDI and trade, the international guidelines consider the possibility that factors of production may be located somewhere within an MNE other than an affiliate to which production would be attributed based merely on legal incorporation or registration of the affiliate. Furthermore, the criterion for accounting records does not rule out formulary apportionment in lieu of separate accounting for either the measurement or the

attribution of production for the affiliate. The bottom line is the guidelines intend for output to be attributed where production is actually taking place.

### *2.3. Alternative Measurement Frameworks*

Challenges encountered under the residency-based framework are widely addressed in international discourse and academic literature. The United Nations recently published a collection of papers that address the impact of globalization on national accounts (United Nations, 2011). An entire chapter is dedicated to identifying and explaining challenges associated with allocating output to national economies under a residency-based framework. Among the challenges are the transfers of intangible property and the attribution of associated income. However, the chapter does not offer any analysis to identify the extent to which allocation of output may be incongruent with actual economic activity. Lipsey (2009, 2010) offers insight regarding possible distortions in U.S. outbound FDI and trade statistics based on aggregate data published by BEA for service industries. Lipsey (2009, 2010) assumes the distortions are a result of global structuring of MNEs and the mobility of productive resources in the service industries. As a result, Lipsey (2009, 2010) suggests but does not develop an alternative location-based framework to accompany the residency-based framework for measuring trade in services.

Early work also suggests supplemental frameworks for organizing FDI and trade statistics based on ownership. Baldwin and Kimura (1998) find that net sales activities of U.S. affiliates of foreign-based MNEs to Americans and foreign affiliates of U.S.-based MNEs to foreigners are almost as high as measured U.S. imports and exports, respectively. Kimura and Baldwin (1998) find an even larger role of FDI in the Japanese economy. In each case, the authors use their results to highlight the usefulness of an ownership-based framework. Landefeld et al. (1993) explain and evaluate ownership-based trade measures and propose an alternative residency-based trade measure that includes an adjustment for the net effect on the U.S. economy of the operations of U.S.-owned companies abroad and of foreign-owned companies in the U.S. As a result of the early work on alternative organizing frameworks, BEA publishes annual ownership-based measures for the current account of the ITAs as a supplement to the residency-based framework (Whichard and Lowe, 1995). The ownership-based framework is fully consistent with the international standards of *BPM6* and the *SNA* and combines with the residency-based measures of U.S. imports and exports the transactions of affiliates that are not

captured in the residency-based framework. While the ownership-based framework may address some of the challenges encountered under the residency-based framework, the ownership-based framework is not intended to identify the location of production, which is the centerpiece for national accounting purposes.

#### *2.4. Formulary Apportionment Literature*

While formulary apportionment is historically used in multistate taxation practice, the treatment of global income under formulary apportionment is also explored in research.<sup>1</sup> In particular, some researchers suggest formulary apportionment as an alternative to the complexities of determining transfer prices and applying the arm's length standard in the determination of international tax obligations of MNEs. Martens-Weiner (2006) discusses in depth issues related to replacing separate accounting for companies operating in Europe with a system of formulary apportionment for the European Union. The issues span a spectrum including business attitudes toward formula apportionment, designing an apportionment formula, and tax administration and compliance. In related work, Fuest et al. (2007) find that smaller European countries that currently attract a relatively large tax base under separate accounting would have a much smaller tax base under formulary apportionment. Avi-Yonah and Clausing (2007) propose a system of formulary apportionment that would include sales as a single apportionment factor. Avi-Yonah and Clausing (2007) argue that their proposed method would protect the U.S. tax base by preventing income shifting to low-tax countries. Avi-Yonah (2010) proposes a hybrid system in which separate accounting is used to the extent that income can be attributed based on observed determinants and the residual profit is attributed under formulary apportionment. Altshuler and Grubert (2010) simulate firm behavior and U.S. revenue collection and find that different responses to tax incentives yield similar revenue under separate accounting and formulary apportionment. In contrast, Hines (2010) presents evidence that the determination of international tax obligations under formulary apportionment may distort actual income attributable to a given country due to income that is unexplained by apportionment factors and may lead to inefficient allocation of productive resources due to differences in tax rates across countries.

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<sup>1</sup> Some research also explores multistate taxation under formulary apportionment (Goolsbee and Maydew, 2000; Gordon and Wilson, 1986; McLure, 1980).

We are not aware of any previous study that applies formulary apportionment to attribute measured output to entities within an MNE, but the attribution of measured output under formulary apportionment does not face the policy concerns described above for international taxation because MNEs presumably do not make operating decisions based on surveys intended solely for statistical purposes. However, formulary apportionment could affect the picture of global production, which could have policy implications. Given the definitions and concepts underlying the international guidelines for measuring official FDI and trade statistics and the challenges encountered under the resulting residency-based framework when applied to MNEs, we next draw upon the related IO literature to outline a simple production model for foreign affiliates and construct a formulary framework for attributing measured output to foreign affiliates of U.S. parents.

### 3. Measuring Output

Before we outline the formulary framework to attribute output to foreign affiliates of U.S. parents, we discuss a production model based in part on Bartelsman and Beetsma (2003), Helpman (1984), and Markusen (1984, 1997, 2002). First, assume the U.S. parent has already implemented a decision regarding foreign direct investment, the organization of production, and the location of investment. Assume also that an affiliate's production function is separable from the rest of the firm. The affiliate chooses locally purchased inputs such as labor and PPE and shared inputs such as intangible property (e.g., patents, trademarks, formulas, processes, etc.) and headquarter services (e.g., accounting, finance, marketing, etc.). The affiliate purchases the shared inputs from the U.S. parent at a price determined by the parent, which maximizes the MNE's profits.

Consider an MNE with one U.S. parent and one or more foreign affiliates. An affiliate produces actual output, denoted  $Q^*$ , with locally purchased inputs, denoted  $L$ , and shared inputs, denoted  $H$ , as follows:<sup>2</sup>

$$Q^* = f(L, H). \tag{1}$$

In practice, a statistician does not observe actual output for the affiliate. However, value-added, denoted  $Q^e$ , can be measured for the affiliate with one of two approaches. As one approach,

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<sup>2</sup> For our purposes, we do not distinguish between nominal output and real output because BEA's ITAs and multinational statistics are published without adjustments for price changes.

value-added can be measured as the difference between gross sales and intermediate inputs. In this case, a discrepancy exists between actual output and measured output to the extent that gross sales and intermediate inputs include intercompany transactions that do not reflect market prices. Alternatively, value-added can be measured as the sum of costs incurred, other than costs of intermediate inputs, and profits earned in production. In this case, costs and profits reflect returns to local inputs and shared inputs, and a discrepancy exists between actual output and measured output to the extent that returns accruing to local and shared inputs are under- or over-attributed to the affiliate. While we can assume returns accruing to local inputs are properly attributed because they are generally determined from market transactions, we cannot be sure that returns to shared inputs are properly attributed given the mobility of shared inputs and their related returns as well as the possible lack of associated market transactions. In either case, the discrepancy, denoted  $\varepsilon$ , between actual output,  $Q^*$ , and measured output,  $Q^\varepsilon$ , can be written as follows:

$$\varepsilon = Q^* - Q^\varepsilon. \quad (2)$$

The objective is to choose a measurement approach to minimize  $\varepsilon$ . Determining the magnitude of  $\varepsilon$  is difficult, but Lipsey (2009, 2010) provides some evidence of distortions in statistics measured for foreign affiliates of U.S. parents.

### *3.1. Residency-Based Separate Accounting*

Consistent with the residency-based framework of *BPM6* and the *SNA*, BEA attributes value-added to a foreign affiliate according to the country in which the affiliate is resident. If the affiliate has little or no physical presence in the country, BEA follows *BPM6* and the *SNA* recommendations to attribute value-added to the affiliate as long as the affiliate is legally incorporated or registered in the country. BEA measures value-added as the sum of costs incurred and profits earned in production (Mataloni and Goldberg, 1994). Both costs and profits are determined under separate accounting according to generally accepted accounting principles. Under separate accounting, accounting records are maintained separately for each entity within an MNE. As a result, if the MNE is structured in a way that attributes costs and profits to an affiliate based partially or solely on economic activity related to shared inputs, measured value-added may be attributed to an affiliate with relatively few or no local inputs and relatively little or no economic activity. In other words, value-added attributed to the affiliate may be distorted

to the extent that costs and profits reflect economic activity related to shared inputs that are not employed by the affiliate.

Chart 1 summarizes the contribution of each of the components and subcomponents to value-added that is published as part of BEA's multinational statistics. Costs incurred include four components: compensation, capital consumption allowance (CCA), indirect business taxes (IBT), and net interest paid (IP). Compensation includes payroll taxes. CCA is an accounting rather than an economic measure of depreciation.<sup>3</sup> IBT includes taxes related to business registry and operations other than income taxes and payroll taxes.<sup>4</sup> IBT is adjusted for government subsidies received and production royalty payments to foreign governments for natural resources. Net IP includes interest expensed or capitalized less interest income. The profits component is referred to as profit-type return (PTR) in BEA's multinational statistics and includes net income adjusted for foreign income taxes paid, depletion, income from equity investments in foreign affiliates, and realized and unrealized gains and losses.

Using the context of our production model, we identify the components of value-added that reflect returns to local inputs and to shared inputs. In particular, we consider compensation and CCA to only reflect returns to local inputs. Compensation and CCA are returns for services provided by labor and PPE, respectively, which need to be physically located at an affiliate in order to provide service. In contrast, IBT reflects payments to the host government for the privilege of existing in a location, such as fees for licenses and registration, in addition to payments for conducting operations in the location, such as sales taxes and property taxes. Licenses and registration do not require a physical location, but we do consider sales taxes for unaffiliated sales and property taxes to require a physical location. Likewise, net IP and PTR can reflect returns to local inputs, shared inputs, or both. However, absent any compensation and CCA (and IBT related to operations), measured value-added that includes only net IP and PTR (and IBT related to registration) under separate accounting calls into question the production of actual output based on a presumed lack of local inputs that are required to produce actual output in our production model. In other words, separate accounting may not minimize  $\varepsilon$  in equation (2). We refer to IBT, net IP, and PTR collectively as the shared-input components of value-

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<sup>3</sup> In the NIPAs, consumption of fixed capital is the measure of economic depreciation. Given that depreciation is a cost in affiliates' accounting records, any difference between CCA and consumption of fixed capital is reflected in profits. Thus, measured value-added is unaffected (Mataloni and Goldberg, 1994).

<sup>4</sup> IBT taxes include sales tax, value-added tax, consumption tax, excise tax, taxes on property and other assets, duties, license fees, fines, penalties, and any other taxes other than payroll taxes and income taxes.

added. We turn now to formulary apportionment as an alternative to separate accounting for attributing value-added to foreign affiliates.

### 3.2. Residency-Based Formulary Apportionment

While *BPM6* and the *SNA* recommend the residency-based framework for attributing measured output to entities within an MNE, attribution under the framework is not limited to separate accounting and may presumably include formulary apportionment. In contrast to separate accounting, formulary apportionment is based on consolidated accounting measures. Formulary apportionment is commonly required by state corporate income tax regulations to determine the income attributable to the state for a corporation that operates in multiple states. Rather than keeping separate accounting records for operations in each state, the corporation keeps consolidated records and attributes income to a state based on prescribed apportionment factors that reflect where income is actually earned based on economic activity. Apportionment factors generally include factors related to employment, property, and sales, which reflect the presence of local inputs and economic activity specific to the entity.

Consistent with our production model, consider an MNE  $m$  with one U.S. parent and one or more foreign affiliates. Let  $q$  denote measured output under separate accounting for each entity  $n$  (i.e., U.S. parent and its affiliates) belonging to the MNE  $m$ . For flexibility,  $q$  may include value-added or the shared-input components of value-added. Likewise, let  $x$  denote apportionment factor  $j$  for each entity  $n$ , and let  $\alpha$  denote the weight associated with apportionment factor  $j$ , where  $\sum_j \alpha_j = 1$ . Apportionment factor  $j$  should reflect economic activity. Under formulary apportionment, measured output, denoted  $\bar{q}$ , attributable to entity  $n$  within MNE  $m$  is calculated as follows:

$$\bar{q}_n = \underbrace{\left( \sum_j \alpha_j \frac{x_{j,n}}{\sum_n x_{j,n}} \right)}_{\text{Apportionment Weight}} \underbrace{\left( \sum_n q_n \right)}_{\text{MNE Output}} \quad \forall n \in m. \quad (3)$$

As noted under the horizontal brackets in equation (3), measured output attributable to an entity under formulary apportionment,  $\bar{q}$ , is a weighted average of the consolidated measured output

determined for the MNE (i.e., U.S. parent and its affiliates) under separate accounting. Each apportionment weight is a combination of each apportionment factor and its associated weight.

We apply data to  $q$  in equation (3) for the shared-input components of value-added (i.e., IBT, net IP, and PTR) for foreign affiliates and their U.S. parents. We then add the shared-input components attributed to each entity under formulary apportionment to the local-input components of value-added (i.e., compensation and CCA) attributed to each entity under separate accounting in order to obtain a new measure of value-added for each entity under formulary apportionment. Equation (3) inevitably changes the industry and country composition of value-added measured under separate accounting because there are no restrictions by industry or country. We consider next an application of formulary apportionment by industry sector and country for measured value-added.

### 3.3. Formulary Apportionment by Industry Sector and Country

With equation (3), measured value-added may be reattributed from an entity classified in one industry to an entity classified in another industry or from an entity located in one country to an entity located in another country (or both). We do not restrict equation (3) by industry or country. However, measured value-added attributed to an entity is classified in the industry and country reported for the entity. If returns accruing to shared inputs are under- or over-attributed to the entity under separate accounting, then statistics by industry and country do not accurately reflect actual output and reattributing across industries and countries is presumably justified. If returns accruing to shared inputs are not under- or over-attributed to the entity under separate accounting, then reattributing across industries and countries may yield inaccurate statistics.

While production functions may be different across industries and countries, we assume the same production function across countries within a given industry sector because entities in different countries belong to the same MNE. For the shared-input components of value-added, we apply the formulary apportionment of equation (3) to related entities classified in the same industry sector  $i$  as follows:

$$\bar{q}_n = \underbrace{\left( \sum_j \alpha_j \frac{x_{j,n}}{\sum_{n \in i} x_{j,n}} \right)}_{\text{Apportionment Weight}} \left( \sum_{n \in i} q_n \right) \quad \forall n \in m. \quad (4)$$

If the apportionment weight is zero for an entire industry sector within the MNE for equation (4), we reattribute measured output to the U.S. parent regardless of the parent's industry sector. Thus, the industry sector composition of measured output may still be affected.<sup>5</sup>

#### **4. Data**

We use survey data collected by BEA from MNEs on direct investment operations for 2009. The data include apportionment factors related to employment, property, and sales, and the data underlie BEA's published statistics on the activities of MNEs. While we apply formulary apportionment to the shared-input components of value-added for all foreign affiliates of a given U.S. parent, we focus attention on results obtained for foreign affiliates classified in select service industry sectors because services are a growing component of MNE activities and because of the role shared inputs potentially play in the output attributed to foreign affiliates classified in the select service industry sectors. The select service industry sectors include administration; finance; information; insurance; management of companies; miscellaneous; professional, scientific, and technical (PST); and real estate and leasing. Table 1 presents a list of the select service industry sectors and their related industries.

##### *4.1. Data on Operations*

We use operations data collected for U.S. parents and their majority-owned foreign affiliates (MOFAs) on the 2009 Benchmark Survey of U.S. Direct Investment Abroad. A foreign affiliate is an enterprise whose voting stock is owned more than 10 percent by a U.S. parent. A MOFA is a foreign affiliate in which the combined direct and indirect ownership interest of all U.S. interests is more than 50 percent. A U.S. parent is defined as a U.S. person with a direct investment interest, either directly or indirectly, of 10 percent or more in a foreign business enterprise.

Benchmark operations survey forms are required to be completed for all U.S. parents (form BE-10A). In addition, benchmark operations survey forms are required for each MOFA with more than \$80 million in assets, sales, or net income (net loss) (form BE-10B).<sup>6</sup> Data used

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<sup>5</sup> We choose the industry sector rather than the industry to apply equation (4) because industries are more narrowly defined and would yield relatively few reattributions. Thus, we assume production functions are the same across industries within the same industry sector.

<sup>6</sup> Less information is collected for each MOFA with assets, sales, or net income (net loss) greater than \$25 million but all less than \$80 million (form BE-10C). In addition, less information is collected for each minority-owned foreign affiliate with more than \$25 million in assets, sales, or net income (net loss) and for each foreign affiliate with less than \$25 million in assets, sales, and net income (net loss) that is a foreign affiliate parent of another

in this study for a given U.S. parent pertain only to the activities of the parent. Data for a given foreign affiliate pertain only to the activities of the affiliate. Data collected on the operations survey forms include income statement information and balance sheet information. Income statement information includes sales by type (i.e., goods, services, and investment income), location, and affiliation. In addition, income statement information includes detailed expenses such as compensation, depreciation, interest, and taxes. BEA uses information from the income statement to measure value-added for each affiliate. Balance sheet information includes details regarding assets, liabilities, and owner's equity. Asset details include PPE.

#### *4.2. Apportionment Factors*

The choice of apportionment factors and their associated weights influences the results obtained from formulary apportionment. We consider three apportionment factors that are available in the operations data: compensation, net PPE, and unaffiliated sales. Compensation and net PPE reflect local inputs employed in the production of output. Unaffiliated sales may also reflect local inputs that may not be reflected in compensation and net PPE. For example, unaffiliated sales may reflect intangibles employed by the affiliate. In contrast, unaffiliated sales may also reflect shared inputs that are not employed by the affiliate. For example, unaffiliated sales may reflect intangibles employed by the U.S. parent. If an affiliate has no compensation or net PPE, output is still attributed to the affiliate under formulary apportionment if unaffiliated sales are greater than zero. Likewise, if an affiliate has no unaffiliated sales, output is still attributed to the affiliate under formulary apportionment if compensation and/or net PPE are greater than zero. In other words, output attributed to the affiliate by equations (3) and (4) is proportional to the economic activity reported for the affiliate.<sup>7</sup>

For practical reasons, we first weight compensation 100 percent in equations (3) and (4). In addition to reflecting the number of employees employed by an affiliate, compensation reflects wages. Thus, if workers are paid their value marginal product, compensation reflects variation in economic activity across industries and countries. In other words, using compensation as an apportionment factor yields relatively more output attributable to high

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foreign affiliate (form BE-10C). Reporting is also required for all foreign affiliates with less than \$25 million in assets, sales, and net income (net loss) (form BE-10D).

<sup>7</sup> In addition to compensation, net PPE, and unaffiliated sales, we consider other possible apportionment factors. In particular, we consider research and development expenditures, which are reported for MOFAs. However, R&D expenditures are likely in some cases to be made pursuant to intercompany cost-sharing arrangements. In addition, we are unable to discern the extent to which R&D expenditures reflect intercompany transactions. Thus, we limit the apportionment factors to compensation, net PPE, and unaffiliated sales.

margin industries and high wage countries and relatively less output attributable to low margin industries and low wage countries. In addition, compensation is based on market transactions rather than accounting conventions, which may affect both net PPE and unaffiliated sales. Furthermore, unaffiliated sales may reflect local inputs and/or shared inputs. Thus, compensation may provide the most objective measure of economic activity.<sup>8</sup>

In addition to weighting compensation 100 percent, we report results from weighting compensation, net PPE, and unaffiliated sales 60 percent, 25 percent, and 15 percent respectively. We determine factor weights from the predicted mean value of value-added based on coefficients from an estimation of value-added as a function of the apportionment factors. We initially determine factor weights separately for two subsamples of the data: 1) MOFAs and U.S. parents classified in select service industry sectors and 2) MOFAs and U.S. parents classified in all other industry sectors. However, even though the coefficient estimates are statistically different between the two subsamples, the resulting factor weights from each subsample are nearly identical due to differences in the subsample means.<sup>9</sup> Thus, we apply the factor weights obtained from the combined sample of MOFAs and U.S. parents classified in any industry sector. In addition to obtaining reasonable factor weights, the explanatory power of the apportionment factors is high (i.e., adjusted r-squared = 0.84).

#### *4.3. Published Value-Added*

Before we apply formulary apportionment to the shared-input components of value-added, we report the related statistics published by BEA under separate accounting. Table 2 reports published value-added by global region and industry sector for all MOFAs and U.S. parents. For both the select service sectors and the other industry sectors, more value-added is attributed to MOFAs in Europe than any other global region. MOFAs classified in select service sectors comprise approximately 22 percent of total value-added attributed to all MOFAs. More

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<sup>8</sup> In contrast, the share of output attributable to shared inputs may be determined in part by the economic substance of transactions (or transfer pricing) under separate accounting. Under economic substance, shared-input components of output are generally attributed to a foreign affiliate based on the functions performed, risks assumed, and assets employed by the affiliate. Given the subjectivity associated with determining functions performed, risks assumed, and assets employed, separate accounting may not yield an objective measure of economic activity. In the most obvious case, a foreign affiliate with no employees is unlikely to be performing functions, assuming risks, or employing assets.

<sup>9</sup> The subsample of select service industry sectors yields factor weights of 0.63, 0.28, and 0.09 for compensation, net PPE, and unaffiliated sales, respectively. The subsample of other industry sectors yields factor weights of 0.64, 0.21, and 0.15 for compensation, net PPE, and unaffiliated sales, respectively. The combined sample yields factor weights of 0.61, 0.24, and 0.15 for compensation, net PPE, and unaffiliated sales, respectively.

value-added is attributed to MOFAs classified in PST than any other select service sector, and more value-added is attributed to MOFAs classified in manufacturing than any other of the other industry sectors.

## **5. Results**

Our goal is to use formulary apportionment as a substitute for separate accounting to reattribute measured value-added to foreign affiliates of U.S. parents. Our primary approach is to consolidate the shared-input components of value-added (i.e., IBT, net IP, and PTR) measured under separate accounting for a given MNE (i.e., U.S. parent and its MOFAs) and reattribute to all entities within the MNE (i.e., U.S. parent and its MOFAs) based on each entity's apportionment weight. In this case, value-added for an entity within the MNE includes compensation and CCA under separate accounting plus the shared-input components reattributed under formulary apportionment. Under this approach, value-added for a given entity may be reattributed to a country or industry other than the country or industry reported for the entity. Thus, we assume the same production function within a given industry sector across countries and apply formulary apportionment for the shared-input components of value-added only to related entities classified in the same industry sector. In addition, we apply formulary apportionment using a single apportionment factor (i.e., compensation) and multiple apportionment factors (i.e., compensation, net PPE, and unaffiliated sales).

We divide the discussion of the results into four subsections: 1) report value-added and the related reattributions under formulary apportionment, 2) evaluate value-added under formulary apportionment relative to value-added under separate accounting, 3) interpret the results in the context of our production model, and 4) discuss implications for the U.S. current account.

### *5.1. Value-Added and Reattributions under Formulary Apportionment*

Results determined under equations (3) and (4) are reported in table 3. Formulary apportionment in table 3 is applied to the shared-input components of value-added for all entities in an MNE (i.e., U.S. parent and its MOFAs). Total value-added is determined for each entity by adding compensation and CCA to the resulting shared-input components determined under formulary apportionment. Separate panels are included in table 3 for formulary apportionment applied by industry sector and for the different factor weights: column (1) reports formulary apportionment applied regardless of industry sector with a single apportionment factor; column

(2) reports formulary apportionment applied by industry sector with a single apportionment factor; column (3) reports formulary apportionment applied regardless of industry sector with multiple apportionment factors; and column (4) reports formulary apportionment applied by industry sector with multiple apportionment factors. Table 3 reports value-added by industry sector and global region for MOFAs and U.S. parents as determined under formulary apportionment.

Table 4 reports the difference between value-added under formulary apportionment (i.e., table 3) and value-added under separate accounting (i.e., table 2). The columns labeled “MOFAs” in table 4 summarize by industry sector and global region the reattribution of value-added for MOFAs. The columns labeled “U.S. Parents” in table 4 summarize by industry sector the reattribution of value-added for U.S. parents. The right-side columns of each panel of table 4 summarize the reattribution of value-added across industry sectors and global regions. In table 4, we can observe overall reattributions, reattributions by global region, and reattributions by industry sector.

#### Overall Reattributions

Line 21 of table 4 shows the overall reattribution of value-added from MOFAs to U.S. parents is as high as \$186.8 billion when formulary apportionment is applied based on a single apportionment factor (i.e., compensation) regardless of industry sector (column 1). In contrast, the overall reattribution of value-added from MOFAs to U.S. parents is as low as \$101.3 billion when formulary apportionment is applied based on multiple apportionment factors by industry sector (column 4). The differences result from the role played by unaffiliated sales and net PPE as apportionment factors and based on inter-industry reattributions when no industry constraint is imposed. Unaffiliated sales may reflect economic activity that is not reflected by compensation or net PPE. In either case, overall reattribution is small relative to total value-added attributed to all MOFAs and U.S. parents under separate accounting—less than 5 percent.

#### Reattributions by Global Region

In contrast to overall reattributions from MOFAs to U.S. parents, reattributions across some global regions are relatively large. For example, value-added attributed to MOFAs in Europe is \$599.2 billion (table 2, line 21) under separate accounting. The \$83.4 billion (table 4, column 1, line 25) that is reattributed is approximately 14 percent of the value-added attributed to Europe under separate accounting. As another example, the \$29.6 billion (table 4, column 1,

line 26) that is reattributed from MOFAs in Latin America is approximately 23 percent of the \$128.4 billion (table 2, line 21) that is attributed to MOFAs in Latin America under separate accounting. Relatively large reattributions also result for MOFAs in Africa, Asia, and Middle East.

Under both formulary apportionment and separate accounting, more value-added is attributed to MOFAs in Europe than any other global region. However, Canada and Latin America change places under formulary apportionment in the distribution of value-added by global region. Under formulary apportionment, more output is attributable to MOFAs in Latin America than Canada. Thus, in addition to less measured output attributable to MOFAs in each of the six global regions, we observe an inter-regional change in the distribution of measured output attributable to MOFAs of U.S. parents.

#### Reattributions by Industry Sector

Reattributions across some industry sectors are also relatively large. As one example, value-added attributed to U.S. parents and MOFAs classified in leasing is \$57.2 billion (table 2, line 8) under separate accounting but \$49.4 billion (table 3, column 1, line 8) under formulary apportionment. The difference of \$7.8 billion (table 4, column 1, line 8) is approximately 14 percent of the value-added attributed to U.S. parents and MOFAs classified in leasing under separate accounting. Relatively large reattributions also result for administration and management in the select service sectors and mining and wholesale trade in the other industry sectors.

In addition to large reattributions across some industries for U.S. parents and MOFAs combined, reattributions are large for U.S. parents and MOFAs when observed separately. For example, value-added attributed to U.S. parents classified in insurance is approximately \$67.4 billion (table 2, line 4) under separate accounting but \$74.8 billion (table 3, column 1, line 4) under formulary apportionment. The \$7.4 billion difference (table 4, column 1, line 4) is over 10 percent of the value-added attributed to U.S. parents classified in insurance under separate accounting. For the select service sectors, relatively large reattributions also result for U.S. parents classified in finance and management and for MOFAs classified in all select service sectors except information. For the other industry sectors, relatively large retribution result for U.S. parents classified in accommodation, manufacturing, mining, and wholesale trade and for MOFAs classified in all other industry sectors.

Under both formulary apportionment and separate accounting, more value-added is attributed to MOFAs classified in PST than any other select service sector, and more value-added is attributed to MOFAs classified in manufacturing than any other of the other industry sectors. However, the distribution of value-added under formulary apportionment changes for MOFAs classified in all other select service sectors except administration and leasing. Likewise, the distribution of value-added under formulary apportionment changes for MOFAs classified in accommodation, mining, transportation, and wholesale. The distribution of value-added under formulary apportionment by industry sector does not change for U.S. parents. Thus, we observe an inter-industry change in the distribution of measured output attributable to MOFAs but no U.S. parents.

Table 4 also allows us to observe reattributions across MOFAs and U.S. parents by industry sector. Consistent with overall reattributions and reattributions by global region, value-added for each industry sector is generally higher under formulary apportionment for U.S. parents and lower for MOFAs. When we apply formulary apportionment regardless of industry sector, reattributions across MOFAs classified in one industry sector and U.S. parents classified in another industry sector can be relatively large. For example, relatively large increases for U.S. parents classified in manufacturing are due in large part to reattributions from MOFAs classified in manufacturing and mining. Likewise, relatively large increases for U.S. parents classified in information and manufacturing are explained in large part by decreases for MOFAs classified in leasing. There are also relatively large reattributions from MOFAs classified in finance to U.S. parents classified in insurance. The remaining attributions are among MOFAs classified in management and MOFAs and U.S. parents classified in finance, insurance, miscellaneous, PST, retail, and wholesale. When we apply formulary apportionment by industry sector, reattributions are relatively large from MOFAs classified in leasing to U.S. parents classified in information and manufacturing and from MOFAs classified in management to U.S. parents classified in finance, insurance, miscellaneous, PST, and wholesale.

## *5.2. Evaluation of Value-Added under Separate Accounting and Formulary Apportionment*

For context, we generate ratios of value-added to compensation and ratios of value-added to net PPE. Ratios with compensation are more practical because compensation is published for MOFAs by industry sector and global region and for U.S. parents by industry sector. In contrast, net PPE is published with limited industry sector detail for MOFAs and is not published at all for

U.S. parents. Ideally, we would be able to generate ratios with CCA in lieu of net PPE, but CCA is not published at all for MOFAs or U.S. parents. Regardless, we do glean some insight from ratios with net PPE.

In addition to the practical considerations, ratios with compensation are generally easier to interpret than ratios with net PPE because compensation is one of the five major components of value-added. Published compensation is approximately 42 percent of published value-added for MOFAs and approximately 61 percent for U.S. parents. Combined, published compensation for MOFAs and U.S. parents is approximately 55 percent of published value-added for MOFAs and U.S. parents. Thus, regardless of separate accounting or formulary apportionment, we expect the ratio of value-added to compensation to be approximately 1.8 (i.e.,  $1.0 / 0.55$ ) for the average MNE. Given differences in production functions, we expect some variation in ratios across MOFAs and U.S. parents, across industry sectors and global regions, and across industries and countries. However, given our production model in which affiliate output is a function of both local inputs and shared inputs, we interpret relatively high or low ratios as a signal for possible excess or deficient returns attributed to entities based on shared inputs under separate accounting.

We now proceed to evaluate value-added attributed under separate accounting and value-added attributed under formulary apportionment based on the following three perspectives: 1) ratios for MOFAs and U.S. parents summarized by industry sector and global region, 2) ratios for MOFAs summarized by country, and 3) summary statistics of ratios for individual MOFAs and of ratios for MOFAs summarized by industry sector and global region and by industry and country.

#### *Ratios for MOFAs and U.S. Parents Summarized by Industry Sector and Global Region*

Table 5.1 reports ratios of published value-added to published compensation. Ratios for each of the select service sectors generally range between 1.0 and 3.0 with some higher absolute values in global regions including Asia, Canada, Europe, and Latin American. Ratios for management and leasing are generally higher than ratios in the other select service sectors. For management, published value-added losses attributed to MOFAs and U.S. parents are 6.8 and 6.0 (table 5.1, line 5) times higher, respectively, than published compensation. For leasing, the ratio of 4.0 (table 5.1, line 8) for MOFAs tells us that every dollar of compensation paid by MOFAs generates 4 dollars of value-added for the MOFAs. The ratio is 5.1 (table 5.1, line 8) for MOFAs

in Europe and 21.0 (table 5.1, line 8) for MOFAs in Latin America, which are high relative to the ratio of 1.8 (table 5.1, line 21) for the average MNE and 2.4 (table 5.1, line 21) for the average MOFA. Ratios for each of the other industry sectors in table 5.1 also range between 1.0 and 3.0 with the exception of mining and utilities, which may be explained by unique production functions for MOFAs and U.S. parents classified in those industry sectors.

Table 5.2 reports ratios of value-added determined under formulary apportionment to published compensation. Comparing the ratios reported in table 5.2 with the ratios reported in table 5.1, the high ratios that exist for some industry sectors and global regions under separate accounting are considerably lower under formulary apportionment. In particular, with respect to the select service sectors, ratios are considerably lower for MOFAs and U.S. parents classified in management when formulary apportionment is applied regardless of industry sector and for MOFAs classified in leasing. With respect to the other industry sectors, ratios are considerably lower for MOFAs classified in mining; however, ratios for mining and utilities are still high relative to the ratio of the average MNE due to the apparent unique production functions. Ratios for all global regions in table 5.2 are lower under formulary apportionment except for the U.S., which is higher due to the offset from MOFAs to U.S. parents.

The magnitude of ratios can be roughly assessed by the values reported in table 4. For example, the large reduction in ratio from 8.4 (table 5.1, line 21) to 4.7 (table 5.2, column 1, line 22) for Africa is a result of reattributing \$19.9 billion (table 4, column 1, line 22). In contrast, the smaller change in ratio from 1.6 (table 5.1, line 2) to 1.1 (table 5.2, column 1, line 2) for MOFAs classified in finance is a result of reattributing \$19.8 billion (table 4, column 1, line 2). Thus, differences in ratios between separate accounting and formulary apportionment have to be interpreted in the context of the related values.

Table 5.3 reports ratios of published value-added to published net PPE. The ratio of value-added to net PPE is 1.0 (table 5.3, line 21) for the average MOFA. Ratios for the select service sectors are generally higher than ratios for the other industry sectors, which reflect higher amounts of net PPE in the other industry sectors including accommodation, farming, mining, transportation, and utilities. Net PPE is not published for U.S. parents and limited detail is published for MOFAs by industry sector and global region. Thus, table 5.3 includes only totals by industry sector and global region for MOFAs.

Table 5.4 reports ratios of value-added determined under formulary apportionment to published net PPE. Comparing the ratios reported in table 5.4 with the ratios reported in table 5.3, most industry sectors and global regions obtain lower ratios under formulary apportionment, which is consistent with compensation in tables 5.1 and 5.2. However, a couple select service sectors including administration and PST yield moderately higher ratios, and a couple other industry sectors including accommodation and farming yield moderately higher ratios.

#### *Ratios for MOFAs Summarized by Country*

In addition to ratios for industry sectors and global regions reported in tables 5.1 to 5.4, we report additional ratios for MOFAs by country in tables 6.1 and 6.2. For reference, column (1) in each table reports ratios of value-added published under separate accounting to published compensation in table 6.1 and to published net PPE in table 6.2. We focus in tables 6.1 and 6.2 on country-level statistics published for MOFAs in Asia, Canada, Europe, and Latin America. Lipsey (2010) argues that the magnitude of ratios for some European and Latin American countries demonstrate potential distortions in aggregate statistics caused by the statistics being generated under on separate accounting. In table 6.1, ratios in column (1), line 1 for some European and Latin American countries display a pattern similar to the countries highlighted by Lipsey (2010). In particular, the global ratio in column (1) of table 6.1 is 2.4, which means every dollar of compensation paid by MOFAs generates 2.4 dollars of value-added for the MOFAs. In contrast, ratios for Africa (line 2), Indonesia (line 8), Malaysia (line 11), Thailand (line 16), Ireland (line 28), Luxembourg (line 30), Norway (line 32), Turkey (line 39), and Other Western Hemisphere (OWH) countries (line 44) are all considerably high relative to the global ratio. Higher ratios for Africa, Indonesia, Malaysia, Thailand, Turkey, and Norway may be explained by significant activities in manufacturing or mining, which is reflected in table 2. Lipsey (2010) suggests higher ratios in the other countries are a result of excess returns attributed under separate accounting to shared inputs that are not actually employed locally by the MOFAs. In other words, value-added is attributed under separate accounting with no corresponding economic activity. A similar pattern of ratios is not quite obtained with net PPE in column (1) of table 6.2. However, ratios for Greece (line 26), Luxembourg (line 30), Switzerland (line 38), and Turkey (line 39) are all considerably high relative to the global ratio of 1.0 (line 1).

Columns (2) – (5) of tables 6.1 and 6.2 include results from the formulary apportionment in equations (3) and (4). In table 6.1, each of the columns generally yields lower ratios relative

to column (1) with the lowest ratios in columns (2) and (3) because compensation is weighted 100 percent for results reported in columns (2) and (3). Ratios are also less affected when an industry constraint is imposed, which is reflected in columns (3) and (5). While some ratios in columns (4) and (5) are higher than those in columns (2) and (3), the highest ratios in columns (4) and (5) are still lower than column (1). In table 6.2, columns (2) – (5) all yield lower ratios relative to column (1) with variation again based on single and multiple apportionment factors and variation based on applying formulary apportionment by industry sector and regardless of industry sector.

#### Summary Statistics of Ratios for MOFAs

Table 7.1 reports summary statistics for ratios of value-added to published compensation under separate accounting and each of the four applications of formulary apportionment, and table 7.2 reports summary statistics for ratios of value-added to published net PPE. The left data panel of each table reports summary statistics for ratios generated by MOFA. The middle data panel reports summary statistics for ratios generated by aggregating MOFAs by industry and country. The right data panel reports summary statistics for ratios generated by aggregating MOFAs by industry sector and global region. In each panel, the mean is generally lowest based on formulary apportionment applied with a single apportionment factor (i.e., compensation) by industry sector. However, the standard deviation is generally lowest when formulary apportionment is applied regardless of industry sector. In any case, standard deviations are lower under formulary apportionment, and means are lower under formulary apportionment except by industry sector and global region. Thus, formulary apportionment yields less variation in measured of value-added relative to published compensation and published net PPE.

#### *5.3. Economic Interpretation*

Based on our production model and the related empirical framework, excess value-added may be attributed to a MOFA under separate accounting based on the availability of shared inputs within an MNE. In particular, the shared-input components of value-added (i.e., IBT, net IP, and PTR) reflect, in part, returns to shared inputs that may not be employed by the MOFA to the extent reflected under separate accounting. In contrast, formulary apportionment attributes returns to shared inputs based on the MOFA's proportion of economic activity reflected by the chosen apportionment factors. Consistent with our production model, our results for value-added

imply too much output is attributed to MOFAs and too little output is attributed to U.S. parents under separate accounting.

Given the economic activity embodied in each of the chosen apportionment factors under formulary apportionment (i.e., compensation, net PPE, and unaffiliated sales), the modest overall reattributions from MOFAs to U.S. parents in table 4 and the relatively large reattributions across some global regions in table 4 imply an overall lack of economic activity for MOFAs that is apparently not reflected under separate accounting. Likewise, the relatively large reattributions across some industry sectors in table 4 and across MOFAs and U.S. parents by industry sector in table 4 reveal considerable differences in economic activity reflected under formulary apportionment and economic activity reflected under separate accounting. In particular, value-added measures constructed under a method of separate accounting generally imply more economic activity than under a method of formulary apportionment for MOFAs classified in finance, information, insurance, leasing, manufacturing, mining, miscellaneous, retail, transportation, and wholesale and for U.S. parents classified in accommodation and PST. In contrast, less economic activity is generally implied under separate accounting than under formulary apportionment for MOFAs classified in accommodation, administration, management, and PST and for U.S. parents classified in industry sectors other than accommodation and PST.

The reattributions reported in table 4 and the summaries reported in tables 5.1 to 5.4, 6.1 and 6.2, and 7.1 and 7.2 generally support formulary apportionment as an alternative to separate accounting. For select service sectors, ratios of value-added under formulary apportionment to compensation and net PPE are generally more consistent with expectations based on global ratios for MOFAs and U.S. parents. In particular, ratios for management and leasing are more consistent with expectations. For other industry sectors, the magnitude of ratios under formulary apportionment for mining and utilities reflect production functions specific to those industry sectors. Likewise, the magnitudes of ratios by global region and country are more consistent under formulary apportionment than separate accounting.

Given the results obtained for value-added, formulary apportionment appears to yield measures of output that are more congruent with economic activity for MOFAs and U.S. parents and more consistent with expectations based on global ratios of value-added to published compensation and published net PPE. Thus, formulary apportionment appears to be a viable alternative to separate accounting under the residency-based framework of *BPM6* and the *SNA*.

We now briefly discuss implications of formulary apportionment based on preliminary work for the U.S. current account.

#### *5.4. Implications for the U.S. Current Account*

In addition to applying formulary apportionment to value-added for MOFAs and U.S. parents, we apply formulary apportionment to reattribute service imports and exports between U.S. parents and their foreign affiliates. Since imports and exports are one of the components of GDP, our results enable us to assess the effect on GDP of formulary apportionment as we apply it here. However, given data limitations and other practical considerations, our work with the current account is very preliminary and does not yet incorporate income payments and receipts. Based on our preliminary results, we expect to have a complete picture of the U.S. current account under formulary apportionment in a forthcoming paper.

We use cross-border transactions data collected from U.S. parents on service imports and exports with their foreign affiliates in 2008 because the cross-border transactions data for 2008 have been linked with the operations data, which contain the apportionment factors (Barefoot and Koncz-Bruner, 2012).<sup>10</sup> Based on our production model in which output is a function of local inputs and shared inputs, we do not expect exports by U.S. parents to their foreign affiliates to be as affected under formulary apportionment as imports by U.S. parents from their foreign affiliates because the data indicate U.S. parents generally have a meaningful amount of local inputs.

Consistent with our expectations, exports are nearly unchanged under formulary apportionment. However, the overall reattribution of imports from foreign affiliates to U.S. parents is \$10.9 billion, which is large relative to published private service imports from affiliated parties of \$85.2 billion—almost 13 percent—but smaller relative to published total private service imports of \$371.2 billion—approximately 3 percent. In addition, reattributions from Europe and Latin America are relatively large—approximately 4 percent and 15 percent, respectively. Likewise, reattributions to U.S. parents are relatively large for insurance services in Latin America.

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<sup>10</sup> The cross-border transactions include annual amounts reports on the Quarterly Survey of Insurance Transactions by U.S. Insurance Companies with Foreign Persons (form BE-45), the Quarterly Survey of Transactions in Selected Services and Intangible Assets with Foreign Persons (form BE-125), and the Quarterly Survey of Financial Services Transactions between U.S. Financial Services Providers and Foreign Persons (form BE-185).

Given the role imports and exports play as components of GDP, we also assess the overall effect of reattributing service imports and exports under formulary apportionment. U.S. goods and services imports decrease by approximately 0.4 percent, but exports remain unchanged. Net exports increase by approximately 1.5 percent. However, the overall effect on GDP is only an approximate 0.1 percent increase. Thus, while reattributions of U.S. service imports and exports under formulary apportionment has a relatively moderate effect on the foreign transactions component of GDP and a bit larger effect on the closely related statistics of the ITAs, the impact on GDP is relatively small.<sup>11</sup>

## **6. Summary and Conclusions**

BEA currently measures and attributes value-added of foreign affiliates and U.S. parents based on separate accounting. Value-added is measured as the sum of cost incurred and profits earned in production. Based on a simple production model and a related empirical framework, excess value-added may be attributed to foreign affiliates under separate accounting due to the availability of shared inputs within an MNE. In particular, the shared-input components of value-added (i.e., IBT, net IP, and PTR) reflect, in part, returns to shared inputs that may not be employed by foreign affiliates to the extent reflected under separate accounting. In this paper, we use formulary apportionment as an alternative to separate accounting to attribute measured value-added to MOFAs and U.S. parents.

We find overall reattributions from MOFAs to U.S. parents are relatively small—less than 5 percent of total value-added attributed to all MOFAs and U.S. parents under separate accounting. Reattributions are affected by the inclusion of multiple apportionment factors and the inclusion of industry constraints. In contrast to overall reattributions, reattributions across global regions including Africa, Asia, Europe, Latin America, and Middle East are relatively large. In addition, reattributions across industry sectors are relatively large. In particular, reattributions are large for select service sectors including administration, finance, insurance, leasing, management, miscellaneous, and PST. Reattributions are also relatively large for all other industry sectors. The magnitude of reattributions across industry sectors depends whether we apply formulary apportionment to MOFAs classified in the same industry sector or whether we apply formulary apportionment to MOFAs across all industry sectors.

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<sup>11</sup> Small differences exist between foreign transactions published in the NIPAs and foreign transactions published in the ITAs due to adjustments for gold, U.S. territories, and other small statistical differences.

In addition to applying formulary apportionment to value-added for MOFAs and U.S. parents, we report preliminary results to apply formulary apportionment to reattribute service imports and exports between U.S. parents and their foreign affiliates. We find overall reattributions are relatively large as a percentage of published total private service imports and as a percentage of published private service imports from affiliated parties—approximately 3 percent and 13 percent, respectively. However, attributing U.S. service imports and exports with foreign affiliates based on formulary apportionment results in only an approximate 0.1 percent increase in GDP. Imported insurance services reattributed from affiliates in Europe and Latin America to U.S. parents are a large percentage of the total imports reattributed to U.S. parents. Based on our preliminary results, we expect to have a complete picture of the U.S. current account under formulary apportionment in a forthcoming paper.

Given the economic activity embodied in each of the chosen apportionment factors under formulary apportionment (i.e., compensation, net PPE, and unaffiliated sales), the reattributions summarized here are a result of the economic activity reflected by the chosen apportionment factors under formulary apportionment relative to a lack of economic activity reflected under separate accounting. Based on ratios of value-added to published compensation and published net PPE, we conclude that value-added attributed to MOFAs and U.S. parents under formulary apportionment yields a picture of measured output by industry sector and country that is more congruent with economic activity and more consistent with expectations than related measures generated under separate accounting. Thus, formulary apportionment appears to be a viable alternative to separate accounting under the residency-based framework of *BPM6* and the *SNA*. However, further work needs to be done to determine whether formulary apportionment should be applied by industry sector or across industry sectors and to determine the combination of apportionment factors that yields the highest quality statistics.

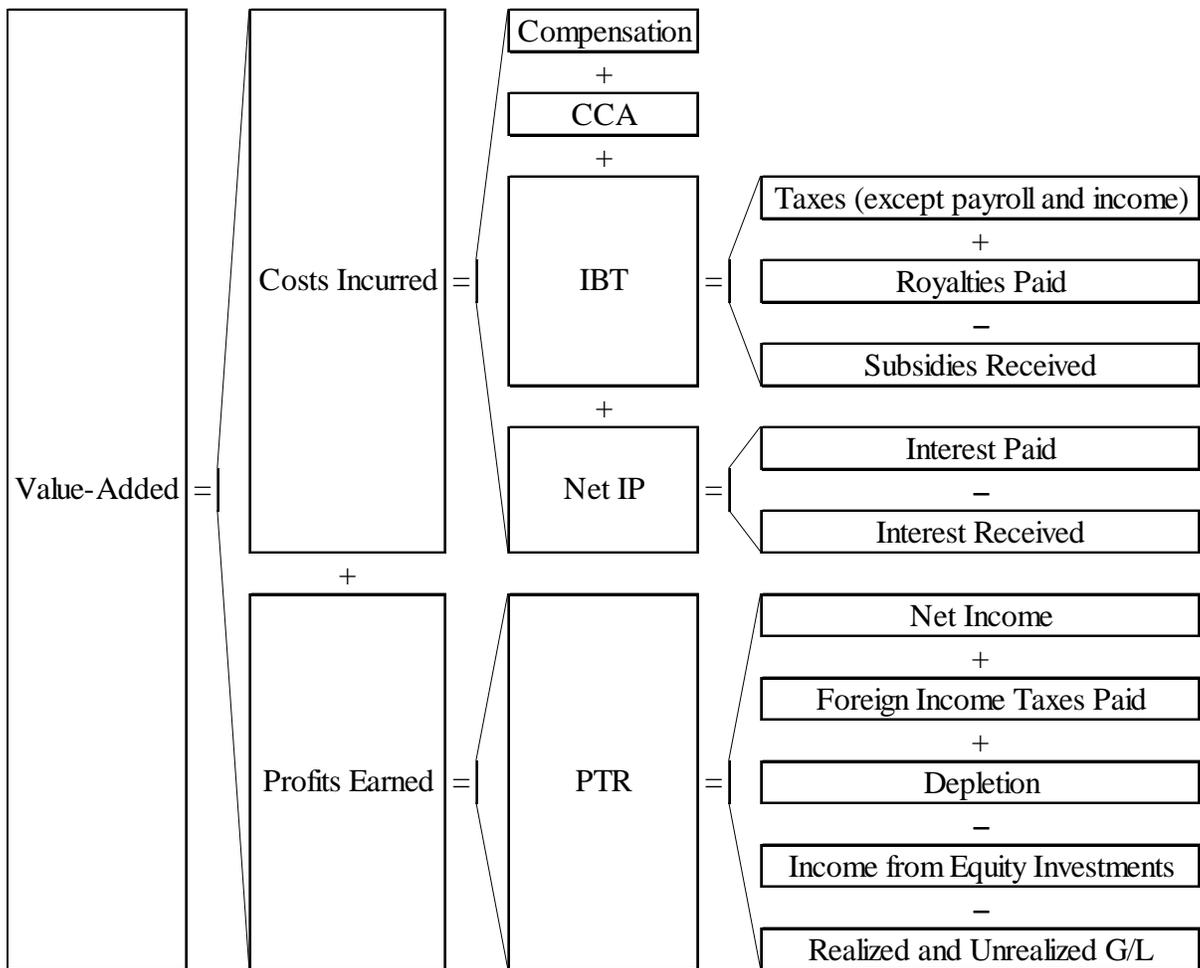
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**Chart 1: Measurement Framework for Value-Added Attributable to Foreign Affiliates**



Note: For insurance affiliates, the net IP component of value-added includes financial intermediation services rendered based on investing premiums on policyholders' behalfs.

**Table 1: Select Service Industry Sectors**

<p><i>Administrative and Support and Waste Management and Remediation Services</i></p> <p>5611 Office administration services                      5612 Facilities support services                      5613 Employment services                      5614 Business support services                      5615 Travel arrangement and reservation services                      5616 Investigation and security services                      5617 Services to buildings and dwellings                      5619 Other support services                      5620 Waste management and remediation services</p>	<p><i>Management of Companies and Enterprises</i></p> <p>5512 Holding companies, except bank holding companies                      5513 Corporate, subsidiary, and regional management offices</p> <p><i>Miscellaneous</i></p> <p>6110 Educational services                      7110 Performing arts, spectator sports, and related                      7121 Museums, historical sites, and similar institutions                      7130 Amusement, gambling, and recreation industries                      8110 Repair and maintenance                      8120 Personal and laundry services                      8130 Religious, grantmaking, civic, professional, and similar organizations                      9200 Public administration</p>
<p><i>Finance and Insurance</i></p> <p>5221 Depository credit intermediation (banking)                      5223 Activities related to credit intermediation                      5224 Non-depository credit intermediation                      5229 Non-depository branches and agencies                      5231 Securities and commodity contracts intermediation and brokerage                      5238 Other financial investment activities and exchanges                      5242 Agencies, brokerages, and other insurance-related activities                      5243 Insurance carriers, except life insurance carriers                      5249 Life insurance carriers                      5252 Funds, trusts, and other financial vehicles</p>	<p><i>Professional, Scientific, and Technical Services (PST)</i></p> <p>5411 Legal services                      5412 Accounting, tax preparation, bookkeeping, and payroll services                      5413 Architectural, engineering, and related services                      5414 Specialized design services                      5415 Computer systems design and related services                      5416 Management, scientific, and technical consulting services                      5417 Scientific research and development services                      5418 Advertising and related services                      5419 Other professional, scientific, and technical services</p>
<p><i>Information</i></p> <p>5111 Newspaper, periodical, book, and directory publishers                      5112 Software publishers                      5121 Motion picture and video industries                      5122 Sound recording industries                      5151 Radio and television broadcasting                      5152 Cable and other subscription programming                      5161 Internet publishing and broadcasting                      5171 Wired telecommunications carriers                      5172 Wireless telecommunications carriers (except satellite)                      5173 Telecommunications resellers                      5174 Satellite telecommunications                      5175 Cable and other program distribution                      5179 Other telecommunications                      5181 Internet service providers and web search portals                      5182 Data processing, hosting, and related services                      5191 Other information services</p>	<p><i>Real Estate and Rental and Leasing</i></p> <p>5310 Real estate                      5321 Automotive equipment rental and leasing                      5329 Other rental and leasing services                      5331 Lessors of non-financial intangible assets (except copyrighted works)</p>

**Table 2: Published Value-Added under Separate Accounting, 2009 (millions USD)**

		MOFAs						U.S. Parents	Totals	
<i>Select Service Industry Sectors</i>		<i>Africa</i>	<i>Asia</i>	<i>Canada</i>	<i>Europe</i>	<i>Latin America</i>	<i>Middle East</i>	<i>Subtotals</i>		
1	Administration	164	4,330	1,540	16,808	2,013	268	25,123	59,080	84,203
2	Finance	(D)	22,385	4,088	37,888	2,081	(D)	66,892	192,719	259,611
3	Information	178	10,735	2,756	30,819	6,073	486	51,047	287,628	338,675
4	Insurance	(D)	4,375	2,327	4,853	1,993	(D)	13,807	67,402	81,209
5	Management of Companies	-51	-1,570	605	-11,210	-2,154	-78	-14,458	-1,271	-15,729
6	Miscellaneous Services	(D)	4,487	1,084	3,817	(D)	14	10,304	28,052	38,356
7	Professional, Scientific, Technical	483	23,215	7,388	42,279	3,617	1,560	78,542	177,549	256,091
8	Real Estate and Rental and Leasing	-1	2,046	2,160	15,179	3,319	23	22,725	34,487	57,212
9	<i>Subtotals</i>	<i>(D)</i>	<i>70,003</i>	<i>21,948</i>	<i>140,433</i>	<i>(D)</i>	<i>(D)</i>	<i>253,982</i>	<i>845,646</i>	<i>1,099,628</i>
<i>Other Industry Sectors</i>										
10	Accommodation and Food Services	(D)	3,423	2,094	8,139	585	(D)	14,347	52,654	67,001
11	Construction	(D)	638	2,133	1,460	428	(D)	4,911	22,088	26,999
12	Farming, Fishing, Forestry	(D)	203	22	107	513	(D)	920	2,192	3,112
13	Health Care and Social Assistance	(D)	72	(D)	1,153	100	0	1,521	31,826	33,347
14	Manufacturing	3,562	94,248	41,013	276,978	58,194	4,169	478,164	1,034,139	1,512,303
15	Mining	35,129	30,339	13,507	45,333	20,202	9,145	153,655	76,139	229,794
16	Retail Trade	(D)	6,338	14,870	26,169	(D)	42	57,099	238,585	295,684
17	Transportation and Warehousing	525	3,245	3,613	7,674	2,899	187	18,143	106,120	124,263
18	Utilities	(D)	1,402	(D)	2,939	2,397	(D)	9,508	61,955	71,463
19	Wholesale Trade	1,707	31,223	11,893	88,836	17,415	1,632	152,706	124,433	277,139
20	<i>Subtotals</i>	<i>(D)</i>	<i>171,131</i>	<i>(D)</i>	<i>458,788</i>	<i>(D)</i>	<i>(D)</i>	<i>890,974</i>	<i>1,750,131</i>	<i>2,641,105</i>
21	<i>Totals</i>	<i>44,858</i>	<i>241,138</i>	<i>113,675</i>	<i>599,220</i>	<i>128,414</i>	<i>17,656</i>	<i>1,144,957</i>	<i>2,595,776</i>	<i>3,740,733</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Published value-added is determined by BEA under residency-based separate accounting from data reported on BEA surveys.

**Table 3: Value-Added under Formulary Apportionment, 2009 (millions USD)**

		Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0						Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15					
		(1)			(2)			(3)			(4)		
		Regardless of Industry Sector			By Industry Sector			Regardless of Industry Sector			By Industry Sector		
		MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals
<i>Select Service Industry Sectors</i>													
1	Administration	28,866	60,574	89,440	(D)	(D)	(D)	27,160	60,622	87,782	(D)	(D)	(D)
2	Finance	47,134	206,253	253,387	50,274	206,915	257,189	48,693	206,712	255,405	50,253	206,655	256,908
3	Information	50,152	294,624	344,776	48,211	297,552	345,763	50,685	294,554	345,239	48,933	295,889	344,823
4	Insurance	10,218	74,760	84,978	8,583	72,264	80,848	9,937	74,708	84,644	8,895	72,476	81,371
5	Management of Companies	3,402	-475	2,927	(D)	(D)	(D)	3,249	-591	2,658	(D)	(D)	(D)
6	Miscellaneous Services	8,263	29,015	37,278	9,602	28,535	38,137	8,437	28,874	37,311	9,730	28,441	38,171
7	Professional, Scientific, Technical	92,492	175,980	268,472	78,896	176,522	255,419	88,300	176,231	264,532	78,752	176,678	255,430
8	Real Estate and Rental and Leasing	13,563	35,883	49,446	(D)	(D)	(D)	14,146	35,718	49,864	(D)	(D)	(D)
9	<i>Subtotals</i>	<i>254,090</i>	<i>876,614</i>	<i>1,130,704</i>	<i>229,704</i>	<i>874,023</i>	<i>1,103,727</i>	<i>250,607</i>	<i>876,828</i>	<i>1,127,435</i>	<i>231,945</i>	<i>872,345</i>	<i>1,104,290</i>
<i>Other Industry Sectors</i>													
10	Accommodation and Food Services	17,666	49,810	67,476	(D)	49,173	(D)	18,164	49,138	67,302	(D)	48,695	(D)
11	Construction	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
12	Farming, Fishing, Forestry	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
13	Health Care and Social Assistance	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
14	Manufacturing	402,512	1,173,486	1,575,998	396,866	1,114,168	1,511,034	411,144	1,147,680	1,558,824	407,633	1,102,539	1,510,173
15	Mining	85,964	84,245	170,209	(D)	84,429	(D)	104,373	81,369	185,743	(D)	81,714	(D)
16	Retail Trade	47,746	244,285	292,031	51,599	243,832	295,431	50,760	240,961	291,721	54,886	240,546	295,432
17	Transportation and Warehousing	16,450	107,197	123,648	16,482	107,496	123,977	17,038	106,903	123,941	16,884	107,140	124,024
18	Utilities	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
19	Wholesale Trade	117,966	129,054	247,020	(D)	126,658	(D)	122,437	128,624	251,061	(D)	126,648	(D)
20	<i>Subtotals</i>	<i>704,069</i>	<i>1,905,960</i>	<i>2,610,029</i>	<i>793,634</i>	<i>1,843,372</i>	<i>2,637,006</i>	<i>741,085</i>	<i>1,872,213</i>	<i>2,613,298</i>	<i>811,733</i>	<i>1,824,710</i>	<i>2,636,443</i>
21	<i>Totals for Industry Sectors</i>	<i>958,159</i>	<i>2,782,574</i>	<i>3,740,733</i>	<i>1,023,338</i>	<i>2,717,395</i>	<i>3,740,733</i>	<i>991,692</i>	<i>2,749,041</i>	<i>3,740,733</i>	<i>1,043,678</i>	<i>2,697,055</i>	<i>3,740,733</i>
<i>Global Regions</i>													
22	Africa	24,979		24,979	45,428		45,428	29,694		29,694	43,407		43,407
23	Asia	198,077		198,077	223,646		223,646	210,692		210,692	230,958		230,958
24	Canada	107,683		107,683	108,768		108,768	111,291		111,291	112,601		112,601
25	Europe	515,834		515,834	527,589		527,589	523,730		523,730	534,115		534,115
26	Latin America	98,796		98,796	104,950		104,950	102,252		102,252	108,537		108,537
27	Middle East	12,791		12,791	12,957		12,957	14,032		14,032	14,060		14,060
28	United States		2,782,574	2,782,574		2,717,395	2,717,395		2,749,041	2,749,041		2,697,055	2,697,055
29	<i>Totals for Global Regions</i>	<i>958,159</i>	<i>2,782,574</i>	<i>3,740,733</i>	<i>1,023,338</i>	<i>2,717,395</i>	<i>3,740,733</i>	<i>991,692</i>	<i>2,749,041</i>	<i>3,740,733</i>	<i>1,043,678</i>	<i>2,697,055</i>	<i>3,740,733</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Formulary apportionment is applied to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all select service affiliates and their parents.

**Table 4: Value-Added Reattributable under Formulary Apportionment, 2009 (millions USD)**

		Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0						Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15					
		(1)			(2)			(3)			(4)		
		Regardless of Industry Sector			By Industry Sector			Regardless of Industry Sector			By Industry Sector		
		MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals
<i>Select Service Industry Sectors</i>													
1	Administration	3,743	1,494	5,237	(D)	(D)	(D)	2,037	1,542	3,579	(D)	(D)	(D)
2	Finance	-19,758	13,535	-6,224	-16,618	14,196	-2,422	-18,199	13,994	-4,206	-16,639	13,937	-2,702
3	Information	-896	6,996	6,100	-2,837	9,924	7,088	-363	6,926	6,563	-2,114	8,261	6,147
4	Insurance	-3,588	7,358	3,770	-5,223	4,863	-361	-3,870	7,306	3,436	-4,912	5,074	163
5	Management of Companies	17,860	795	18,655	(D)	(D)	(D)	17,707	680	18,387	(D)	(D)	(D)
6	Miscellaneous Services	-2,042	963	-1,079	-702	483	-219	-1,867	822	-1,045	-575	389	-186
7	Professional, Scientific, Technical	13,950	-1,568	12,381	354	-1,026	-672	9,758	-1,317	8,441	210	-870	-661
8	Real Estate and Rental and Leasing	-9,163	1,396	-7,766	(D)	(D)	(D)	-8,579	1,231	-7,349	(D)	(D)	(D)
9	<i>Subtotals</i>	<i>106</i>	<i>30,969</i>	<i>31,075</i>	<i>-24,280</i>	<i>28,378</i>	<i>4,098</i>	<i>-3,376</i>	<i>31,183</i>	<i>27,806</i>	<i>-22,038</i>	<i>26,700</i>	<i>4,662</i>
<i>Other Industry Sectors</i>													
10	Accommodation and Food Services	3,320	-2,844	476	(D)	-3,482	(D)	3,817	-3,516	302	(D)	-3,960	(D)
11	Construction	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
12	Farming, Fishing, Forestry	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
13	Health Care and Social Assistance	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
14	Manufacturing	-75,652	139,347	63,695	-81,298	80,030	-1,269	-67,020	113,541	46,521	-70,531	68,400	-2,130
15	Mining	-67,691	8,107	-59,585	(D)	8,290	(D)	-49,282	5,231	-44,051	(D)	5,575	(D)
16	Retail Trade	-9,353	5,700	-3,653	-5,500	5,247	-253	-6,339	2,376	-3,963	-2,213	1,961	-252
17	Transportation and Warehousing	-1,693	1,078	-615	-1,662	1,376	-286	-1,105	783	-322	-1,259	1,020	-239
18	Utilities	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
19	Wholesale Trade	-34,740	4,621	-30,119	(D)	2,224	(D)	-30,269	4,190	-26,078	(D)	2,215	(D)
20	<i>Subtotals</i>	<i>-186,905</i>	<i>155,830</i>	<i>-31,075</i>	<i>-97,340</i>	<i>93,241</i>	<i>-4,098</i>	<i>-149,889</i>	<i>122,083</i>	<i>-27,806</i>	<i>-79,241</i>	<i>74,580</i>	<i>-4,662</i>
21	<i>Totals for Industry Sectors</i>	<i>-186,799</i>	<i>186,799</i>	<i>0</i>	<i>-121,619</i>	<i>121,619</i>	<i>0</i>	<i>-153,266</i>	<i>153,266</i>	<i>0</i>	<i>-101,279</i>	<i>101,279</i>	<i>0</i>
<i>Global Regions</i>													
22	Africa	-19,879		-19,879	570		570	-15,163		-15,163	-1,451		-1,451
23	Asia	-43,058		-43,058	-17,489		-17,489	-30,443		-30,443	-10,176		-10,176
24	Canada	-5,993		-5,993	-4,908		-4,908	-2,384		-2,384	-1,074		-1,074
25	Europe	-83,386		-83,386	-71,631		-71,631	-75,490		-75,490	-65,105		-65,105
26	Latin America	-29,618		-29,618	-23,463		-23,463	-26,162		-26,162	-19,877		-19,877
27	Middle East	-4,865		-4,865	-4,699		-4,699	-3,624		-3,624	-3,596		-3,596
28	United States		186,799	186,799		121,619	121,619		153,266	153,266		101,279	101,279
29	<i>Totals for Global Regions</i>	<i>-186,799</i>	<i>186,799</i>	<i>0</i>	<i>-121,619</i>	<i>121,619</i>	<i>0</i>	<i>-153,266</i>	<i>153,266</i>	<i>0</i>	<i>-101,279</i>	<i>101,279</i>	<i>0</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Formulary apportionment is applied to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all select service affiliates and their parents.

**Table 5.1: Ratios of Published Value-Added to Published Compensation, 2009**

		MOFAs						U.S. Parents	Totals	
<i>Select Service Industry Sectors</i>		<i>Africa</i>	<i>Asia</i>	<i>Canada</i>	<i>Europe</i>	<i>Latin America</i>	<i>Middle East</i>	<i>Subtotals</i>		
1	Administration	0.9	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2
2	Finance	(D)	1.8	1.7	1.6	1.5	(D)	1.6	1.0	1.1
3	Information	1.6	1.7	1.5	2.0	3.1	1.3	2.0	2.1	2.1
4	Insurance	(D)	0.9	2.1	1.0	(D)	(D)	1.2	0.8	0.9
5	Management of Companies	(D)	-2.0	10.4	-10.1	-12.9	(D)	-6.8	-6.0	-6.7
6	Miscellaneous Services	(D)	3.9	1.4	1.5	(D)	(D)	2.0	1.4	1.6
7	Professional, Scientific, Technical	1.6	1.6	1.4	1.4	1.6	1.1	1.4	1.5	1.4
8	Real Estate and Rental and Leasing	-1.0	1.4	2.0	5.1	21.0	1.0	4.0	2.2	2.6
9	<i>Subtotals</i>	<i>(D)</i>	<i>1.5</i>	<i>1.6</i>	<i>1.5</i>	<i>(D)</i>	<i>(D)</i>	<i>1.5</i>	<i>1.4</i>	<i>1.4</i>
<i>Other Industry Sectors</i>										
10	Accommodation and Food Services	(D)	1.6	1.5	1.6	1.2	(D)	1.6	1.6	1.6
11	Construction	(D)	1.5	1.3	1.4	2.9	(D)	1.4	1.2	1.2
12	Farming, Fishing, Forestry	(D)	1.9	2.2	1.6	1.3	(D)	1.5	1.2	1.3
13	Health Care and Social Assistance	(D)	1.5	(D)	1.4	2.0	0.0	1.5	1.4	1.4
14	Manufacturing	2.3	2.9	1.9	2.4	2.7	2.2	2.4	1.7	1.9
15	Mining	20.8	9.7	7.7	14.2	6.8	13.8	11.5	4.1	7.2
16	Retail Trade	(D)	2.1	2.0	2.9	(D)	1.1	2.6	1.9	2.0
17	Transportation and Warehousing	2.3	1.9	1.8	1.4	2.0	2.1	1.7	1.6	1.6
18	Utilities	(D)	8.0	(D)	4.5	7.5	(D)	5.2	3.6	3.7
19	Wholesale Trade	2.9	2.9	2.1	2.8	5.7	2.4	2.9	1.6	2.1
20	<i>Subtotals</i>	<i>(D)</i>	<i>3.2</i>	<i>(D)</i>	<i>2.6</i>	<i>(D)</i>	<i>(D)</i>	<i>2.9</i>	<i>1.8</i>	<i>2.1</i>
21	<i>Totals</i>	<i>8.4</i>	<i>2.4</i>	<i>2.0</i>	<i>2.2</i>	<i>2.9</i>	<i>3.0</i>	<i>2.4</i>	<i>1.6</i>	<i>1.8</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Published value-added and compensation are determined by BEA under residency-based separate accounting from data reported on BEA surveys.

**Table 5.2: Ratios of Value-Added under Formulary Apportionment to Published Compensation, 2009**

		Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0						Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15					
		(1)			(2)			(3)			(4)		
		Regardless of Industry Sector			By Industry Sector			Regardless of Industry Sector			By Industry Sector		
		MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals
<i>Select Service Industry Sectors</i>													
1	Administration	1.3	1.3	1.3	(D)	(D)	(D)	1.3	1.3	1.3	(D)	(D)	(D)
2	Finance	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.1	1.2	1.1	1.1
3	Information	1.9	2.1	2.1	1.9	2.2	2.1	2.0	2.1	2.1	1.9	2.1	2.1
4	Insurance	0.9	0.9	0.9	0.7	0.9	0.9	0.8	0.9	0.9	0.7	0.9	0.9
5	Management of Companies	1.6	-2.2	1.2	(D)	(D)	(D)	1.5	-2.8	1.1	(D)	(D)	(D)
6	Miscellaneous Services	1.6	1.5	1.5	1.8	1.5	1.5	1.6	1.5	1.5	1.9	1.5	1.6
7	Professional, Scientific, Technical	1.7	1.4	1.5	1.4	1.4	1.4	1.6	1.4	1.5	1.4	1.4	1.4
8	Real Estate and Rental and Leasing	2.4	2.2	2.3	(D)	(D)	(D)	2.5	2.2	2.3	(D)	(D)	(D)
9	<i>Subtotals</i>	<i>1.5</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>	<i>1.5</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>	<i>1.4</i>
<i>Other Industry Sectors</i>													
10	Accommodation and Food Services	1.9	1.5	1.6	(D)	1.5	(D)	2.0	1.5	1.6	(D)	1.5	(D)
11	Construction	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
12	Farming, Fishing, Forestry	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
13	Health Care and Social Assistance	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
14	Manufacturing	2.0	2.0	2.0	2.0	1.9	1.9	2.1	1.9	2.0	2.1	1.9	1.9
15	Mining	6.4	4.5	5.3	(D)	4.5	(D)	7.8	4.4	5.8	(D)	4.4	(D)
16	Retail Trade	2.1	2.0	2.0	2.3	2.0	2.0	2.3	2.0	2.0	2.5	2.0	2.0
17	Transportation and Warehousing	1.5	1.6	1.6	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
18	Utilities	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
19	Wholesale Trade	2.2	1.7	1.9	(D)	1.6	(D)	2.3	1.7	1.9	(D)	1.6	(D)
20	<i>Subtotals</i>	<i>2.3</i>	<i>2.0</i>	<i>2.0</i>	<i>2.5</i>	<i>1.9</i>	<i>2.1</i>	<i>2.4</i>	<i>1.9</i>	<i>2.0</i>	<i>2.6</i>	<i>1.9</i>	<i>2.1</i>
21	<i>Totals for Industry Sectors</i>	<i>2.0</i>	<i>1.7</i>	<i>1.8</i>	<i>2.1</i>	<i>1.7</i>	<i>1.8</i>	<i>2.1</i>	<i>1.7</i>	<i>1.8</i>	<i>2.2</i>	<i>1.7</i>	<i>1.8</i>
<i>Global Regions</i>													
22	Africa	4.7		4.7	8.5		8.5	5.6		5.6	8.1		8.1
23	Asia	2.0		2.0	2.2		2.2	2.1		2.1	2.3		2.3
24	Canada	1.9		1.9	1.9		1.9	2.0		2.0	2.0		2.0
25	Europe	1.9		1.9	2.0		2.0	1.9		1.9	2.0		2.0
26	Latin America	2.2		2.2	2.3		2.3	2.3		2.3	2.4		2.4
27	Middle East	2.2		2.2	2.2		2.2	2.4		2.4	2.4		2.4
28	United States		1.7	1.7		1.7	1.7		1.7	1.7		1.7	1.7
29	<i>Totals for Global Regions</i>	<i>2.0</i>	<i>1.7</i>	<i>1.8</i>	<i>2.1</i>	<i>1.7</i>	<i>1.8</i>	<i>2.1</i>	<i>1.7</i>	<i>1.8</i>	<i>2.2</i>	<i>1.7</i>	<i>1.8</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Formulary apportionment is applied to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all select service affiliates and their parents. Published compensation is determined by BEA under residency-based separate accounting from data reported on BEA surveys.

**Table 5.3: Ratios of Published Value-Added to Published Net PPE, 2009**

		MOFAs						U.S. Parents	Totals	
<i>Select Service Industry Sectors</i>		<i>Africa</i>	<i>Asia</i>	<i>Canada</i>	<i>Europe</i>	<i>Latin America</i>	<i>Middle East</i>	<i>Subtotals</i>		
1	Administration	N/A	N/A	N/A	N/A	N/A	N/A	5.8	N/A	N/A
2	Finance	N/A	N/A	N/A	N/A	N/A	N/A	2.1	N/A	N/A
3	Information	N/A	N/A	N/A	N/A	N/A	N/A	1.3	N/A	N/A
4	Insurance	N/A	N/A	N/A	N/A	N/A	N/A	2.0	N/A	N/A
5	Management of Companies	N/A	N/A	N/A	N/A	N/A	N/A	-7.0	N/A	N/A
6	Miscellaneous Services	N/A	N/A	N/A	N/A	N/A	N/A	0.7	N/A	N/A
7	Professional, Scientific, Technical	N/A	N/A	N/A	N/A	N/A	N/A	4.1	N/A	N/A
8	Real Estate and Rental and Leasing	N/A	N/A	N/A	N/A	N/A	N/A	0.3	N/A	N/A
9	<i>Subtotals</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>1.2</i>	<i>N/A</i>	<i>N/A</i>
<i>Other Industry Sectors</i>										
10	Accommodation and Food Services	N/A	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A
11	Construction	N/A	N/A	N/A	N/A	N/A	N/A	3.2	N/A	N/A
12	Farming, Fishing, Forestry	N/A	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A
13	Health Care and Social Assistance	N/A	N/A	N/A	N/A	N/A	N/A	1.1	N/A	N/A
14	Manufacturing	N/A	N/A	N/A	N/A	N/A	N/A	1.2	N/A	N/A
15	Mining	N/A	N/A	N/A	N/A	N/A	N/A	0.5	N/A	N/A
16	Retail Trade	N/A	N/A	N/A	N/A	N/A	N/A	1.2	N/A	N/A
17	Transportation and Warehousing	N/A	N/A	N/A	N/A	N/A	N/A	0.7	N/A	N/A
18	Utilities	N/A	N/A	N/A	N/A	N/A	N/A	0.2	N/A	N/A
19	Wholesale Trade	N/A	N/A	N/A	N/A	N/A	N/A	4.0	N/A	N/A
20	<i>Subtotals</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	<i>1.0</i>	<i>N/A</i>	<i>N/A</i>
21	<i>Totals</i>	<i>0.6</i>	<i>1.0</i>	<i>0.7</i>	<i>1.3</i>	<i>0.8</i>	<i>0.8</i>	<i>1.0</i>	<i>N/A</i>	<i>N/A</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Published value-added and compensation are determined by BEA under residency-based separate accounting from data reported on BEA surveys.

**Table 5.4: Ratios of Value-Added under Formulary Apportionment to Published Net PPE, 2009**

		Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0						Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15					
		(1)			(2)			(3)			(4)		
		Regardless of Industry Sector			By Industry Sector			Regardless of Industry Sector			By Industry Sector		
		MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals	MOFAs	U.S. Parents	Totals
<i>Select Service Industry Sectors</i>													
1	Administration	6.7	N/A	N/A	(D)	N/A	N/A	6.3	N/A	N/A	(D)	N/A	N/A
2	Finance	1.5	N/A	N/A	1.6	N/A	N/A	1.5	N/A	N/A	1.6	N/A	N/A
3	Information	1.3	N/A	N/A	1.3	N/A	N/A	1.3	N/A	N/A	1.3	N/A	N/A
4	Insurance	1.5	N/A	N/A	1.3	N/A	N/A	1.5	N/A	N/A	1.3	N/A	N/A
5	Management of Companies	1.7	N/A	N/A	(D)	N/A	N/A	1.6	N/A	N/A	(D)	N/A	N/A
6	Miscellaneous Services	0.6	N/A	N/A	0.7	N/A	N/A	0.6	N/A	N/A	0.7	N/A	N/A
7	Professional, Scientific, Technical	4.8	N/A	N/A	4.1	N/A	N/A	4.6	N/A	N/A	4.1	N/A	N/A
8	Real Estate and Rental and Leasing	0.2	N/A	N/A	(D)	N/A	N/A	0.2	N/A	N/A	(D)	N/A	N/A
9	<i>Subtotals</i>	<i>1.2</i>	<i>N/A</i>	<i>N/A</i>	<i>1.1</i>	<i>N/A</i>	<i>N/A</i>	<i>1.2</i>	<i>N/A</i>	<i>N/A</i>	<i>1.1</i>	<i>N/A</i>	<i>N/A</i>
<i>Other Industry Sectors</i>													
10	Accommodation and Food Services	0.7	N/A	N/A	(D)	N/A	N/A	0.7	N/A	N/A	(D)	N/A	N/A
11	Construction	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A
12	Farming, Fishing, Forestry	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A
13	Health Care and Social Assistance	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A
14	Manufacturing	1.0	N/A	N/A	1.0	N/A	N/A	1.0	N/A	N/A	1.0	N/A	N/A
15	Mining	0.3	N/A	N/A	(D)	N/A	N/A	0.3	N/A	N/A	(D)	N/A	N/A
16	Retail Trade	1.0	N/A	N/A	1.1	N/A	N/A	1.1	N/A	N/A	1.2	N/A	N/A
17	Transportation and Warehousing	0.6	N/A	N/A	0.6	N/A	N/A	0.6	N/A	N/A	0.6	N/A	N/A
18	Utilities	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A	(D)	N/A	N/A
19	Wholesale Trade	3.1	N/A	N/A	(D)	N/A	N/A	3.2	N/A	N/A	(D)	N/A	N/A
20	<i>Subtotals</i>	<i>0.8</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.8</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>
21	<i>Totals for Industry Sectors</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>
<i>Global Regions</i>													
22	Africa	0.3		0.3	0.6		0.6	0.4		0.4	0.6		0.6
23	Asia	0.8		0.8	0.9		0.9	0.8		0.8	0.9		0.9
24	Canada	0.7		0.7	0.7		0.7	0.7		0.7	0.7		0.7
25	Europe	1.1		1.1	1.2		1.2	1.2		1.2	1.2		1.2
26	Latin America	0.6		0.6	0.7		0.7	0.7		0.7	0.7		0.7
27	Middle East	0.6		0.6	0.6		0.6	0.7		0.7	0.7		0.7
28	United States		N/A	N/A		N/A	N/A		N/A	N/A		N/A	N/A
29	<i>Totals for Global Regions</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>	<i>0.9</i>	<i>N/A</i>	<i>N/A</i>

Note: (D) denotes data suppressed to avoid disclosure of data of individual companies. Formulary apportionment is applied to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all select service affiliates and their parents. Published compensation is determined by BEA under residency-based separate accounting from data reported on BEA surveys.

**Table 6.1: Ratios of Value-Added to Published Compensation for MOFAs by Country, 2009**

	(1)	Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0		Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15	
		(2)	(3)	(4)	(5)
		Published VA / Published Compensation	Apportionment for Shared-Input Components	Apportionment for Shared-Input Components by Industry	Apportionment for Shared-Input Components
1 All Countries	2.4	2.0	2.1	2.1	2.2
2 Africa	8.4	4.7	8.5	5.6	8.1
3 Asia	2.4	2.0	2.2	2.1	2.3
4 Australia	2.2	1.9	2.2	2.0	2.3
5 China	2.5	2.0	2.0	2.1	2.2
6 Hong Kong	2.3	1.6	1.7	1.7	1.7
7 India	1.8	1.6	1.7	1.7	1.8
8 Indonesia	7.7	6.9	9.6	6.9	8.8
9 Japan	1.8	1.7	1.8	1.8	1.9
10 Korea	1.8	1.7	1.8	1.7	1.8
11 Malaysia	4.3	3.0	4.3	3.3	4.3
12 New Zealand	2.0	1.9	2.3	1.9	2.4
13 Philippines	3.4	2.5	2.9	2.9	3.4
14 Singapore	3.0	2.1	2.4	2.4	2.7
15 Taiwan	2.0	1.8	2.0	1.8	2.0
16 Thailand	5.5	3.1	3.8	3.6	4.1
17 Canada	2.0	1.9	1.9	2.0	2.0
18 Europe	2.2	1.9	2.0	1.9	2.0
19 Austria	1.7	1.8	2.0	1.7	1.9
20 Belgium	2.0	2.1	1.7	2.0	1.7
21 Czech Republic	2.5	2.2	2.2	2.2	2.3
22 Denmark	2.9	1.9	1.9	1.9	2.0
23 Finland	2.0	1.7	1.8	1.7	1.8
24 France	1.5	1.7	1.6	1.6	1.6
25 Germany	1.7	1.8	1.9	1.7	1.8
26 Greece	3.3	2.8	3.1	2.9	3.1
27 Hungary	3.3	2.2	2.1	2.1	2.2
28 Ireland	7.6	2.4	2.4	3.1	3.0
29 Italy	2.1	1.9	2.0	1.9	2.0
30 Luxembourg	5.2	1.5	2.9	1.5	2.9
31 Netherlands	1.7	2.0	1.9	2.0	1.9
32 Norway	6.5	3.7	5.4	3.9	5.3
33 Poland	2.7	2.4	2.4	2.6	2.5
34 Portugal	3.2	2.4	2.6	2.5	2.6
35 Russia	2.9	3.1	4.4	3.5	4.2
36 Spain	1.4	1.8	1.5	1.8	1.6
37 Sweden	1.1	1.6	1.7	1.6	1.6
38 Switzerland	3.8	2.9	2.7	2.9	2.8
39 Turkey	4.2	3.1	3.3	3.5	3.2
40 United Kingdom	2.0	1.7	1.7	1.7	1.7
41 Latin America	2.9	2.2	2.3	2.3	2.4
42 South America	2.9	2.4	2.5	2.4	2.5
43 Central America	2.1	1.9	1.9	2.0	2.0
44 Other Western Hemisphere (OWH)	10.8	2.9	4.6	3.3	4.9
45 Barbados	41.0	5.8	8.3	5.8	8.7
46 Bermuda	10.9	1.4	5.3	1.1	4.9
47 Dominican Republic	4.8	3.6	4.6	3.6	4.5
48 UK Islands, Caribbean	16.0	2.2	2.6	3.1	3.6
49 Other OWH	7.6	3.8	4.8	4.5	5.5
50 Middle East	3.0	2.2	2.2	2.4	2.4

Note: Published value-added and compensation in column (1) are determined by BEA under residency-based separate accounting from data reported on BEA surveys for 2009. Value-added in columns (2) – (5) is determined by applying formulary apportionment to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all MOFAs and their parents. The amounts for columns (2) – (5) are determined by dividing aggregate value-added determined under formulary apportionment for the country or region by the aggregate published compensation for the country or region.

**Table 6.2: Ratios of Value-Added to Published Net PPE for MOFAs by Country, 2009**

	(1)	Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0		Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15	
		(2)	(3)	(4)	(5)
		Apportionment for Shared-Input Components	Apportionment for Shared-Input Components by Industry	Apportionment for Shared-Input Components	Apportionment for Shared-Input Components by Industry
	Published VA / Published Net PPE				
1 All Countries	1.0	0.9	0.9	0.9	0.9
2 Africa	0.6	0.3	0.6	0.4	0.6
3 Asia	1.0	0.8	0.9	0.8	0.9
4 Australia	0.8	0.7	0.8	0.7	0.8
5 China	0.9	0.7	0.7	0.8	0.8
6 Hong Kong	1.7	1.2	1.3	1.3	1.3
7 India	1.6	1.4	1.5	1.5	1.6
8 Indonesia	0.8	0.7	1.0	0.7	0.9
9 Japan	1.2	1.1	1.2	1.2	1.2
10 Korea	1.0	0.9	1.0	0.9	1.0
11 Malaysia	0.9	0.6	0.9	0.7	0.8
12 New Zealand	1.7	1.6	1.9	1.6	2.0
13 Philippines	1.0	0.7	0.8	0.8	0.9
14 Singapore	1.0	0.7	0.8	0.8	0.9
15 Taiwan	0.6	0.5	0.6	0.6	0.6
16 Thailand	0.9	0.5	0.6	0.6	0.7
17 Canada	0.7	0.7	0.7	0.7	0.7
18 Europe	1.3	1.1	1.2	1.2	1.2
19 Austria	1.4	1.4	1.6	1.4	1.5
20 Belgium	1.3	1.3	1.1	1.3	1.1
21 Czech Republic	1.2	1.1	1.1	1.1	1.2
22 Denmark	1.9	1.2	1.3	1.2	1.3
23 Finland	2.0	1.7	1.8	1.7	1.8
24 France	1.7	1.8	1.7	1.8	1.7
25 Germany	1.3	1.3	1.4	1.3	1.3
26 Greece	4.1	3.5	3.9	3.7	4.0
27 Hungary	1.4	0.9	0.9	0.9	0.9
28 Ireland	1.2	0.4	0.4	0.5	0.5
29 Italy	1.6	1.5	1.6	1.5	1.6
30 Luxembourg	5.9	1.7	3.4	1.7	3.3
31 Netherlands	1.4	1.7	1.6	1.6	1.6
32 Norway	0.9	0.5	0.7	0.5	0.7
33 Poland	1.0	0.9	0.9	0.9	0.9
34 Portugal	2.2	1.6	1.7	1.7	1.8
35 Russia	0.8	0.9	1.2	1.0	1.2
36 Spain	1.0	1.3	1.2	1.3	1.2
37 Sweden	1.0	1.4	1.5	1.4	1.4
38 Switzerland	3.2	2.4	2.2	2.4	2.3
39 Turkey	4.1	3.0	3.2	3.4	3.1
40 United Kingdom	1.4	1.2	1.2	1.2	1.3
41 Latin America	0.8	0.6	0.7	0.7	0.7
42 South America	0.9	0.7	0.8	0.7	0.8
43 Central America	0.8	0.7	0.7	0.7	0.8
44 Other Western Hemisphere (OWH)	0.7	0.2	0.3	0.2	0.3
45 Barbados	1.1	0.2	0.2	0.2	0.2
46 Bermuda	0.5	0.1	0.3	0.1	0.2
47 Dominican Republic	1.2	0.9	1.1	0.9	1.1
48 UK Islands, Caribbean	0.7	0.1	0.1	0.1	0.2
49 Other OWH	0.6	0.3	0.4	0.4	0.4
50 Middle East	0.8	0.6	0.6	0.7	0.7

Note: Published value-added and net PPE in column (1) are determined by BEA under residency-based separate accounting from data reported on BEA surveys for 2009. Value-added in columns (2) – (5) is determined by applying formulary apportionment to the shared-input components of value-added (i.e., IBT, net IP, and PTR) for all MOFAs and their parents. The amounts for columns (2) – (5) are determined by dividing aggregate value-added determined under formulary apportionment for the country or region by the aggregate published net PPE for the country or region.

**Table 7.1: Summary Statistics of Ratios of Value-added to Published Compensation, 2009**

	By MOFA (no aggregation)		Aggregated by Industry and Country		Aggregated by Industry Sector and Global Region	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1 Separate Accounting <i>Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0</i>	7.3	361.7	15.0	769.8	2.2	7.1
2 Apportionment for Shared-Input Components	2.2	11.6	2.8	12.6	2.3	1.8
3 Apportionment for Shared-Input Components by Industry	1.9	115.0	2.5	37.3	2.5	3.6
<i>Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15</i>						
4 Apportionment for Shared-Input Components	2.7	18.4	3.4	18.5	2.5	2.3
5 Apportionment for Shared-Input Components by Industry	2.7	76.7	2.6	92.9	2.4	4.0

Note: The measures being summarized are ratios of value-added to compensation. The panel “By MOFA” includes summary statistics across all MOFAs without any aggregation. The panel “By Industry and Country” includes summary statistics of affiliate-level data aggregated by industry and country. The panel “By Industry Sector and Global Region” includes summary statistics of affiliate-level data aggregated by industry sector and global region.

**Table 7.2: Summary Statistics of Ratios of Value-added to Published Net PPE, 2009**

	By MOFA (no aggregation)		Aggregated by Industry and Country		Aggregated by Industry Sector and Global Region	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
1 Separate Accounting <i>Factor Weights: Compensation = 1.0, PPE = 0.0, Sales = 0.0</i>	153.4	11,451.1	270.4	20,874.6	1.9	3.7
2 Apportionment for Shared-Input Components	46.0	1,552.2	33.8	1,131.6	2.3	2.9
3 Apportionment for Shared-Input Components by Industry	34.9	4,003.8	22.5	1,827.3	2.1	3.3
<i>Factor Weights: Compensation = 0.60, PPE = 0.25, Sales = 0.15</i>						
4 Apportionment for Shared-Input Components	52.0	1,625.2	35.5	1,010.2	2.2	2.8
5 Apportionment for Shared-Input Components by Industry	51.2	4,297.6	25.1	1,389.4	2.0	3.2

Note: The measures being summarized are ratios of value-added to compensation. The panel “By MOFA” includes summary statistics across all MOFAs without any aggregation. The panel “By Industry and Country” includes summary statistics of affiliate-level data aggregated by industry and country. The panel “By Industry Sector and Global Region” includes summary statistics of affiliate-level data aggregated by industry sector and global region.