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U.S. Bureau of Economic Analysis' Experience in Evaluating Alternative Data and Methods to Improve Travel Statistics

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**BEA's Experience in Evaluating Alternative Data and Methods
to Improve Travel Statistics**

I.   Introduction

This paper provides a description of BEA's experience in evaluating alternative data and

methods for estimating trade in travel services with particular emphasis on evaluating

alternative travel expenditure surveys. BEA decided to explore the alternative data and

methods due to concerns about the quality and continued availability of one of its primary

data sources for compiling travel statistics: a survey conducted by another Department of

Commerce agency of international air travelers that collects information on their

expenditures. One alternative source—credit, debit, and bank card data—offered several

advantages over survey data, including that they did not rely on travelers' recall or

expectations of their travel spending, they provided complete geographic coverage, and they

could be collected on a BEA survey, allowing BEA to control its design, frequency, and

continued availability. However, there were obstacles to obtaining and using the card data

that would have to be overcome. First, the survey had to be designed to capture only travel-

related transactions and not other cross-border transactions made using cards. Second, not all

travel spending is done with cards, so a method for extrapolating from the card data to the

estimates of total spending had to be devised. BEA was able to address some of the issues

but not all, and, as a result, is exploring how it can use the card data it now collects along

with other data sources and methods to compile its travel statistics.

The paper begins with a description of the motivation behind the effort to collect and use

card data. This is followed by a description of the original BE-150 Survey of Payment Card

and Bank Card Transactions Related to International Travel and the proposed method for using the BE-150 survey data. This method involved estimating an expansion factor to include in the statistics the portion of travel spending not made with cards. BEA conducted a survey to estimate this expansion factor. Then, the paper provides a summary of the major concerns with the original BE-150 survey, the redesign of the survey to address those concerns, and problems estimating the expansion factor. Next, it provides an assessment of alternative data sources available to BEA to produce travel estimates. This focuses on comparisons of average expenditure data collected on the Survey of International Air Travelers (SIAT), which is administered by the Office of Travel and Tourism Industries of the International Trade Administration, U.S. Department of Commerce, to data from the BE-150, data from comparable surveys from four partner countries, and, for U.S. imports, data from a survey of consumer expenditures by U.S. households and publicly available information on average costs for travel to selected countries. The paper then outlines next steps as BEA continues to develop an improved methodology for estimating travel services. The paper concludes with a description of the new presentation of travel statistics that BEA will introduce in June 2014 to align with the international guidelines.

II. Motivation for exploring the use of card data to estimate travel

BEA uses a method of estimating international trade in travel services that involves multiplying the number of travelers by estimates of average expenditures per traveler.[1] The data on the number of travelers comes from the Department of Homeland Security, Office of

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[1] This method applies to travel to and from overseas countries. BEA uses partner country data for estimates of travel with Canada and Mexico, the two countries with which the United States shares borders.

Immigration Statistics. The estimates of average expenditures are based on the SIAT. BEA

bases estimates of education services, medical services, and the expenditures of short-term

workers, included in travel in the international guidelines, on other source data. This paper

only examines estimating personal travel, excluding education or health-related travel, along

with business travel, excluding expenditures by short-term workers, to and from overseas

countries.

Some aspects of the data on numbers of foreign visitors to the United States and of U.S.

travelers abroad limit their usefulness although these data are very reliable. The U.S. traveler

data capture travel by citizens rather than travel by residents as called for by balance of

payments accounting guidelines. For U.S. travelers abroad, the data capture only the initial

destination of the traveler, so BEA must adjust the data to account for cases where travelers

visit multiple countries during a trip.

While the average expenditure data from the SIAT appeared to be reliable with no

documented bias, BEA had several concerns about the data received from the SIAT. The

SIAT is a self-administered survey of travelers departing the United States. Foreigners

traveling to the United States must rely on their recall when responding to the survey and, in

some cases, may not be inclined to provide accurate information. U.S. residents traveling

abroad are asked to provide their expectations of their foreign expenditures rather than their

actual expenditures and, in some cases, may not be inclined to provide accurate information.

The sample sizes for the survey can be small, especially for countries that are less common

destinations for U.S. travelers abroad or origins of foreign travelers to the United States. In

terms of survey design, the SIAT asked for information on a wide variety of aspects of the

travel experience in addition to the questions on expenditures, perhaps limiting respondents' focus on the expenditure questions. In previous versions of the SIAT, the questions on expenditures may not have been clear to respondents; in particular, it may not have been clear whether or not they should include air fare. Finally, there are periodic concerns about funding for the SIAT and whether it will continue to be available as a data source.

Card data offered several advantages. The data came from company records and, therefore, should be more accurate than data based on travelers' recall or expectations. The data should also be more complete than those based on the small sample sizes of the SIAT, particularly for less common tourist destinations for U.S. travelers or less common origins for foreign travelers in the United States. Because of concentration in the card industry, only a few firms would have to reply to the survey, which should reduce the costs to administer the survey as well as minimize the total burden placed on respondents. Finally, BEA could control the design, frequency, and administration of the survey. As a result of the concerns with the SIAT and the advantages offered by card data, BEA decided to explore whether credit and bank card data could be used as the basis for estimating travel expenditures.

III.   **Original proposal and surveys**

Originally, BEA planned to collect data on expenditures made by U.S. travelers abroad and foreign travelers in the United States using credit, debit, and bank cards and then use an expansion factor based on the portion of spending that total international travelers make using those cards to derive estimates of total travel expenditures. The portion of spending made using cards was also to be based on a survey. Each of these surveys and the issues that arose are discussed below.

BE-100 Survey of International Travel Expenditures

To provide a basis for expanding the data from the survey of card transactions to reflect expenditures using all means of payment, BEA contracted with a survey research firm to survey international air travelers on the proportion of their expenditures for travel made using various forms of payment. For pre-trip expenditures, it asked about the percentage spent using credit or debit cards with a U.S. business, using credit or debit cards with a non-U.S. business, and using cash or check. For within-trip spending, it asked for the percentage made using a credit or debit card, using cash withdrawn or advanced using a credit or debit card, or using cash or travelers' checks brought from home. In addition, the survey collected information on the trip, including origin/destination, length, purpose, and total expenditure, and limited demographic information on the traveler, including age and gender.

The survey was translated into five languages: Japanese, German, Spanish, French, and Korean. The contractor conducted the survey at six U.S. airports in four seasonal waves: December 2008, March 2009, August 2009, and October 2009. Approximately 1,300 responses, evenly divided between inbound and outbound travelers, were collected in each wave; after removal of incomplete or obviously incorrect responses, there were about 4,800 responses remaining.

The selection of airports depended on both the amount of international air traffic handled by the airport as well as receiving permission from the airport to conduct the survey. Interviews of foreign travelers were conducted in waiting areas at departure gates and interviews of U.S. travelers were conducted in baggage claim areas, so both inbound and outbound travelers were interviewed at the end of their trips. Flights were selected to provide adequate regional

coverage. Respondents were randomly selected based on an interviewing rate dependent on the amount of traffic at each location (i.e., every nth person at a specific location was approached for an interview). Respondents received an incentive to participate in the survey.

Original BE-150 Survey of Payment Card and Bank Card Transactions Related to International Travel

The original BE-150 survey was launched in the first quarter of 2009 and covered four companies that operate card networks. It identified cross-border transactions based on the location of the merchant (seller) and the location of the bank that issued the card. At the aggregate level, it asked for transactions to be divided into seven categories: cash withdrawals and six spending categories. These spending categories were lodging, air transportation, other transportation, food services and drinking places, recreation and entertainment, and retail goods and services. The survey also asked that aggregate spending be separated by spending on business cards and on personal cards, and by country of the card issuer for U.S. receipts and by country of the merchant for U.S. payments.

IV. **Concerns with the BE-100 and original BE-150 surveys**

In reviewing the data from the surveys and the implied estimates of trade in travel services that would have resulted from the proposed estimation methods, several concerns were identified. These are discussed for each survey below.

BE-100 survey

The key item collected on the BE-100 was the share of travel expenditures paid for using credit and debit cards. This share would be used to expand the reported card spending to

derive estimates of total expenditures. The first step in evaluating the quality of the BE-100 responses was to compare the estimates from the BE-100 survey to other data on spending by method of payment. An alternative source is the SIAT, which collects data on travel expenditures by method of payment. However, these data are not strictly comparable because the SIAT did not ask for spending by the same means of payment. Specifically, the SIAT asked for spending by cash and did not distinguish cash acquired using cards overseas from cash brought from home. BEA also examined data from the Nilson Report, a newsletter for the payment card industry, and from the 2008 and 2009 Surveys of Consumer Payment Choice conducted by the Boston Federal Reserve Bank. Neither the Nilson Report nor the Federal Reserve data provided statistics specifically for travel. The results from the BE-100 survey were broadly consistent with these other data sources, but it was impossible to make precise comparisons due to the differences discussed above.

BEA had several other concerns. First, the survey was a one-time survey beginning in the fourth quarter of 2008 through the fourth quarter of 2009, and BEA has no firm plans to conduct the survey again. The time period covered by the survey may not have been typical given the financial crisis and economic slowdown at that time. In addition, with a one-time survey, it is not possible to monitor how card usage has changed over time. Card usage could be expanding, both overseas and by tourists in the United States, so that the portion of international travel spending paid via card could be increasing. On the other hand, new forms of payment not included on the survey, such as paying via cell phones, could have grown in popularity and reduced the portion of travel spending via card.

Second, there were two concerns about the survey design. The survey asked respondents for the percentage of spending by various means, which may be difficult for respondents to calculate. In reviewing the data, it was discovered that almost half of respondents, both inbound and outbound travelers, had replied either 100 percent or 0 percent. The third most popular response was 50 percent. While it is possible that these were legitimate responses, it is also possible that asking the question another way may have yielded a more accurate estimate of the portion of travel spending via card. Finally, for respondents traveling in groups, the survey did not make clear if the respondent should reply for himself or herself or for the group as a whole.

Third, the survey had a small sample. It was hard to evaluate how representative the sample was because the demographics of the total traveling population are not known. However, it could be compared to the characteristics of the larger sample for the SIAT, and, while not definitive, some of these comparisons raised concerns. For example, business travelers were a larger share of respondents to the BE-100 survey than to the SIAT. If business travelers are more likely to use cards, then the resulting usage rate is likely to be higher on the BE-100 survey than on the SIAT, although which is more accurate would likely depend on which sample was closer to the actual share of business travelers in the population. The small sample size also meant that estimates of trade in travel services for many countries would have to be estimated using an average for a broad region.

Under the proposed methodology, the expenditure estimates would be very sensitive to the estimated portion of spending made using cards.[2] Due to the sensitivity of the resulting estimates to the expansion factor, it would be necessary to have a very good estimate of these shares. Given the difficulty of designing a survey instrument to produce an accurate estimate of the portion of spending via card as well as the expense of conducting a survey on a frequent enough basis with a large enough sample to produce estimates that would remain accurate over time, no further surveys were undertaken to estimate the share of travel expenditures paid via card.

BE-150 survey

In examining the data reported on the BE-150 survey, BEA had several areas of concern. First and foremost, the survey appeared to include e-commerce and other on-line transactions that were not travel-related. Second, companies may have differed in how they classified transactions into the requested spending categories. Third, there were transactions that represented spending by U.S. residents abroad or foreign residents in the United States that should not be classified as travel services. Finally, there may have been additional companies that should have been surveyed. These issues were addressed in a redesign of the BE-150 survey that was launched in the first quarter of 2012.

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[2] Let X represent the portion of spending via card used in the estimation methodology and Y represent the true value. It can be shown that the resulting error in the estimate would be equal to $\left(\frac{Y}{X}\right) - 1$. To give an idea of the error involved, if X is 55 percent when in reality Y is 63 percent, the method would yield an estimate 15 percent higher than would result from using the true value for the expansion factor.

In reviewing the data from the original survey, it was discovered that the category retail goods and services accounted for about 70 percent of travel receipts and 50 percent of travel payments. These percentages were higher than the levels suggested by other information on travel expenditures by category, such as the SIAT, and indicated that e-commerce transactions were being included in the data. Other evidence included very large transactions reported for countries with few international travelers but a large e-commerce presence. For example, Cyprus ranked 14th in credit card spending by U.S. residents in 2009, but, according to the Cyprus Statistical Service, fewer than 18,000 U.S. residents visited the country in that year. However, Cyprus is a popular location for internet payment systems and on-line entertainment sites.

To address these concerns, BEA asked the card companies for spending to be reported for the six spending categories (lodging, air transportation, other transportation, food services and drinking places, recreation and entertainment, and retail goods and services) by whether a card was present at the time of sale and by country. This allowed BEA to identify those transactions where the card was not present that may not have been travel-related, and to identify countries that may have had unusually high spending in certain categories. For example, BEA would want to include all spending for lodging whether the card was present or not because all lodging expense is likely to be travel-related, but would want to exclude card-not-present transactions for retail goods and services because these are likely to be e-commerce transactions. This made a significant difference in the reported data. After removing card-not-present retail goods and services, the shares of total travel expenditures accounted for by retail goods and services fell to 32 percent for receipts (down from 70 percent on the original survey) and to 15 percent for payments (down from 50 percent),

closer shares to what was expected. There were also changes by country. For example, when card-not-present goods and services transactions are excluded, Cyprus ranked 99th in payments. All of the reporters on the BE-150 survey that process card-not-present transactions are able to report as requested.

In the original BE-150 survey, BEA did not provide detailed definitions of the six spending categories, which raised the possibility that different reporters were classifying similar transactions in different categories. In the redesigned survey, BEA uses 4-digit codes, called merchant category codes (MCCs), to define the categories. The U.S.-based payment card industry uses MCCs to classify each merchant and its transactions into industry groups. One or more MCCs are assigned to each U.S. or foreign merchant based on the merchant's primary type of business. Each transaction is then assigned the MCC used by the merchant to process the transaction. Most members of the payment card industry collect detailed data on transactions by country and MCC-based industry group. In total, there are approximately 600 MCCs on the universal list used by the U.S. payment card industry. However, the card companies group the most-detailed MCCs into higher level aggregates for their internal processing purposes. As discussed below, this aggregation presented a problem for BEA as the aggregations differ from the six spending categories proposed by BEA.

BEA identified the 4-digit MCCs codes that should be included in each of the six spending categories. BEA was also concerned that certain transactions that BEA did not want in the source data were being included in the six categories. For example, if a business traveler purchased materials with a card and then had them shipped to the United States, those transactions should not be included in the source data for travel because they would be

included in the cross-border goods trade. Similarly, BEA uses data from other sources to estimate cross-border trade in education and health-care spending associated with travel. BEA attempted to use the MCCs to remove spending that appeared to be related to these transactions.

Unfortunately, these efforts to exclude specific transactions and define spending categories through MCCS were only partially successful as card companies did not fully report as requested since they would have had to incur significant programming costs to do so. As discussed above, card companies group the most-detailed MCCs into higher level aggregates for their internal processing, and these higher level aggregates vary from company to company. Reporters match their internal aggregates to the six spending categories as closely as possible, but have not reengineered their systems to report fully as requested on the survey.

BEA sent the original survey to only credit, debit, and charge card processing companies. BEA has since researched the payments industry to determine if additional companies should have been surveyed. As a result of this research, BEA identified and added to the survey companies that operate point-of-sale networks. These companies account for about 2 percent of reported transactions. BEA believes that coverage for the survey is now complete but will continue to monitor the card industry for new reporters.

Despite these improvements, there were other concerns that could not be addressed by redesigning the BE-150 survey. First, the transactions reported on the BE-150 survey include transactions captured elsewhere in the ITAs. For example, air fares for travel to and from the United States and spending by non-travelers who are overseas, such as U.S.

military, students, and diplomatic personnel stationed overseas, would be included in the reported transactions. The reported data may also include some remittances.

A second issue is that there may be a difference between the country of residence of the traveler and the country of the card issuer. If a U.S. resident has been issued a card through a foreign card issuer, his or her spending in the United States with that card would incorrectly be recorded as spending by inbound travelers and his or her spending on international travel would be incorrectly excluded from spending by outbound travelers. A comparable situation would exist for foreign residents with cards from a U.S. card issuer. In addition, a foreign resident could hold a card by an issuer in another foreign country. In this case, their spending in the United States would be correctly reported as spending by an inbound traveler, but would be incorrectly attributed to the country of the card issuer rather than the country of residence. As a result, the value of transactions for some countries that are financial centers appear to be unusually high, while transactions for some small countries appear to be low or not reported at all.

Finally, some transactions may be missed by the survey due to the structure of the card processing and card issuing industries. First, if a traveler uses his or her card at a foreign branch of his or her issuing bank, that transaction would be processed through the bank's internal network and would not be recognized as an international transaction. Second, a card issuer may have a reciprocal agreement with a foreign card processor that would allow the foreign company to process transactions made using that issuer's cards. Because the BE-150 survey only covers U.S. card processors, such transactions would be missed on the survey.

Under the original proposal for using the card data, travel estimates would be produced by taking the data reported on the BE-150 survey and expanding it to total travel spending using an expansion factor that represents the share of travel spending using cards. As discussed above, due to concerns with the reliability of the expansion factors BEA has not yet adopted that as an estimation method for cross-border trade in travel. However, BEA still considers the information collected on the BE-150 survey to be useful in informing its travel estimates. As of now, BEA has retained its current method of estimating travel by multiplying the number of travelers by a measure of average spending per traveler taking into consideration additional data sources in the estimation of average spending per traveler. BEA is assessing alternative and additional data sources for the estimates of average expenditure per traveler and identifying approaches to improve those estimates if necessary. BEA is also addressing some issues with the data on the number of travelers. Even though BEA feels that the data on the numbers of inbound and outbound travelers are of high quality, there are issues with the timeliness of data, especially for inbound travelers, and with the distribution of travelers by country, especially for outbound travelers. These issues are discussed in turn below.

V.   SIAT and other data sources for average expenditures per traveler

To assess the quality of the SIAT data, BEA examined the SIAT microdata, focusing on the adequacy of the sample sizes for individual countries and the level of implied travel expenditures as compared to those from other source data. The data reported by foreigners traveling to the United States rely on their recall and, for U.S. residents traveling abroad, rely on their expectations of their foreign expenditures rather than their actual expenditures.

There is concern that both of these could be understated, and that the problem could be worse

for outbound travelers as they might routinely spend more than they expected.[3]

The data sources used for comparison to the SIAT include the BE-150 survey, along with

partner country microdata on travel expenditures, travel import data from the U.S.

Department of Labor's Consumer Expenditure Survey (CE), and publicly available

expenditure estimates. BEA identified four countries—Australia, Italy, New Zealand, and

the United Kingdom—that published pivot tables of data from their surveys of international

travelers.[4] The pivot tables allowed BEA to obtain information on the underlying microdata,

such as counts, averages, and sums, without actually accessing the microdata. For U.S.

imports, BEA acquired special tabulations from the U.S. Department of Labor's CE. The CE

is a household survey that collects data on the buying habits of U.S. households; it includes a

travel module that separately identifies international travel. BEA also compared the data to

publicly available information on typical expenditures for travelers to various countries. The

assessment of the SIAT data is still underway but has yielded some preliminary indications

of quality of the data.

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[3] One set of concerns about the SIAT regarding the clarity of some questions and the collection of data on aspects of travel other than expenditures has largely been addressed by a redesigned survey instrument that was launched in the first quarter of 2013. The redesign has reduced the number of questions and clarified some of the questions on expenditures. In addition, the Office of Travel and Tourism Industries, which oversees the SIAT, has expressed a willingness to work with BEA to refine further the questions on expenditures.

[4] Data were not available for travelers from New Zealand to the United States.

Partner country data

The comparison to partner country data enabled BEA to explore several facets of the SIAT including comparisons of estimates of average expenditure per traveler and sample sizes from the SIAT to those from the partner country surveys. These comparisons allowed for an assessment of whether expectations-based reporting is understated compared to recall-based reporting. BEA has microdata from the SIAT for 1996 to 2010, so the comparisons were made for as many of these years as partner country data were available.

These comparisons show that the average expenditures calculated from the SIAT data were not consistently above or below the partner country data. Furthermore, the SIAT average expenditure data for U.S. imports, which are based on expectations, were not consistently lower than the partner country data, which are all based on recall. Thus, there is no evidence that the expectations-based data are understated relative to the recall-based data. However, it is not possible from these comparisons to assess whether recall resulted in underreporting for the SIAT because all the partner country surveys similarly rely on recall. BEA will continue to investigate whether the levels of reporting on the SIAT are understated.

The SIAT data generally showed the same year-to-year movement as the partner country data as well as the same seasonal patterns in the quarterly data. For example, BEA examined the quarterly patterns in the SIAT and in the partner country data for ten separate series: tourism and business travel expenditures for inbound and outbound travel to the United Kingdom and to Italy, and just for U.S. outbound travelers for Australia. In every case that the SIAT showed a significant seasonal pattern, so did the partner country data and vice versa. In addition, when the SIAT data for a quarter were above (or below) the annual average, 80

percent of the time the partner country data for that quarter were also above (or below) its annual average.

The SIAT survey generally had smaller sample sizes for travel to and from the United States than the partner country data. One exception was travel to and from the United Kingdom. Italy had much larger sample sizes on its survey than the SIAT. To assess the impact of the smaller sample sizes of the SIAT on the estimates, standard deviations were computed for each series of quarterly estimates of average travel expenditures for travel to and from the partner country for both the SIAT and for the partner country survey. The standard deviation for the SIAT was smaller than the standard deviation for the partner country survey in 8 of these 14 cases. In addition, for 3 of these 8 cases, the hypothesis that the standard deviation for the SIAT was the same as for the partner country was rejected—the standard deviation for the SIAT was significantly *smaller* than that for partner country data. In the 5 other cases, and in all of the 6 cases in which the standard deviation for the SIAT was larger than that for the partner country survey, the hypothesis of equal standard deviations could not be rejected. Thus, despite generally smaller sample sizes, the SIAT estimates showed no greater variability than estimates from the larger country surveys.

To summarize, the SIAT estimates of average expenditures for travel to and from the United States for the four partner countries examined are comparable to estimates produced by the surveys of those countries. This analysis has alleviated BEA's concerns about sample sizes on the SIAT for major partner countries, but further analysis is needed to assess more definitively if the levels of spending reported on the SIAT are understated due to a downward bias in travelers' recall or expectations.

BE-150 survey

Next, BEA compared SIAT data to the data collected on the BE-150 survey. A problem in doing so is that the redesigned BE-150 survey was not launched until the first quarter of 2012, but BEA only has microdata from the SIAT through 2010. To permit comparisons, BEA adjusted the BE-150 survey from 2009 and 2010 for the card-not-present transactions using the data reported for the four quarters in 2012 to calculate the share of card-not-present retail goods and services in total receipts and in total payments by country for each quarter. These shares were deducted from the total receipts and the total payments reported by quarter and by country in 2009 and 2010.

Comparisons of estimates for Australia, Italy, New Zealand, and the United Kingdom based on alternative data sources

Figures 1 and 2 present U.S. exports of travel services for 2009 and 2010 to the four partner countries whose data on expenditures by travelers are compared to the SIAT. The first bar represents the estimate that results from multiplying the average expenditures calculated by BEA from the SIAT microdata by the number of travelers from those countries from U.S. immigration authorities. The next bar shows the total value of estimated transactions for this country on the BE-150 survey. The third bar represents the estimate of total travel spending that would result from expanding the BE-150 data using the expansion factors from the BE-100 survey. The fourth bar presents the estimates that result from multiplying the average expenditure from the partner country's survey by the number of travelers from the U.S. immigration authorities. Thus, the only difference between the first and fourth bars is in average expenditures and not in the number of travelers.[5] The last bar is BEA's published estimates. The clear box is the number of travelers from U.S. immigration authorities and is measured on the right axis.

A few observations are noteworthy. First, the estimates for each country vary considerably across the different data sources. Second, the total values of transactions from the BE-150 survey (unexpanded) are close to or exceed the SIAT totals for all of the countries. This is surprising since the BE-150 values should only be a portion of the total spending. Third, the SIAT-based estimates often produce the lowest estimate of travel spending across the

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[5] It should be emphasized that this estimate is not the partner country's published estimate. Estimates are not available for New Zealand.

countries, but the data source producing the highest estimates varies. For Australia and the United Kingdom, the expanded BE-150-based estimates are highest, but, for Australia, these estimates are close to those based on the partner country data. For Italy and New Zealand, BEA's published estimates are highest, followed by the expanded BE-150 estimates.

Figures 3 and 4 show the same information for U.S. imports in 2009 and 2010. In this case, the data on the number of travelers have been adjusted by BEA to represent the main destination for the U.S. traveler. This adjustment will be discussed further below. Again, the different data sources generate a wide range of estimates for each country. With the exception of New Zealand, the total value of transactions reported on the BE-150 survey (unexpanded) exceeds the total expenditures based on the SIAT. So, it is not surprising that the expanded BE-150 estimates are the highest estimates for these three countries. The expenditures based on average expenditures from the SIAT are relatively close to those based on average expenditures from the partner country surveys.

Figures 5 and 6 show U.S. exports based on the SIAT, the total value of transactions reported on the BE-150 (unexpanded), the expanded estimates of total travel based on the BE-150 survey, and BEA's published estimates for major regions for 2009 and 2010. Again, the pattern is similar, with a wide range of estimates from the different data sources for each region. The SIAT-based estimates are often the lowest estimates; the exception is Asia and Pacific in 2009 and 2010. The total values of transactions from the BE-150 survey (unexpanded) are close to or greater than the SIAT-based estimates for all regions except Africa and Asia and Pacific. The expanded BE-150-based estimates are highest for Europe,

the Caribbean, and the Middle East, and BEA's published estimates are highest for South and Central America, Africa, and Asia and Pacific.

Figures 7 and 8 show the same estimates for U.S. imports as well as estimates from the Consumer Expenditure Survey (CE). The CE includes a module on travel that separately identifies international travel. Given that the survey does not specifically target international travelers but rather aims to capture all spending by a sample of U.S. households and identifies international travel as just one category of spending, it is not surprising that the sample of households reporting international travel expenditures is small. As a result, the CE data on international travel are not published, so BEA requested a special tabulation of those data. It was difficult to make exact comparisons to the SIAT because the survey is conducted at the household level and does not collect information on how many people in the household are responsible for specific expenditures. Thus, it was not possible to derive a precise average expenditure per traveler from the CE data. However, it was possible to derive a lower bound on average expenditures per traveler by assuming that all household members traveled and an upper bound by assuming that only one household member traveled. To produce an estimate of total travel expenditures, BEA calculated the average between the lower and upper bounds. This average was multiplied by the number of travelers from U.S. immigration authorities to produce an estimate based on the CE data. The CE-based estimates are unavailable for the Middle East and Africa to protect the confidentiality of the data.

There is a wide range of estimates for each region across the different data sources used. However, for U.S. imports from these regions, the expanded BE-150 estimates are always the

highest, and, with the exception of Africa in 2009 and Asia and Pacific, the SIAT-based estimates are always the lowest. The total expenditures calculated using the average from the SIAT are relatively close to those calculated using the average expenditure from the CE for South and Central America, less than the total expenditure from the CE for Europe and for the Caribbean, and higher than the total expenditure from the CE for Asia and Pacific.

Publically available estimates

BEA also compared the average expenditures from the SIAT to information available from the Lonely Planet, a publisher of travel guides. The Lonely Planet publishes two estimates of typical expenditures per day for several countries; one average represents a bare minimum and the other a more comfortable level of spending. Using information on the length of the trip collected on the SIAT, BEA computed an average expenditure per day from the SIAT to compare to these estimates. In 21 of 28 cases for which comparisons could be made, the SIAT is above the bare minimum. Comparisons could be made for 11 of the top 15 destinations. Out of these 11, SIAT average expenditures per day are above the Lonely Planet bare minimum for 9 destinations. This suggests that the SIAT estimates of average expenditures for countries with relatively large sample sizes are appropriately larger than estimates of minimum expenditures for travel to these countries.

Implications of expenditure comparisons for travel estimates

BEA will continue to seek data sources that validate or improve upon the accuracy and precision of levels of average expenditures that it uses in developing its travel estimates. The comparisons undertaken so far provide evidence that the average expenditures from the SIAT

are in the neighborhood of partner country data derived from surveys of international air travelers. For imports, they also are comparable to information from the CE and from public sources. However, they are generally lower than what would be expected based on the unexpanded (and expanded) card data that BEA collects on its BE-150 survey. BEA is examining the BE-150 microdata and has found for some countries that the receipts and payments reported on the BE-150 survey track well other information on the amount of international travel, such as the number of travelers, suggesting that the BE-150 survey is capturing at least directional movements in travel-related spending for these countries. However, for other countries there is little or no relationship between the number of travelers and the receipts and payments reported on the BE-150 survey. BEA will continue to explore the use of the BE-150 survey data as a tool to examine the possibility of underreporting on the SIAT for those countries for which the BE-150 data collection seems to be successful in capturing levels of or movements in travel expenditures. However, another issue complicates the use of the BE-150 survey data as a source to validate the expenditure data from the SIAT: travel websites, such as Expedia, that charge the traveler directly for his or her foreign travel and then pay the foreign providers. If a traveler pays a website in his or her country for some or all of his or her foreign travel, these expenditures would not be captured on the BE-150 survey.[6]

BEA continues to analyze the SIAT microdata to estimate rough confidence intervals and needed sample sizes to assess the likelihood that the observed period-to-period changes in

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[6] BEA had intended to address this with expansion factors accounting for pre-trip spending in the originally proposed method.

average spending reflect real changes in spending levels. It is possible that the BE-150 data could also be a source of information for changes in level of spending for those countries where the data collections appears to be more fully capturing travel-related spending. The statistical analysis performed thus far indicates that the SIAT reliably captures seasonal patterns in spending for countries with a large enough sample size, suggesting that the sample sizes are adequate for these countries.

VI.   Number of travelers data

While BEA is confident that the data on the number of travelers that it receives from the U.S. Department of Homeland Security, Office of Immigration Statistics, accurately capture the number of international travelers, there are concerns about the timeliness and, for outbound travelers, the country distribution of these data. BEA produces monthly estimates of trade in travel services with a lag of about 35 days. At the time these monthly estimates are prepared, BEA has usually received information on the number of outbound travelers, but not always. The data on the number of inbound travelers may be delayed by several months. Therefore, BEA projects the number of inbound travelers and, sometimes the number of outbound travelers, for its monthly estimates. These projections are currently based on enplanements data from Airlines for America and analyst judgment. BEA is exploring incorporating the use of time series forecasting methods with the enplanements data to better project the number of travelers for its monthly estimates.

For outbound travelers, BEA adjusts the data on the number of travelers by country because the data provided by the Department of Homeland Security only capture the initial country visited by the U.S. traveler. These adjustments are meant to capture all of the countries that

the U.S. traveler visits on his or her trip and are based on historical data from the SIAT and analyst judgment. BEA is exploring whether information on the distribution of expenses of outbound travelers in the BE-150 survey data could help in making these adjustments.

VII.   **Next Steps**

BEA is exploring how best to use alternative data sources to produce reliable and accurate estimates of expenditures by country and regions that capture seasonal and cyclical changes in travel expenditures. BEA will also continue to monitor the quality of its estimates of travel expenditures through ongoing comparisons to alternative data sources.

BEA will continue to explore the use of the BE-150 data to inform its travel estimates. For those countries where the BE-150 survey appears to be more fully capturing travel-related expenditures, the BE-150 survey data could be used as a check on, or substitute for, the level of spending reported on the SIAT. BEA is also exploring the use of BE-150 data to adjust the number of outbound travelers for all destinations visited and whether the BE-150 data can provide information on quarter-to-quarter changes in spending and capture trends in travel spending. Finally, the BE-150 survey could be an alternative data source for estimating travel expenditures if the SIAT survey is interrupted or discontinued due to Federal funding limitations.

BEA is also planning to use the data collected from the BE-150 survey on spending on personal, business, and government cards to separate total travel into personal and business travel. This method will use the share of expenditures made using corporate cards and an estimate of the amount of spending business travelers incur with their personal cards to

derive an estimate of the average expenditures of business travelers. An estimate of the number of business travelers will be developed using information both from the SIAT on the purpose of travel and from the immigration authorities on the type of visa issued to the traveler. This number will be multiplied by the average expenditure of business travelers to derive an estimate of total spending by business travelers. Personal travel will then be derived as a residual.

VIII.   Revised Presentation of Travel Statistics

As part of its June 2014 revision, BEA will align its presentation of travel statistics with the international guidelines. Currently, BEA excludes education-related travel, health-related travel, and expenditures by border, seasonal, and other short-term workers from its international travel statistics and includes them in other categories of trade in services. In the revision, these will be included in BEA's travel statistics. In addition, BEA will present the business/personal split. Within personal travel, BEA will present statistics for education-related travel and for health-related and other personal travel. Within business travel, expenditures by border, seasonal, and other short-term workers will be presented separately from other business travel on an annual basis. In preparation for these changes, BEA introduced improvements to its data sources and methods for estimating expenditures by border, seasonal, and other short-term workers in its June 2013 annual revisions. BEA is currently exploring data sources and methods to improve its estimates of health-related travel.

IX.   Conclusions

Due to the importance of travel in total U.S. trade in services and concerns about the quality of the source data for those estimates, BEA has undertaken a multi-year effort to develop and evaluate alternative data and methods to compile international travel statistics. This evaluation continues at this point, but a few tentative conclusions are possible. A comparison of the SIAT to other data sources and an examination of the SIAT microdata preliminarily indicate that BEA's concerns about the sample sizes for the SIAT were not well founded. In addition, the redesign of the SIAT raises the possibility that data quality has improved. However, concerns about possible underreporting on the SIAT due to its reliance on travelers' recall or expectations remain.

Collection of data from credit, debit, and charge card processing companies to estimate international travel statistics is complicated by the inclusion of non-travel-related spending, such as e-commerce, in the reported data. While careful survey design can mitigate this problem, it does not appear to be possible to solve it entirely. Card data can play an important role in informing travel statistics by 1) producing the business/personal split in travel statistics, 2) validating data from other sources, and 3) informing estimates for countries where it appears to track well other information on international travel, such as the number of travelers. However, these data do not appear at this time to be a reliable single source of data for BEA's travel estimates due to continuing data quality concerns and the inability to estimate the expansion factor with a sufficient degree of confidence.

Because BEA is still evaluating data and methods, it is not possible to produce a complete set of experimental estimates of travel statistics for comparison to its currently published

statistics. The estimates based on the SIAT and on the BE-150 survey presented in this paper should not be taken as representative of the eventual revised estimates as BEA will likely use multiple data sources to inform its estimates. However, alternative data sources and new methods may result in significant revisions to BEA's currently published travel statistics. These revisions will be in addition to those resulting from alignment of the statistics with the international standards in a new presentation of international travel statistics that will be introduced in June 2014.

Figure 1: Total expenditures & number of travelers--U.S. exports--2009

Figure 2: Total expenditures & number of travelers--U.S. exports--2010

Figure 3: Total expenditures & number of travelers--U.S. imports--2009

Figure 4: Total expenditures & number of travelers--U.S. imports--2010

Figure 5: Total expenditures & number of travelers--U.S. exports--2009

Figure 6: Total expenditures & number of travelers--U.S. exports--2010

Figure 7: Total expenditures & number of travelers--U.S. imports--2009

Figure 8: Total expenditures & number of travelers--U.S. imports--2010