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REPORT ON THE STATE OF AVAILABLE DATA FOR THE STUDY OF INTERNATIONAL  
TRADE AND FOREIGN DIRECT INVESTMENT

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**ABSTRACT**

This report, prepared for the Committee on Economic Statistics of the American Economic Association, examines the state of available data for the study of international trade and foreign direct investment. Data on values of imports and exports of goods are of high quality and coverage, but price data suffer from insufficient detail. It would be desirable to have more data measuring value-added in trade as well as prices of comparable domestic and imported inputs. Value data for imports and exports of services are too aggregated and valuations are questionable, while price data for service exports and imports are almost non-existent. Foreign direct investment data are of high quality but quality has suffered from budget cuts. Data on trade in intellectual property are fragmentary. The intangibility of the trade makes measurement difficult, but budget cuts have added to the difficulties. Modest funding increases would result in data more useful for research and policy analysis.

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# Report on the State of Available Data for the Study of International Trade and Foreign Direct Investment\*

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## 1. Introduction and Motivation

Increased globalization of the U.S. economy has led to a rising awareness of the importance of statistics on international trade and investment. A number of recent reports, including those by the Government Accountability Office (GAO, 2004, 2005), National Academy of Public Administration (NAPA, 2007), National Research Council (NRC, 2006), the Sloan Foundation (Sturgeon, 2006), and a 2009 conference on “Measurement Issues Arising from the Growth of Globalization” sponsored by the W.E. Upjohn Institute for Employment Research and the National Academy of Public Administration,<sup>1</sup> have highlighted the ability and limitations of publicly available data to accurately analyze phenomena such as offshoring and services trade.<sup>2</sup> This report, commissioned by the Committee on Economic Statistics of the American Economic Association, seeks to provide a comprehensive description of data available for the study of international trade and foreign direct investment, as well as to identify areas where data collection could be improved.

As the U.S. economy becomes more integrated with the rest of the world, price developments abroad become ever more important in affecting inflation in the United States. Indeed, former Federal Reserve Chairman Alan Greenspan partially attributed favorable U.S. inflation performance during the later years of his tenure to falling prices on U.S. imports from China and other rapidly developing countries.<sup>3</sup> While falling import prices may have helped U.S. inflation

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\* This report is prepared for the Committee on Economics Statistics of the American Economic Association. We thank W. Erwin Diewert, Susan Houseman, J. David Richardson and several U.S. statistical agencies for providing valuable comments.

<sup>1</sup> See: <http://www.upjohninstitute.org/measurement/final-program.html>.

<sup>2</sup> Other reports include the World Trade Organization (2005), and the Office of Senator Joseph Lieberman (2004). The link between offshoring and U.S. productivity is the subject of articles in *Business Week* (Mandel, 2007) and the *New York Times* (Uchitelle, 2009).

<sup>3</sup> See, for example, <http://www.federalreserve.gov/BoardDocs/Speeches/2004/200405062/default.htm>

performance, they may have also contributed to pressure on the wages of U.S. workers employed in producing goods that have to compete with ever-cheaper imports. Understanding the monetary policy and labor market implications of import prices is only possible with accurate and detailed data on import prices.

Another key area of policy interest revolves around offshoring and its impacts. Workers face potential loss of jobs due to the movement of production facilities overseas, but at the same time U.S. firms and their customers benefit from the reduction in costs made possible through shifting some activities abroad. Both phenomena require detailed, disaggregate data for understanding their impacts. For example, whereas overall import prices are useful for understanding globalization and inflation, import prices disaggregated by product and by source country can give an important insight into the geography of competition. Likewise, disaggregate import prices are needed to determine the extent to which offshoring reduces costs for U.S. firms and contributes to higher productivity.

An example will serve to illustrate the difficulty in tracking international trade flows and their impact on the U.S. economy. Suppose that a firm has moved its production entirely offshore, and we wish to determine the impact of this decision on industry employment or wages in the United States. If the production formerly done in the United States is replaced by merchandise imports of the same product, then it would not be difficult to measure the increase in those imports and estimate the impact on employment or wages in that U.S. industry. But this simple example makes many assumptions that may not hold in practice.

First, it is common for firms to move only *a portion* of their production process offshore. For example, they might be exporting unfinished components, assembling them in Mexico, and then importing the finished product back to the U.S. In that case, the portion of production done offshore should be measured by its value-added, which can be much less than the imported value of the product. The situation is even more complicated when, instead of importing a finished product, the firm imports intermediate inputs that it uses in production of a final product: since the purchaser or ultimate owner of the imports is not available in the U.S. import statistics, we do not directly observe the intermediate inputs that are imported by a firm and, therefore, we cannot directly relate such imports to industry employment or wages. Rather, we need to *impute* the

value of imported intermediate inputs into an industry. As discussed in section 2.1 and 2.2 below, that imputation involves somewhat crude assumptions that researchers are only beginning to overcome. Accurate data on the prices of imports and exports, and their comparison to domestically produced products, are essential to measure the impact of offshoring, as discussed in section 2.3. These are areas where progress can be made in improving the availability of international data.

A second major difficulty arises when there is offshoring of *service* inputs. For example, the iPod, sold by Apple, is physically produced by several Asian companies, (Linden *et al.*, 2007). Whether or not the payment that Apple makes to these companies for their services will be picked up as a U.S. import of goods or services depends on a number of factors, such as the nature of the contract between Apple and the suppliers. We discuss the conceptual and practical difficulties in collecting data on services trade in section 2.4.

Tracking the flows of services between firms is slightly easier when they are affiliated with a multinational enterprise. Information on the activities of U.S. multinationals and foreign multinationals with affiliates in the United States is collected by the U.S. Bureau of Economic Analysis (BEA), as described in section 2.5. Unfortunately, the information collected by the BEA has been shrinking over time, even while the activities of U.S. multinationals, especially as they relate to offshoring, are receiving increased attention. The same holds for the activities of the International Price Program at the Bureau of Labor Statistics (BLS), which has had to reduce its collection of trade prices – especially in the services area – as a consequence of recent budget cuts. A final topic we deal with is international knowledge flows, discussed in section 2.6.

Recommendations for improvements in the collection and availability of data are given throughout the report, and are summarized in section 3. Throughout, we focus on the trade and foreign direct investment data available for the United States, while omitting discussion of portfolio investment and international macroeconomic data. The Appendices include a brief discussion of tariff data along with other data and conventions used by the United Nations and other international organizations.

## 2. Summary of International Data

Data on U.S. trade in goods and services, as well as foreign direct investment, are needed to serve two different purposes. One is to produce a set of data that follow the rules set down by the IMF in its Balance of Payments Manual (BPM), the most recent of which was promulgated in 2009, so that the United States can fulfill its obligations under international agreements to produce data comparable to those of other countries. The other is to produce a set of trade data that reflect the flows of goods and services and reveal the impact of exports, imports and foreign direct investment on factors of production located in the United States. While this paper focuses on the second goal, we include some discussion of the most recent BPM (see sections 2.4 and 2.5), especially when those instructions conflict with the conventional treatment of trade and foreign investment data.

### 2.1 Commodity-level U.S. Trade Data

The starting point for any study of the effects of trade on the U.S. economy is the merchandise exports and imports, including all physical goods that cross the U.S. border —i.e., all manufactured, agricultural and natural resource goods. These data are collected at the border by the U.S. Census Bureau according to several different classifications. Prior to 1989, the import data were collected under the Tariff Schedule of the U.S. Annotated (TSUSA) system, whereas the export data were collected under the Schedule B classification. Effective in 1989, both imports and exports switched to the Harmonized System (HS) classification, which is also used by the United Nations and which at its most disaggregate level contains over 16,000 commodities.

#### *Availability*

In addition to the availability of U.S. trade data from the United Nations (see Appendix A), there are several national sources:

- a) National Trade Databank CD-ROMs that are distributed by the U.S. Department of Commerce, available at <http://www.stat-usa.gov/tradtest.nsf?OpenDatabase>;
- b) U.S. Exports and Imports of Merchandise on CD-ROM [machine-readable data file] distributed by the Bureau of the Census, available in government documents of many libraries;

- c) A compilation of U.S. import and export data by the NBER (Feenstra, 1996, 1997, and Feenstra, Romalis and Schott, 2002), available at [www.nber.org/data/](http://www.nber.org/data/), and at [www.internationaldata.org](http://www.internationaldata.org). These data are available at a disaggregate HS level, and the more aggregate Standard Industrial Classification (SIC) and North American Industry Classification (NAICS),<sup>4</sup> and have recently been updated to 2006;
- d) USA Trade On-Line - Distributed by the U.S. Department of Commerce, U.S. Census Bureau and available at [www.usatradeonline.gov](http://www.usatradeonline.gov). Data are available back to 1992 at the HS 10-digit level and NAICS 6-digit level, providing several different measures of merchandise exports and imports.

### *Issues*

Imports from within the same industry where production occurs are one measure of the impact of trade on U.S. industries. Recently, attention has shifted instead to the offshoring of U.S. production activities, which is another view of how industries are integrated into the global economy. Measuring the degree of offshoring, however, is more difficult than just measuring imports. The report by the National Research Council (NRC, 2006) described the most common approach to date in academic studies for measuring offshoring, which is based on the so-called “proportionality” assumption. This approach can be briefly described as follows.

Since offshoring involves the replacement by a firm of intermediate inputs produced in-house with foreign-produced intermediate inputs, the starting point for the measure is the input-output tables from the BEA. These data, however, are at the industry level rather than for firms, and therefore focus on the replacement at the industry level of domestically produced intermediates with those imported. The goal is to know how the import share of these intermediate purchases by industry is changing over time. Answering this question requires the key simplifying assumption: because the input-output tables do not contain information on the share of intermediates purchases by industries that is imported, this share is proxied by the economy-wide

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<sup>4</sup> In order to use the merchandise trade statistics to measure import competition it is essential to concord the Harmonized System to the classifications used for domestic industries. Prior to 1997, U.S. industries were categorized according to the Standard Industrial Classification (SIC), and since that time, by the North American Industry Classification System (NAICS). The disaggregate HS data for both imports and exports described in Feenstra, Romalis and Schott (2002) include the corresponding SIC code (4-digit, 1987 version) and NAICS code (6-digit, 1997 version). The U.S. import and export data are also organized by Standard International Trade Classification code (SITC 5-digit, revision 2 and 3).



share of imports in total domestic consumption for each of the intermediate goods. In other words, it is assumed that the proportion of intermediates that an industry purchases from abroad is *equal to* the share of total domestic consumption in that industry that is imported: this is the “proportionality” assumption.

To go beyond the proportionality assumption, it would be necessary to track imports by firm and industry, as discussed in the next section. Short of this, some improvement to the measure of offshoring obtained using this assumption can be achieved by restricting the economy-wide share of imports in domestic consumption to be the share of total *intermediate* imports in domestic *intermediate* use. This is done using additional information in the data on the End-use classification for imports, which distinguishes products as either intermediates or final goods.<sup>5</sup> In the future, a more direct solution at the industry level would be for BEA to begin distinguishing between domestic- or foreign-produced inputs in the construction of the input-output tables. In other words, the number of rows in the “Make” matrix could be doubled: outputs could be distinguished by whether they are delivered to a domestic demander or a foreign demander (via exports) and, likewise, the “Use” matrix could distinguish between domestic or foreign supplied inputs (Diewert, 2008). Along these lines, some headway has been recently made by the Census Bureau, as the 2007 Economic Census includes inquiries regarding whether firms design their own products, what the firm’s primary activity is, and whether they engaged in domestic or foreign outsourcing (offshoring). Of course, since these firm responses are qualitative, it may be worthwhile to consider adding a quantitative field in the future (e.g., the value of offshored production).

An alternative classification scheme used for U.S. merchandise imports that can also be used to make some headway on measuring offshoring, even without firm-level data, is the classification of “general imports” versus “imports for consumption.” General imports are imports as they come off the dock: they reflect the total arrival of merchandise from foreign countries that immediately enter consumption channels, and also those that enter as inputs into foreign trade zones (or bonded warehouses). In contrast, imports for consumption are used for immediate

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<sup>5</sup> The End-Use Classification System used by the BEA was designed to categorize items by use or consumption rather than by the more traditional stage of production. It is the system used to produce the national accounts.

consumption, and include those goods *coming out of* U.S. foreign trade zones (and withdrawals from warehouses for consumption).<sup>6</sup>

Therefore, these two types of data will differ for goods used in foreign trade zones (or entering into bonded warehouses). Examples include automobiles and their parts, for which in 1993 the value entering U.S. foreign trade zones was over \$12 billion (Swenson, 1997, p. 37). Therefore, these goods represent the foreign content of goods produced in U.S. foreign trade zones (such as the foreign content of an American-built Toyota Camry, for example), which is a measure of the offshoring of intermediate inputs. So, for goods produced in foreign trade zones it is possible to measure such foreign content, or offshoring. However, for goods not produced in U.S. foreign trade zones, this method is not available; instead, studies have relied on the “proportionality” assumption described above to measure the offshoring of intermediate inputs. This raises the question of whether better measures can be obtained by the use of firm-level trade data, which we consider next.

## 2.2 Firm-level U.S. Trade Data

The U.S. merchandise data collected by the U.S. Census Bureau are obtained from reports made by exporters and importers, which are at the level of the firm. This raises a difficulty with accessing such data, since they are necessarily confidential. Recognizing this, there are three datasets available for studying U.S. international trade at the firm level.

### *Availability*

- a) The first two datasets track the universe of U.S. export and import transactions, respectively, over the period 1992 to 2009. These datasets are not publicly available but may be accessed at one of several Research Data Centers by researchers whose projects have been approved by the Census Bureau’s Center for Economic Studies.<sup>7</sup> For a more detailed discussion of the transactions data, see Bernard, Jensen and Schott (2009).

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<sup>6</sup> Since April 1995, the National Trade Databank CD-ROMs that are distributed by the U.S. Department of Commerce have reported general imports rather than imports for consumption. The earlier U.S. import data distributed by Feenstra (1996) for 1972-1994 was for “imports for consumption,” but the updated data for 1989-2006 available at [www.nber.org/data/](http://www.nber.org/data/), and at [www.internationaldata.org](http://www.internationaldata.org) includes general imports. All measures of exports and imports, including imports for consumption, are available from the U.S. Census Bureau.

<sup>7</sup> See the CES website at <http://www.ces.census.gov/> for more information about submitting research proposals for using these data. The export and import transaction data are a complete enumeration of documentation collected by

- b) The third dataset is the Exporter Database, which provides annual summaries of the export activities of U.S. firms, including their number, geographic concentration and characteristics. It is compiled and maintained by the Foreign Trade Division of the U.S. Census Bureau and can be accessed at the U.S. Department of Commerce's International Trade Administration website at <http://ita.doc.gov/td/industry/otea/edb/index.html>.

### *Issues*

The firm-level import transaction data can potentially be used to construct a better measure of offshoring than has been available to date. A preliminary attempt to do so for the U.S. is made by Feenstra and Jensen (2009). They begin by dividing firm-level imports into intermediate inputs and final goods. The intermediate purchases are then distributed across each of a firm's establishments according to the known levels of consumption of various intermediates by those establishments. These establishments are classified by industry, and so by aggregating up, one can determine the value of industry-level imported intermediates. In a comparison with the industry-level imports obtained from the "proportionality" assumption, Feenstra and Jensen find instances where these measures deviate quite substantially.

The analysis of Feenstra and Jensen (2009) is too preliminary to allow one to infer the impact of these differences. But in related work for Germany, Winkler and Milberg (2009) find that offshoring measured from firm-level imports deviates substantially from that obtained by the "proportionality" assumption. Furthermore, they find that these differences are important enough to reverse the sign of the impact of offshoring on wages in some specifications. These results suggest that further work for the United States would be highly desirable.

An additional starting point in constructing accurate measures of offshoring activity is to use information from the import transaction data that indicates the share of value for each

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the U.S. Census Bureau and the U.S. Customs and Border Protection office. Information available for each transaction includes: date of shipment, identity of U.S. exporting or importing firm, value of shipment, quantity of shipment, ten-digit HS category of shipment, the destination or source country, the transport mode, the port of entry and whether or not the transaction took place between "related parties." For exports, Foreign Trade Statistics Regulations, 30.7(v), define a related party transaction as one between a U.S. exporter and a foreign consignee, where either party owns, directly or indirectly, 10% or more of the other party. For import transactions, Section 402(e) of the Tariff Act of 1930 defines related party trade to include transactions between parties with various types of relationships including "any person directly or indirectly, owning, controlling or holding power to vote, 6 percent of the outstanding voting stock or shares of any organization"

commodity shipment that is of U.S. origin. This allows for calculating the foreign value-added component of goods that originated in the U.S. While this information does not address the significant portion of offshored production that originates in foreign countries, it may be useful for studying products containing components of high technological value that are domestically produced but assembled abroad.

Besides offshoring, there are many other reasons for policy makers and academics to be interested in the firm-level export and import data. It has been known for many years that a small number of firms in the United States account for the lion's share of exports (Richardson, 1995). More recently, it has been shown that many of these firms are also engaged in importing: they are the "most globally engaged" firms, according to Bernard, Jensen and Schott (2009). Such firms are much larger in size and of higher productivity than their competitors, and are of great importance to the U.S. economy. Understanding the dynamics of these firms is an important priority for academics, and can lead to valuable insight for policy. As noted above, the firm-level trade data can be accessed through Research Data Centers by researchers whose projects have been approved by the Census Bureau's Center for Economic Studies.

### **2.3 U.S. International Prices**

The usefulness of data on U.S. exports and imports is greatly enhanced by having price indexes that can be used to convert nominal values into real measures. Thus, the first objective of international price indexes is to deflate the aggregate values of exports and imports in a manner consistent with the National Income and Product Accounts. But detailed and internationally comparable prices are also needed to assess the extent of actual and potential substitution between domestic and foreign sources. For example, international prices play a key role in understanding the relationship between exchange rates and inflation at the aggregate level, and the impact of foreign investment and trade on domestic output and employment at the disaggregate level. Ideally, such international price data would be available for both goods (discussed in the preceding sections) and for services (discussed in the following sections). In practice, however, the price data for services are harder to collect and more limited in scope.

#### ***Availability***

The main source of data on international prices is the International Price Program (IPP) at the BLS, available at <http://www.bls.gov/mxp/>. IPP uses market sale prices for calculating export and import price indexes for goods.<sup>8</sup> Three classification systems are currently used to describe U.S. merchandise import and export price indexes: North American Industry Classification System (NAICS), Harmonized system (HS), and End-Use.<sup>9</sup> The IPP data generally are available on a monthly basis. International prices by origin are also available for various sample periods for specific countries and regions.<sup>10</sup>

For international services, the available prices from the IPP program at BLS are extremely limited, and most series and all development were discontinued as of 2007 because of budgetary constraints. Continuing data are available only for air freight and air passenger fares by selected country and region, including Europe, Asia, Japan, South Korea for air freight, and Europe, Other Europe, UK, Asia, Japan, and LAC for air passenger fares. Sample periods and frequency vary. Other services data, including travel and tourism, education services, and additional data on passenger fares have been discontinued. The restoration of funding for international service price collection is of very high importance, but it is not the only area where the activities of IPP program at BLS can contribute to improved understanding of offshoring and other phenomena, as discussed below.

### *Issues*

As noted above, the primary function of the export and import price indexes is as deflators of the export and import volumes used in the U.S. national accounts figures. In this role, they provide

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<sup>8</sup> The majority of prices used in calculating import price indexes are quoted FOB (Free On Board) Foreign Port. This excludes duties, insurance and other extra charges to bring a good into the United States. The majority of prices used in calculating export price indexes are quoted FAS (Free Along Ship) U.S. Port. This includes inland freight, insurance and other charges to get the good to the carrier exiting the United States but not afterwards. About 5-10% of imports and exports currently surveyed are priced in foreign currencies in which case the IPP uses an exchange rate factor that is an average for the month prior to the pricing month.

<sup>9</sup> The SITC was created by the United Nations and was the first classification system used by the International Price Program (IPP) to publish its price indexes. These data are available on a quarterly—last month of the quarter—frequency, and go back as far as 1974 for some categories, but end in 2005 with the beginning of the NAICS classification system. NAICS data are available monthly, but only from 2005. Price indexes based on HS can be used with other international source data (see UN Comtrade, Appendix B). Some series go back to 1994 on a monthly basis and to 1992 on a quarterly basis, using the last month of the quarter. End-use data are available from 1977 on a quarterly—last month of the quarter—basis early in the sample, and monthly beginning in the late 1980s.

<sup>10</sup> These include the Industrialized Countries, Other Countries, Canada, European Union, Latin America, Japan, Asian Newly Industrialized Countries, France, Germany, United Kingdom, Mexico, Pacific Rim, China, Association of Southeast Asian Nations, and the Asia Near East.

insight into the impact of trade on U.S. real GDP. In order to correctly measure real GDP, however, it is essential that the import and export prices are themselves correctly measured. This creates several challenges for the IPP program at BLS.

First, the best formula to use for any price index is a question that can only be settled by research. For the consumer price index, that research was done as part of the Boskin *et al.* (1996) Commission, as discussed in Diewert (1998). While the same degree of attention has not been given to the export and import prices indexes, a promising start along these lines is provided by Alterman, Diewert and Feenstra (1999). They investigate the impact of alternative formulas for the export and import price index, which currently use Laspeyres formulas. They find that both indexes overstate the rate of increase in prices as compared to using a geometric (Törnqvist) formula for the prices indexes. This result is similar to the overstatement of the consumer price index before the adjustment to geometric indexes was made. But because of budget constraints, and the lack of further research, no adjustment to the formulas used by IPP has been made.

Because the overstatement in the IPP indexes (as compared to a geometric formula) has been greater for imports than for exports, it follows that the terms of trade – which is the ratio of export to import prices – computed from the IPP prices are biased downwards. The United States has enjoyed greater improvements in the terms of trade, especially since the mid-1990s, than shown by official indexes (Feenstra, *et al.*, 2009). One implication of that finding is that a portion of the apparent productivity speedup in the U.S. since the mid-1990s is in fact an (unmeasured) terms of trade improvement. In order to correctly attribute that gain for consumers to globalization, rather than to domestic productivity, it is essential to continue to improve the measurement of international prices.

One of the most difficult areas to deal with is the switching by domestic firms of sources of supply for an intermediate input from high-price domestic to lower-priced foreign sources. This switch is analogous to the “outlet substitution bias” in the consumer price index (see Diewert, 1998), as consumers seek out the lowest-price stores. In fact, large shifts in sourcing of intermediate inputs have been documented in the literature (e.g., Eldridge, 1999; Houseman, 2008) and several papers document significant price discounts due to this switching (e.g., Byrne, Kovak and Michaels, 2009) However, the drop in price that accompanies this switch is not

currently reflected in any domestic or international price index. A proposal to measure this price drop has been developed by the IPP program (Alterman, 2009) in what is called an “input price index.” The input price index would measure the cost of inputs regardless of their source, and would therefore capture the drop in price when firms switch to lowest cost suppliers, including those overseas. However, this proposal would require additional funding in order to be implemented by the IPP.

Besides offshoring, there are many other research questions, too, that can be addressed with these data. One of these is the impact of exchange rates on the prices of traded goods, and also on the prices of domestic goods. This is the inflation issue that Federal Reserve Chairman Alan Greenspan raised (as noted in the Introduction), whereby favorable U.S. inflation performance during the later years was attributed in part to falling prices on U.S. imports from China and other rapidly developing countries. Accurate measures of exports and import prices – both at the aggregate level and for disaggregate sectors – are needed to assess the implications of exchange rate changes on prices, and thereby on the conduct of monetary policy. Unfortunately, the recent budget environment has severely limited the ability of IPP to expand the number of countries for which they publish data from, as well as the level of detailed price data reported for each country.

Another issue with regard to the international price data arises from differences in classification philosophies.<sup>11</sup> As discussed, with regard to both transactions data and price data, NAICS is the organizing classification system for much of U.S. data going forward. But NAICS does not resolve the tension between the production-based philosophy and the balance of payments (BOP) transaction-based philosophy (which includes both cross-border and affiliate transactions). More specifically, the philosophy of the NAICS-based Producer Price Index (PPI) has as its objective to deflate the *net* output on an *industry* basis. Thus, intermediate activities are netted out and intra-firm trade within an industry group that might go along with these intermediate activities is not included. In contrast, the IPP trade indexes are *transactions-* or *product-based*, with the objective to construct real exports and imports as inputs to the U.S. National Income and Product Accounts. Export and import transactions are, generally, collected on a *gross* basis. Accordingly, so long as the international trade data exist for transactions in intermediates, the IPP would

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<sup>11</sup> For more, see William Alterman (1997), pp. 18-32.

construct a price to go with them. The principal difficulty that arises with the tension between these two concepts is that domestic prices don't match international prices, raising the challenge of measuring that fundamental determinant of supply and demand—relative prices.

One example of the difference in these approaches is the NAICS “Information sector”, which includes establishments that produce, manipulate and distribute information, data, and transactions, as well as establishments that transmit or distribute these products.<sup>12</sup> In the BOP data, trade for these activities are “scattered across several categories in the tables for cross-border trade and for sales by affiliates” (Borga and Mann, 1992, Box page 68). Moreover, as intermediate services, many of these activities are embedded in the flows of and prices associated with trade in goods.

Finally, as noted above, international services prices are extremely limited and most series and all development were discontinued as of 2007 because of resource constraints. In the absence of data on international prices of trade in categories such as business and professional services, it is impossible to address research questions such as the role of information technology in enabling more fragmentation and cross-border trade in services.

## **2.4 U.S. International Trade in Services**

Over the past few years, the International Monetary Fund, the United Nations, and the World Trade Organization have evolved toward greater recognition of the importance of services in international trade, and have also broadened the definition of international trade in services. In Appendix C we describe the conceptual issues involved with defining trade in services.

The 2009 Balance of Payments Manual (BPM) changes the instructions for manufacturing services on physical inputs owned by others, including “processing, assembly, labeling, packing, etc.” (IMF, 2009, sections under 10.6). Manufacturing operations undertaken by an entity that does not own the goods concerned, and for which a fee is paid by the owner of the goods, are to be treated as services. The flow of services is measured by the amount of the fees. The former,

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<sup>12</sup> See Economic Classification Policy Committee, “Issues Paper No. 1, Conceptual Issues,” February 8, 1993. <http://www.census.gov/epcd/naics/issues1>. See also, “Implications of Implementing NAICS in the Current Services Program”, <http://www.census.gov/epcd/www/naicssvc.html>



and still customary, rule was to treat the exports for processing as merchandise exports and the processed merchandise as imports, including the value of the processing. This new treatment of exports for processing in the BPM conflicts with the customary collection of merchandise exports and imports, and thereby creates an inconsistency between the balance of payments data and international trade data.

In the United States, the BEA presents aggregate data on international services through four publication programs: (a) cross-border trade in services data in the international transactions accounts; (b) sales of services through affiliates of multinationals, some portion of which represent cross-border trade; (c) annual and benchmark input-output tables; and (d) the national income and product accounts.

### ***Availability***

#### **a) Cross-border trade in services**

The cross-border trade in services publication program provides the basis for all of BEA's services trade data. As a result, this publication program provides the best sense of what trade data BEA collects:

The estimates of cross-border transactions cover both affiliated and unaffiliated transactions between U.S. residents and foreign residents. Affiliated transactions consist of intra-firm trade within multinational companies—specifically, the trade between U.S. parent companies and their foreign affiliates and between U.S. affiliates and their foreign parent groups. Unaffiliated transactions are with foreigners that neither own, nor are owned by, the U.S. party to the transaction.... Cross-border trade in private services is classified into the same five, broad categories that are used in the U.S. international transactions accounts—travel, passenger fares, “other transportation,” royalties and license fees, and “other private services.” (*Survey of Current Business*, November 2001)

Services trade data are available for varying levels of industry detail for 1986 through 2009. The number of categories reported for both unaffiliated and affiliated trade increases over the period.

Data are available by service for regions and countries, also. Data are available at:

<http://www.bea.gov/international/intlserv.htm> .

**b) Services Supplied through Affiliates**

The data on services supplied through affiliates come from surveys that collect a variety of data on the financing and operations of multinational corporations. Additionally, these surveys provide information used in the construction of the cross-border trade in services series, and there are two key differences in what is collected. First, data on affiliates' services are classified based on the primary industry of the affiliate. In contrast, data on cross-border trade are classified by type of service. Second, the survey data on services supplied through affiliates measure affiliate sales, but not purchases, whereas the data on cross-border trade consider both purchases and sales.

The BEA data on services supplied through affiliates are based on surveys conducted through BEA's U.S. Direct Investment Abroad and Foreign Direct Investment in the U.S. programs. Comprehensive benchmark surveys are collected every 5 years and less comprehensive collections are conducted annually. BEA collects data on U.S. international transactions in private services through several surveys that it conducts.<sup>13</sup>

Detailed data on international services transactions are currently available from 1986 through 2006, for cross border trade, and from 1989 for services supplied through affiliates. Service imports and exports are reported for approximately 30 (1986-1991) to 35 (1992-2006) service types (with additional detail on whether the transactions are between affiliated or unaffiliated parties available for some categories). These data are available by country for approximately 35 countries and country groupings for 1986-2006.

Data on services supplied through affiliates, cross-border trade in services, and other information on methods and concepts are available at: <http://www.bea.gov/international/intlserv.htm>. The respondent-level data underlying the cross-border services transactions program are available to specially sworn researchers (with an approved project and clearance) through BEA's restricted access facility.

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<sup>13</sup> These surveys fall into two broad categories: (1) The surveys of "selected" services, which cover mainly business, professional, and technical services; and (2) the surveys of transportation services. These collection programs are the principal source of BEA's estimates of trade in services but the estimates of some services are based on data from a variety of other sources, including U.S. Customs and Border Protection and surveys conducted by other Federal Government agencies, private sources, and partner countries. BOP data are available at: <http://www.bea.gov/international/index.htm#bop>.

### **c) Benchmark Input-Output Accounts**

In addition to the international services transactions data programs described above, BEA also presents import and export data for services by commodity in the benchmark input-output tables.<sup>14</sup> BEA prepares benchmark input-output accounts for years ending in 2 and 7, which are based on detailed data from the quinquennial economic censuses that are conducted by the Bureau of the Census. They are published at the summary level and at the detailed level. The benchmark accounts show how industries interact at the detailed level; specifically, they show how approximately 500 industries provide input to, and use output from, each other to produce gross domestic product. These accounts provide detailed information on the flows of the goods and services that make up the production processes of industries. The 1997 benchmark input-output accounts use the North American Industry Classification System (NAICS) while the 1992 and earlier benchmark accounts are based on the Standard Industry Classification (SIC).<sup>15</sup>

#### ***Issues***

Issues related to the collection of services trade data are explored in great detail in a recent report produced by the MIT Services Offshoring Working Group, Sturgeon (2006). Drawing on this report, we highlight the following issues.

First, BEA is making progress in providing more detail for affiliated transactions and now reports detail that is consistent across unaffiliated and affiliated transactions. However, the data are still not nearly as detailed as merchandise trade. There are over 10,000 product categories, but only about 30 service trade categories, and only in the most recent years. Furthermore, the country breakdown is limited to broad service categories, as is the breakdown between unaffiliated and affiliated trade. Increasing the level of detail reported for service trade, based on NAICS industries or other classifications recommended by international guidelines, is an important priority.

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<sup>14</sup> BEA's International Transaction Accounts are the source for the foreign trade estimates in the I-O accounts.

<sup>15</sup> Benchmark input-output tables are available (at varying levels of aggregation and on various classification systems) for 1947, 1958, 1963, 1967, 1972, 1977, 1982, 1987, 1992, 1997, and 2002. There is very little service sector detail prior to 1977. These data and additional information are available at: [http://www.bea.gov/industry/index.htm#benchmark\\_io](http://www.bea.gov/industry/index.htm#benchmark_io).

Second, exemption levels are specific to the type of traded service, but in general they are high and are rising. High exemption levels mean that firms with import or export transactions below a certain level are not required to report. For example, U.S. insurance companies involved in international transactions must fill out a BEA survey if these transactions exceed \$8,000,000 in a calendar year<sup>16</sup>. For goods transactions, the reporting threshold is \$2,500 per transaction. Exemption levels should be lowered to capture more of the trade activity.

Third, both of the priorities identified above highlight an operational issue the BEA faces in conducting the surveys that support the trade in services data. The issue is that, in contrast to the Census Bureau or the BLS, BEA does not have access to a sampling frame derived from the universe of establishments and firms. Because the Census sampling frame derives from IRS data, it cannot be shared with other agencies. Data sharing legislation regarding dissemination of these data would be a useful step forward.

Fourth, BEA allows specially sworn researchers to access respondent level versions of the data through its restricted access program. BEA should be commended on this program. However, BEA should take advantage of the Census Bureau Research Data Center network to provide access to BEA data (both trade in services and FDI data) outside of Washington, DC. The physical and administrative infrastructure are both available through the CES/RDC program<sup>17</sup>.

Finally, as noted earlier, one method used to date to measure the extent of offshoring is the “proportionality” assumption, under which the economy-wide share of imports in domestic consumption is used to allocate comparable imports of goods across industries. BEA uses the same approach to allocate imports of services across “using” industries in constructing an input-output table. As we have argued above for imports of goods, it would be very desirable to improve on this method for services as well.<sup>18</sup>

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<sup>16</sup> BEA Reporting Requirements, March 2007: <http://www.bea.gov/surveys/pdf/surveysu.pdf>

<sup>17</sup> For more details see Jensen (2009).

<sup>18</sup> Another issue that arises with respect to the import and export data available in BEA’s input-output tables is that of “non-comparables.” While many imported services are allocated across commodities and across industries, certain types of imports are classified as non-comparables and aggregated into a “non-comparables” line in the Annual Industry Accounts (AIAs). For example, royalties and license fees are classified as non-comparable. Unfortunately, a significant portion of imported services is assigned to the “non-comparables” line in the AIAs, greatly restricting the usefulness of the industry classifications. In fact, 80 percent of business, professional, and technical services were classified as non-comparables in 2004.

## 2.5 U.S. Direct Investment Data

The BEA collects data on direct investment via a variety of surveys and publishes tabulated aggregate figures. The data can be grouped into several categories. First, surveys capture financial and operating information for both the parent companies and foreign affiliates of U.S. based multinationals. These data are described in detail in Mataloni (1995). The 1977 Benchmark Survey of U.S. Direct Investment Abroad (U.S. Department of Commerce, 1981) can be thought of as the first of the modern surveys. The data were collected under the authority of the International Investment Survey Act of 1976, which was the first to specify 10 percent ownership by a single owner as the definition of U.S. Direct Investment Abroad.<sup>19</sup> Subsequent outward benchmark surveys took place in 1982, 1989, 1994, 1999, and 2004, and annual data have been collected on a smaller sample since 1983.

In addition to measuring U.S. multinational activity abroad, BEA tracks the activities of foreign firms operating in the United States. Quijano (1990) describes these data. They cover most of the data items covered in the outward surveys and the nature of the surveys is similar. However, less information is collected about the foreign parents of U.S. affiliates than is collected about the U.S. parents. There is some overlap between the inward and outward surveys because U.S. parent firms in the outward FDI surveys include firms incorporated in the United States that are owned by foreign firms, and the foreign-owned affiliates in the inward FDI surveys include those owned by firms incorporated abroad, but ultimately owned by U.S. owners. The inward FDI benchmark survey years now coincide with U.S. Economic Census years. The two data sets have been matched in a joint BEA-Census project for 1987, 1992, 1997, and 2002, the latest of which is Department of Commerce (2007).<sup>20</sup>

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<sup>19</sup> This was adopted in place of earlier definitions based more on control of the enterprise or ownership shares across different and independent owners. The evolution of these definitions is described in Lipsey (2003). The data do not merely measure only those entities that are directly owned by U.S. parents, but they trace out chains of ownership to measure indirectly owned affiliates. This is an essential aspect of the data given the rise in the use of holding company structures by U.S. multinationals. The 1977 survey also began the practice of including the most detailed information for majority-owned affiliates, much less information for minority-owned affiliates, and only a small amount for banks. For majority-owned affiliates, there were detailed balance sheet and income accounts, the composition of affiliate external financial positions, inventories and property, plant, and equipment by type, employment and employee compensation (with the distinction between production and non-production workers in manufacturing), sales, divided between local, sales to the United States, and sales to other countries, R&D expenditures, and exports shipped to the affiliate from the United States.

<sup>20</sup> The census data differ from the BEA data in that the census data are at the establishment level while BEA reporting requirements permit a greater level of consolidation. The matched data include information on shipments,

Another set of data, only fragmentary so far, is a match of BEA data on foreign-owned firms in the U.S. with BLS data on occupations and wages. The data were tabulated for a brief period around 1990, and the project was then abandoned, but it has recently been revived. Releases from the earlier effort covered the fourth quarters of 1989, 1990, 1991, and 1992.

Until recently, as a supplement to the quarterly and annual surveys of foreign direct investment in the United States, BEA collected data on the acquisition of existing U.S. firms by foreign firms and the establishment of new legal entities by foreign firms. For acquired firms, it includes information on the assets, sales, and net income in the year of foreign acquisition, and for new entities, the initial assets. The data also cover the costs of the acquisition or new establishment and some information on how these costs were funded. This dataset was discontinued by the BEA following the release of the 2008 data because of a lack of funding.

Finally, BEA also collects quarterly data related to the balance of payments. These include flows of U.S. direct investment to and from foreign countries, flows from foreign countries into and out of the United States, and estimates of the U.S.-owned stock of direct investment abroad and the foreign-owned stock of direct investment in the United States. The methods and definitions used in constructing these data are partly determined by international standards, as set out in International Monetary Fund (1993), replaced by International Monetary Fund (2009), and the UN System of National Accounts (1993), replaced by UN System of National Accounts (2008).

The latest Balance of Payments Manual (BPM) instructions (IMF, 2009) on the location of multinational firms' activity is a retrogression from the earlier insistence on evidence of physical production in a country. The earlier definition imposed a requirement for defining location, that to be a “center of economic interest and to be a resident unit of a country (economic territory) when the enterprise is engaged in a significant amount of production of goods and/or services there or when the enterprise owns land or buildings there. The enterprise must maintain at least one productive establishment in the country...” (IMF, 1993, Par. 73). In contrast, the current BPM abandons the requirement that some activity actually take place in an affiliate and

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employment, and payrolls, by industry, state, and country of ultimate beneficial owner, or the owner that is not owned or controlled by another person. Not all data are available for all cross-classifications; in particular, payroll data are not available by state and detailed industry in recent years, although they were in 1982 and 1987.

substitutes a purely legal definition in terms of ownership. The new BPM states that “a corporation is always resident in its economy of incorporation” (IMF, 2009, Par. 4.21) and “The residence of entities with little or no physical presence is to be determined from the jurisdiction of incorporation or registration.” The effect is to accept the assignments of intangible and financial assets to tax havens to minimize taxes as movements of production, even when no movement of tangible productive activity takes place. The fictions of corporate accounting are given precedence over the facts of production censuses and surveys.

### *Issues*

Although the BEA foreign direct investment data are among the most extensive in the world, there has been a slow deterioration in their coverage in response to budget pressures and concerns about reporting burdens. BEA now plans to implement further cutbacks in the data it collects. These changes undermine the accuracy of the published aggregate data and detract from the value of analysis conducted using the firm-level data. Given the rapid growth in the activities of multinational firms and the importance of globalization considerations to business and public policy decisions, we believe that the maintenance of funding for collecting international investment data would benefit both research and policy analysis.<sup>21</sup>

Another change that reduces the value of the BEA data to researchers is the introduction of sampling in the annual surveys. Historically, one advantage of the BEA data was the ability to follow a large sample of affiliates and parents annually over time. This allowed one to conduct careful analysis of the effects of policy changes, macroeconomic shocks or other factors that affect firm behavior. While the use of sampling may not have a large impact on certain aggregate data, it has deleterious consequences for analysis of activity in smaller countries and industries and for firm-level analysis using panel data.

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<sup>21</sup> Over the last two and a half decades, increased reporting thresholds for multinational firms and the introduction of shorter forms for certain types of filers have reduced the coverage of the BEA data. For example, in the 1982 Benchmark Survey of U.S. Direct Investment Abroad, each foreign affiliate that had sales, assets or net income with an absolute value in excess of \$3 million and their parents were required to file an extensive form. By the time of the 2004 Benchmark Survey, BEA increased reporting thresholds and used three forms in collecting data from foreign affiliates, a long form, a short form and a mini form. Approximately one quarter of affiliates filed the long form, which had a reporting threshold of \$150 million and covered around three-quarters of the items covered in 1982; one-half filed the short form, which had a reporting threshold of \$25 million and covered about half the items covered in 1982; and the remainder filed the mini form, which covered only basic items and had a reporting threshold of \$10 million. Only larger parents were required to file detailed reports, and smaller ones provided only very basic information.

The proposed changes to the future survey forms include significant cutbacks, some of which have already taken place. Under these changes, reporting thresholds would increase dramatically, fewer items would be collected on survey forms, and sampling would continue. We believe these proposed changes threaten the accuracy of the direct investment data, and we suggest that BEA be given the resources it needs to restore its data collection and processing efforts to their former levels.

As was mentioned in Section 2.4, the BEA makes the individual firm data on foreign direct investment in and out of the United States available to specially sworn researchers with approved projects who can conduct their research at the BEA office in Washington. For these data, as for the service trade data, providing access to specially sworn researchers through the Census Bureau's Research Data Centers would greatly expand the use of these data by academic researchers.

## **2.6 (Mis)Measuring International Trade in Ideas?**

While much of this report focuses on the measurement of U.S. exports and imports of goods and services, global trade in disembodied ideas has also expanded substantially in recent years, approaching annual levels of \$100 billion in the 2000s.<sup>22</sup> U.S. firms are important sellers and buyers of technical processes, patented technologies, and engineering knowhow. How well do the available data capture American firms' growing trade in ideas?

### ***Availability***

U.S. firms are required to report data on the sales of their intangible property, including technology, to their own affiliates and to unaffiliated third parties to the BEA. These sales are used to help compute the U.S. current account, as well as to the IRS. BEA data on these sales are obtained through a number of different survey instruments, and the set of survey instruments has changed substantially over time as the BEA has put more resources into the measurement of international services trade.<sup>23</sup> Under U.S. law, firms are required to assign prices to intra-firm

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<sup>22</sup> See Athreye and Cantwell (2005).

<sup>23</sup> The BE-10 is the survey of the foreign affiliates of U.S. firms used in benchmark years (roughly once every five years), and obtains information on royalty payments between U.S. parents and affiliates in those years. The parallel survey of U.S. affiliates of foreign firms, BE-12, obtains similar information on the royalty payments of U.S. affiliates to/from their foreign parents. Historically, in non-benchmark years, the BEA used the BE-605 to track



transactions in intellectual property and other intangible assets that reflect the prices they would charge an unaffiliated third party.

In 2007, total U.S. royalty payments and license fees from foreigners amounted to \$82.6 billion.<sup>24</sup> More than two-thirds of this flow came from intra-firm transactions: payments received by U.S. parents from foreign affiliates (\$54.7 billion) and payments earned by U.S. affiliates from foreign parents (\$4.1 billion). These flows measure *all* royalty and licensing fees pertaining to intangible assets, including franchise fees, payments for use of trademarks, etc. However, the BEA also breaks aggregate royalty payments and licensing fees down into categories.

Aggregating across inter-firm and intra-firm transactions, the total flows are dominated by payments for industrial processes (\$37.4 billion) and general use computer software (\$26.7 billion). While software licensing is a form of technology transfer, it is really the payments for industrial processes that come closest to measuring the sale of disembodied technology. Intra-firm licensing of industrial processes in 2007 totaled \$29.5 billion, and intra-firm software licensing totaled \$15.3 billion. Total U.S. licensing income from unaffiliated parties totaled \$23.7 billion in 2007, of which \$7.9 billion was attributed to sales of industrial processes and \$11.4 billion was earned through licensing of general purpose software.

### *Issues*

While these numbers are not small, they would not seem to loom as large as we might expect given that U.S. firms' foreign affiliate sales totaled nearly \$5.5 trillion in 2007. U.S. parents' total receipts from sales of technology to their affiliates were less than 1% of total sales. Large numbers of affiliates report zero payments to parents for the use of intangible assets. It seems clear that the reported flows fall far short of a full and complete accounting of all the benefits

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transactions between U.S. affiliates and their foreign parent groups, the BE-577 to track royalty payments from unaffiliated parties, and the BE-93 to track royalty payments received by U.S. firms from unaffiliated parties. Starting in 2006, the primary data collection instruments have become the BE-120 Benchmark Survey of Transactions in Selected Services and Intangible Assets with Foreign persons and the BE-125 Quarterly Survey of Transactions in Selected Services and Intangible Assets. The BE-120 is a comprehensive survey to be administered once every five years, while the BE-125 captures data on a quarterly basis, but with higher threshold reporting requirements and less comprehensive coverage. The BE-120 requires mandatory reports from all U.S. persons with sales exceeding \$2 million to foreign persons (or purchases exceeding \$1 million) in any category of covered transactions. The BE-125 only requires mandatory reports when sales exceed \$6 million (or purchase exceed \$4 million)

<sup>24</sup> These and all other numbers in this paragraph are taken from the U.S. BEA website, <http://www.bea.gov/international/xls/tab4b.xls>, downloaded on August 30, 2009.

conferred on affiliates by access to the intellectual assets of the parent. Possible reasons why these numbers are so small include: underreporting by U.S. firms of payments back to the parent in order to reduce the worldwide tax liability of the parent system;<sup>25</sup> intellectual property migration (Lipsey, 2008), whereby intellectual property is located in affiliates in tax-haven jurisdictions (such as the Cayman Islands, Ireland, Singapore, the Netherlands, or Hong Kong) with favorable tax accounting laws; and inadequate data quality and coverage, since thresholds in the BE-10 survey, which obtains data on multinational firms' royalty payments, have increased steadily over time, potentially resulting in deterioration of coverage for smaller firms.<sup>26</sup>

Budgetary pressures and other priorities have led the BEA in recent years to raise the reporting thresholds for some of the key survey instruments that measure technology licensing activity by U.S. multinationals. If these trends continue, then the quality of our official data could deteriorate even as the need for high quality data rises. We strongly believe additional funds would improve the quality of the survey instruments and survey processes.

In addition, it should be recognized that from the perspective of U.S.-based multinationals, intellectual property migration is a rational method of minimizing global tax liability. To what extent does it meaningfully distort official measures of technology licensing and other international service flows? Even indicative or incomplete evidence on this question could be useful, and additional resources would enable the BEA to pursue this issue.

Finally, additional research could also help clarify the extent to which inter-firm licensing revenues, especially the component based on royalty payments for industrial processes, reflect broad cross-licensing agreements versus intentional sales of particular technologies. Survey research focused on a manageably small number of firms who account for large amounts of technology licensing revenue could be quite helpful in describing how these two very different sources of licensing revenue have evolved across different industries and over time.

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<sup>25</sup> Branstetter, Fisman, and Foley (2006) noted these problems and attempted to account for them in their study of the response of technology transfer to changes in patent laws.

<sup>26</sup> The BE-10 survey is administered in benchmark years. In non-benchmark years, the BEA now relies on the BE-125 to track royalty payments between affiliated and unaffiliated parties. The minimum transaction size necessary to trigger a mandatory report (\$6 million in sales) could be high enough to miss some transactions.

### 3. Proposals

We summarize the proposals implicit and explicit in the discussions above as follows:

**With respect to import and export data**, understanding the greater fragmentation of the production process of goods and services requires access to firm-level data, as well as more complete surveys of the nature of intra-multinational trade. These measures can then be compared with existing industry-level measures to gauge the extent of mismeasurement of macroeconomic measures of productivity and GDP growth. To this end, more work is needed in the construction of measures of goods and services offshoring using the firm-level datasets collected by BEA and the Census Bureau. While data on trade in services are now available at a more disaggregate level than at any other time, more detail is sorely needed. And more generally, the data collection process for the input-output tables constructed by BEA should be expanded to distinguish between domestic- or foreign-produced inputs in the construction of the input-output tables.

**With respect to international prices**, understanding the incentives for firms and consumers to buy or sell internationally, and the implications of international trade and movements in the dollar exchange rate for domestic costs and price inflation, require far more detailed international prices than are currently available. In the face of these data needs the International Price Program faces severe budget shortfalls. While data on the source and destination of cross-border flows of services are limited, the already very limited data on international prices of services have been further curtailed. There are no international prices for business and professional services, a part of international trade rising rapidly and of particular interest at the new frontier for global competition in labor markets. It is critical that policy discussions related to services trade are founded on research that provides clear results and policy guidance. This means having access to data that are much more disaggregated and comprehensive in scope. Collection of these international price data, particularly for so-called “other private services”, is a priority. Apart from data collection, a valuable IPP resource would be created under the proposed program to construct an “input price index”. This would allow for accurate measurement of prices as the availability of low-price foreign goods grows—a task that is overdue. However, this program would require additional funding in order to be implemented by the IPP.

**With respect to data on foreign direct investment and multinational trade**, over the last 25 years, resource constraints have limited BEA's ability to keep pace with the growing levels of international engagement of U.S. firms. As a result, survey coverage of firms is less complete than in the past, limiting what BEA can report, especially about operations in smaller industries and countries. Restoring the level of funding for the foreign direct investment surveys would reverse, or at least contain, the deterioration of the micro-data that BEA collects, and if it permits less use of sampling in the surveys, would enhance the ability of researchers to make use of longitudinal data that allow for careful analysis of policy changes and changes in economic conditions.

**With respect to trade in intellectual property and ideas**, it is unlikely that in the near future corporate tax law will be reformed sufficiently to alleviate the problems faced in collecting data on inter-firm technology transfers. However, targeted surveys of the largest firms could potentially uncover the basic patterns of trade in ideas. Again, the budget-constrained BEA would be an ideal partner in this area.

As an alternative to generating new data, another way to enable more research with existing data is through **more extensive data-sharing**. For example, there would be significant benefits to improving data sharing arrangements between BEA and the U.S. Census. Although both of these organizations are a part of the U.S. Department of Commerce, data sharing between these entities is limited. In principle, one could match the BEA data on multinational firms and foreign investment with the firm-level U.S. trade data described in Section 2.2, as well as with the other firm-level census data. A data set with information on multinational activity, intra-firm trade, and arm's length trade would be very powerful in a variety of studies, including studies of offshoring, the international product life cycle, and the modes by which firms serve foreign markets. However, legal and bureaucratic hurdles have impeded the creation and use of combined data. Removing these hurdles would open up many possibilities for research on the important role of multinationals in U.S. trade.

## Appendix A: U.S. Tariff Data

One source for U.S. tariffs is the U.S. trade data described in section 2.1. Those data include a variable reflecting the tariff duties collected on each product. By dividing the duties by the customs value of imports, an estimate of the *ad valorem* tariff is obtained. A second source is the U.S. International Trade Commission (USITC) which posts the Harmonized Tariff Schedule of the United States (HTS), [www.usitc.org](http://www.usitc.org). For the years 1989 to 2001, those files have been compiled in a tariff database described in Feenstra, Romalis and Schott (2002), available at [www.nber.org/data/](http://www.nber.org/data/) and [gsbwww.uchicago.edu/fac/john.romalis/research/](http://gsbwww.uchicago.edu/fac/john.romalis/research/).

The tariff database includes *ad valorem*, specific and estimated *ad valorem* equivalent (AVE) tariffs based on the most favored nation (MFN) rate of the HTS. The file also indicates products that are eligible for tariff preferences under free trade agreements such as with Canada, Mexico and Israel, and indicates products eligible for any preferential programs such as the Generalized System of Preferences (GSP), the Caribbean Basin Initiative (CBI) and the African Growth and Opportunity Act (AGOA). The database provides details of the applicable tariffs under all of these agreements and programs. The other potential advantage is that the tariff database provides information separately on specific versus *ad valorem* tariffs.

As mentioned, tariffs can be inferred using data on actual tariffs paid and the value of trade. The main information contained in the tariff schedule that is not available elsewhere is information on applicable tariffs where no trade is observed. While the MFN tariff can almost always be observed in this way, the same is not true for many preferential tariffs, because in many cases trade in the product between with the relevant country simply does not take place.

## **Appendix B: United Nations Trade Data**

The main United Nations trade data are those of the United Nations Commodity Trade Database (UN Comtrade), maintained by the United Nations Statistical Office. They include detailed annual data from 1962 to the present on commodity exports and imports that have been reported to the UN. The reports for recent years cover almost all the countries in the world, more than 200, many areas that are not countries, and many countries that no longer exist in their former status. Some countries that existed in 1962 did not begin reporting their trade until after that date, although their trade may have been reported by their partners. Data for years before 1962 are not included in the Comtrade database, but were published by the United Nations (United Nations, 1953 and 1962). The Comtrade database is now publicly available for subscription by individuals or institutions. Information is available at: <http://comtrade.un.org>.

The Comtrade data include values in all cases and measures of quantity for much of trade. The data are initially collected by national customs authorities or statistical offices, converted by them into the statistical classification prescribed by the UN Statistical Office, and supplied by them to the Statistical Office. The Statistical Office incorporates them in the UN Comtrade database and publishes abbreviated versions in the UN *International Trade Statistics Yearbooks* and other UN publications. At the present time, most countries supply trade data to the UN according to the Harmonized System (HS) classification, 2002 version, at the six-digit level of detail or more disaggregate.

The UN data have been supplied to users and published for many years in various versions of the UN's Standard International Trade Classification (SITC). The first version of the SITC was published in 1950, Revision 1 in 1961, Revision 2 in 1974, and Revision 3 in 1986. The successive versions have expanded greatly. The original SITC contained only 570 product classifications at the most detailed level, the first revision, 1,312, the second revision 1,924, and the third, 3,118. That increase in detail means that data reported in a later version of the SITC can be converted to an earlier version more accurately than data reported in an earlier version can be converted into a later version. For the earliest years of the Comtrade database, most countries' reports are only available in SITC Revision 1. For 1962, the first year, 84 countries are covered.

By 2005, 136 countries were available according to SITC Revision 3. The number of countries that reported in each classification is shown, for several years, in Table A1.

**Table A1: The Number of Countries Available In UN Comtrade Data Base By Classifications**

	SITC Rev. 1	SITC Rev. 2	SITC Rev. 3	HS1992	HS1996	HS2002
1962	84	0	0	0	0	0
1972	118	0	0	0	0	0
1982	115	87	0	0	0	0
1992	113	109	90	56	0	0
2002	165	165	165	161	154	88

Source: UN Comtrade Database.

In addition to the countries and areas that report their trade to the UN, the database includes the trade of other countries, to the extent that they appear as trade partners of the reporting countries. Some of the partner data are in summary geographical categories such as “Africa, n.e.s.” and cannot be attributed to specific countries. Trade among non-reporting countries is not included at all.

Since Taiwan is not recognized by the UN, the trade of Taiwan is included in the Comtrade data base only as it is reported by its trading partners, under the heading “Other Asia, n.e.s.” One feature of the Comtrade data base is that the UN Statistical Office accepts the member countries’ data and makes no estimates of missing or misclassified data even when omissions or misclassifications are known. For example, the data on imports into Singapore from Indonesia were not revealed by the Singapore government from 1964 to 2002, and the Comtrade data base therefore did not show any such imports.

Countries report their trade to the UN Statistical Office under one of two trade systems, the “general trade system” or the “special trade system.” Under the general trade system, there is no distinction between the statistical territory of a country and its economic territory. Imports therefore include products that do not pass through customs and are later exported, with or without further processing, and exports include products that had been previously imported. Under the special trade system, imports include only goods entering the “free circulation area of a compiling country, which means cleared through customs for home use...and exports include all goods leaving the free circulation area of a compiling country” (United Nations, 2004, p. 81).

The United Nations accepts both systems, but recommends the general trade system. The distinction is of major importance only for entrepôt countries, such as Singapore, but is one of the reasons why export and import reports disagree.

The NBER World Trade database for 1962-2000 (Feenstra, Lipsey, *et al.*, 2005) is partly a modification of UN Comtrade data and partly derived from earlier versions of UN data. For 1962 to 1983, the data had been in SITC Revision 1 categories, and were converted to SITC Revision 2. For the later years, data for 72 countries were obtained from the UN, classified by SITC Revision 2, and a single-valued trade data set was constructed giving preference to import data, but using export data from partners where import data were not available.

Two main adjustments were made to the UN data. One was to make corrections or additions to data for 35 of the countries between 1984 and 2000, by estimating values for trade where either the partner or the commodity classification had been concealed by the reporting country. Another adjustment was to shift to Hong Kong exports part of exports by China through Hong Kong. These were treated by some importers, such as the United States, as imports from China even though part of the value was added in Hong Kong. In addition to these adjustments, U.S. imports reported by the U.S. Census Bureau were substituted for U.S. imports reported in the UN data.

The NBER World Trade database is available at [www.nber.org/data/](http://www.nber.org/data/), and at [www.internationaldata.org](http://www.internationaldata.org). Because the Comtrade database is now publicly available for subscription by individuals or institutions, there are no plans to update the NBER World Trade database beyond 2000.



## Appendix C: Concepts of International Trade in Services

There are several criteria used by the UN and WTO to define international trade in services. First, services can be distinguished from goods in that they are characterized by “abstract concepts rather than by physical attribute or physical function”.<sup>27</sup> Second, international trade in services is not just cross-border activity between buyers and sellers, but also is linked to foreign investment and movement of people. Hence, classification and definition of services by international institutions incorporates various modes of delivery of services, rather than simply measuring the activity through cross-border trade.

The IMF’s *Balance of Payments Manual 5 (BPM5)* covers international trade in services in the traditional cross-border sense, that is, imports and exports in the System of National Accounts. When the General Agreement on Trade in Services (GATS) came into force in 1995 as part of the Uruguay Round undertaking, it included a broader definition of internationally traded services, specifically activities in the host economy associated with direct investment and the movement of people engaged in service activities. Making the bridge between the *BPM5* and the GATS, the UN, in conjunction with an Interagency Task Force, in 2002 produced the *Manual on Statistics of International Trade in Services*. Specifically, the *Manual* extends the definition of “international trade in services” to include the value of services provided through foreign affiliates and by non-permanent movement of persons. Thus, international trade in services extends significantly beyond the notion of cross-border trade in the “goods” sense.

The GATS’ four modes are important because they explicitly acknowledge linkages between cross-border trade in the traditional sense, like goods (mode 1 and mode 2), the link between trade and direct investment inside a corporate organization (mode 3), and the link between trade and movement of people for economic activities (mode 4).

- Mode 1: “cross-border supply” covers services supplied from one country to another, such as international telephone calls or Internet-related web-services (e.g. call-centers) where the customer stays in his or her own country.

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<sup>27</sup> See paragraph 1.13, *Manual on Statistics of International Trade in Services*, United Nations, OECD, Eurostat, IMF, UN Statistics Division, UNCTAD, WTO (2002).

- Mode 2: “consumption abroad” covers activities where consumers from one country travel to the other countries to make use of a service in another country, such as tourism, education, and medical services.
- Mode 3: “commercial presence” covers activities such as when a company from one country sets up subsidiaries or branches to provide services in another country, for example a wholesale outlet, or branch bank.
- Mode 4: “presence of natural persons” is when individuals, such as a construction worker or software programmer, travel from their own country to supply services in another country. In implementation though, there are still problems. First, the GATS modes and the UN *Manual*, while making important strides in defining international trade in services broadly, acknowledge significant tensions and blurring between goods and services. Second, the match between the SNA and the GATS is imperfect.

With regard to the second issue, Modes 1 and 2 are clearly exports and imports in the SNA sense, Mode 3 is not, and Mode 4 is troublesome. Mode 4 is acknowledged to be an import or export of labor services, but data are not usually available to capture these services. Rather they appear as flows of remittances, in another part of the international accounts, rather than being incorporated into trade flows. These issues matter for producers of price indexes. In particular, the Internet and information technology are enabling more activities to be undertaken in Modes 1 and 3 (perhaps as substitutes for Mode 4), particularly as “intermediates” inside a corporate structure that might be classified within manufacturing. Thus, much of the most interesting and challenging international service activities have no clear identification in classification schemes and have no source of detailed data.

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