



# Reliability of the International Accounts

By Thomas Anderson | December 17, 2024

This article analyzes the reliability of two of the core accounts in the U.S. Bureau of Economic Analysis' (BEA's) International Economic Accounts: the International Transactions Accounts (ITAs) and the International Investment Position (IIP) Accounts. The ITA and IIP statistics are updated on a regular cycle that involves the release of a preliminary or "first" quarterly or annual estimate, followed by revisions to the preliminary estimate in subsequent quarters or years. The revised estimates are based on newly available source data that had not been previously available, or more complete or detailed information than previously available in the source data. The revised estimates may also reflect the incorporation of improved estimation methodologies.

While the "first" or other early vintage estimates are published before full or final information regarding an account is available, BEA endeavors to ensure that these estimates are sufficiently timely and reliable to be used confidently as the basis of economic policy and business decisions. To assess the reliability of these estimates, BEA undertakes periodic studies of the size and pattern of revisions in the statistics. The difference between early estimates and later estimates, which incorporate more up-to-date concepts and statistical methods and more complete and accurate source data, provides a measure of the reliability of the initial estimates. In this article, BEA's standard of reliability hinges on these revisions; the standard of reliability is met if the revisions do not substantively change BEA's measures of behavior and trends in key aggregates.

Together, the ITAs and the IIP Accounts provide policymakers, scholars, and the public a broad and comprehensive picture of the economic interactions and relationship between the United States and the rest of the world. The ITAs provide a statistical accounting of U.S. international trade in goods and services, income payments to and receipts from foreign countries, and financial transactions with the rest of the world. The ITA statistics include the balance on trade in goods and services (commonly referred to as the "trade balance") and the current-account balance, which are key net indicators of U.S. economic transactions with the rest of the world.

The IIP Accounts present the value of U.S. financial assets and liabilities with respect to the rest of the world at a given point in time.

## Major Findings

Based on analysis of preliminary and revised statistics for recent years, early estimates from BEA present a clear and consistent picture of both the ITAs and the IIP Accounts. Revisions are generally small relative to the statistics themselves and do not show consistent bias in one direction or the other. Revisions rarely change the estimated time trend of a statistic.

Among the key findings for the quarterly ITA statistics are:

- The first estimates of the balance on goods and services show the same direction of change as the latest estimates 90 percent of the time and correctly identify a majority of turning points.
- Revisions to major components of the ITAs are generally small in magnitude, with a tendency for the first estimates of certain components to be revised upward in subsequent updates.
- Revisions to both exports and imports of services tend to be larger, on a relative basis, than revisions to exports and imports of goods.
- Revisions to secondary income receipts tend to be among the largest, on a relative basis, among the major ITA series.
- Later vintages of the statistical discrepancy are centered closer to zero than earlier vintages.

Among the key findings for the quarter-end and yearend IIP statistics are:

- The first estimates of the direction of the annual change in the net international investment position consistently show the same direction as the estimates updated the following June.
- Revisions to most components of the quarter-end and yearend position tend to be small.
- Revisions for direct investment debt instruments are the largest, in relative terms, among both U.S. assets and U.S. liabilities.
- Direct investment debt instruments also exhibited the least directional reliability.

### Approach of study

This study examines the revisions to quarterly estimates of the ITAs from 2014 to 2023 and quarter-end and yearend estimates of the IIP Accounts from 2013 to 2022 or 2023.<sup>1</sup> For both sets of statistics, the starting point for the analysis is the first period presented on a restructured presentational basis that was introduced in the 2014 comprehensive restructuring.<sup>2</sup>

This study updates a 2017 analysis of the ITAs and a 2012 analysis of the International Economic Accounts.<sup>3</sup>

This study uses two measures to assess the size of the revisions to a quarterly or annual estimate: the mean percent revision (a measure of the net size) and the mean absolute percent revision (a measure of the gross size). The mean percent revision is the average over time of the percent difference between a preliminary estimate and a corresponding revised estimate, expressed as a percent, using scaling factors outlined in the next section. The mean absolute percent revision is the average of the absolute value of the percent difference between a preliminary estimate and a revised estimate. With the mean percent revision measure, negative revisions tend to offset positive revisions (and vice versa), while with the mean absolute percent revisions, negative and positive revisions do not offset each other. Mean revisions are large in magnitude only when either negative or positive revisions predominate.

The study uses several measures to assess the consistency across estimation vintages of the quarterly or annual estimates, including the direction of the revisions, the consistency of the estimate of the quarter-to-quarter or year-to-year trend, and the accuracy of capturing turning points.

In addition, this study also examines the impact of seasonal adjustment on revisions of the ITA components.<sup>4</sup>

## Background

BEA aims to promote a better understanding of the U.S. economy by providing the most timely, relevant, and accurate economic accounts data. For most of its accounts, BEA produces several vintages of any given estimate. Early vintage estimates are necessarily more provisional and are based on less complete source data than updated, later vintage estimates. Despite the largely unavoidable tradeoff between timeliness and reliability, BEA strives to present a consistent and accurate picture of economic patterns and trends even in its early estimates so that economic policy and business decisionmakers can be confident in the factual basis for their decisions. This article presents measures to assess BEA's success in this effort for its ITA and IIP estimates.<sup>5</sup>

Across the economic accounts, BEA balances the competing demands for timeliness and accuracy by releasing preliminary estimates soon after the reference period, and then later updating these estimates on a set schedule as more complete source data become available. For the international accounts, while a substantial share of the preliminary statistics are based on contemporaneous source data, the remainder are projections based on trends and indicator series.<sup>6</sup> Preliminary statistics are based on statistical series that are themselves subject to revision, which necessitates revisions of the BEA series that utilize them as source data. After the first estimate is published, estimates are revised at set intervals to incorporate more current source data and to integrate other estimation changes. The exact timing of these revisions for the ITAs and the IIP Accounts is described in detail in the next section of this study.

The source data errors and regular revisions, along with occasional changes in definitions and methodologies, mean that the *accuracy* of BEA's estimates cannot be assessed by conventional statistical measures such as standard errors.<sup>7</sup> Nonetheless, information on the reliability of the estimates—in other words, how similar repeated estimates of the same target are to one another—can be assessed by examining magnitudes and patterns of differences between early and subsequent vintages of the same estimate. In general, the smaller the revisions to key aggregates, balances, and other accounts, the more the early estimates present a reliable picture of trends and levels in transactions and positions as well as expansions or contractions of U.S. participation in the international economy.

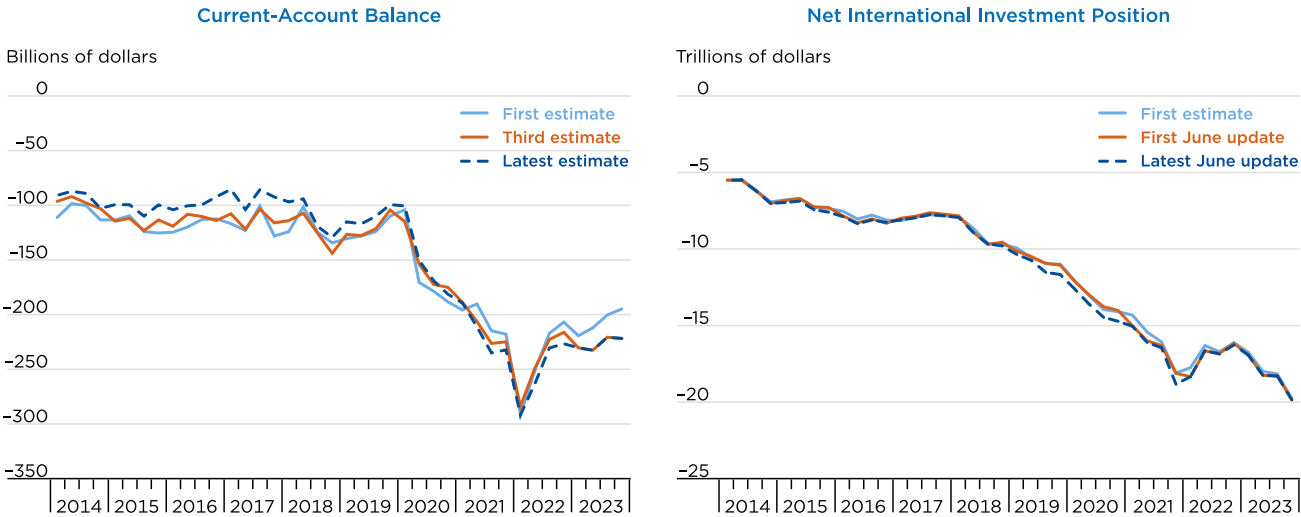
The ITAs provide a comprehensive and detailed look at transactions between U.S. residents and foreign residents, via imports and exports of goods and services and income from investments and other sources. These accounts contribute to, and provide important context for, BEA's National Income and Product Accounts (NIPAs), including the statistics on gross domestic product (GDP). The ITAs are presented as a group of data tables released quarterly. This study focuses on the statistics released in ITA table 1.2. "[U.S. International Transactions, Expanded Detail](#)." The analysis uses the seasonally adjusted data from this table unless otherwise noted.

The IIP Accounts provide a look at the stock of U.S.-owned financial assets abroad and U.S. liabilities to foreign residents broken down by type of investment. Estimates of the net position and its components are released quarterly in IIP table 1.2 “[Net International Investment Position at the End of the Period, Expanded Detail](#).” Data from the IIP Accounts are used in compiling national balance sheet statistics in the Financial Accounts of the United States prepared by the Federal Reserve Board (FRB). During most of the period of analysis, an annual estimate of the net position and its components, along with the sources of change in the position from one year to the next, was released once a year, in June, in IIP table 1.3 “[Change in the Yearend U.S. Net International Investment Position](#).”<sup>8</sup>

Although preliminary estimates are typically revised, sometimes substantially, the results of this study confirm that the preliminary estimates in the ITAs and IIP Accounts present the same overall picture of activity as do later estimates. Chart 1 presents three vintages of estimates for key series of the ITAs and IIP Accounts from 2014 to 2023. The current-account balance for three vintages—the initial (or “first”) estimate, the estimate for that time period released in the subsequent June annual update of the ITAs (the “third estimate”—see the section below Sources, Timing, and Vintages of the ITA and IIP Estimates), and the latest estimate, released in June 2024—is shown in chart 1 (left panel). Although there are notable differences among the three series, it is clear that the size of the revisions is small relative to the size of the estimates and that the overall trend presented by each is the same.<sup>9</sup>

Chart 1 (right panel) presents the net international investment position, which is negative, representing a U.S. net liability to the rest of the world for three vintages—the first estimates, first June update, and latest June update—and illustrates that the size of revisions is small compared to the size of the estimates.<sup>10</sup>

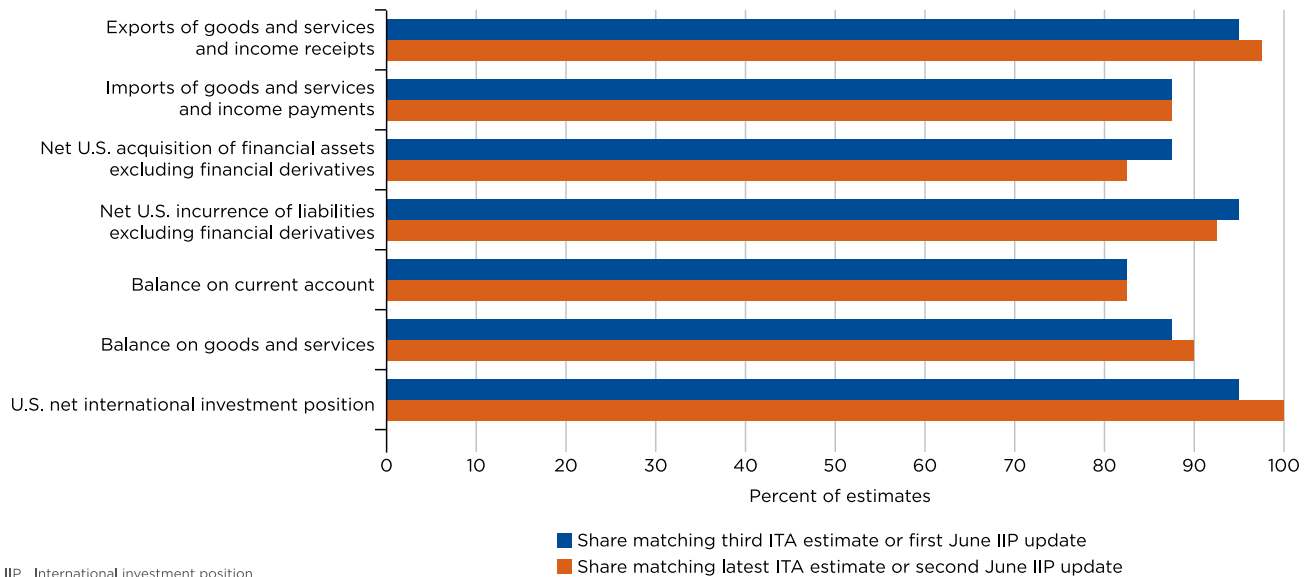
**Chart 1. Comparison of Three Vintages, 2014–2023**



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Chart 2 examines the consistency of seven important components of the ITAs and the net IIP, in terms of whether the quarter-to-quarter direction of change in the first vintage is the same as in the third and latest vintages. For each of the seven components, the direction of change matched in the two vintages more than 80 percent of the time.

**Chart 2. Share of First ITA and IIP Estimates Matching Direction of Later Estimates, 2014–2023**



The rest of the article will present a variety of measures to evaluate the reliability of early vintage estimates. The next sections present detailed information on the sources, timing, and vintages of the ITA and IIP estimates examined in this article and the methodology used in this study. Then, an analysis of revisions in the quarterly ITAs and the quarter-end and yearend IIP Accounts is presented. This article also features three boxes: (1) an analysis of the statistical discrepancy in the ITAs, (2) the impact of the COVID-19 pandemic on the revisions to the ITAs, and (3) ITA seasonal adjustment revisions. The article concludes with a summary of the findings. An appendix examines the challenges of statistical inference of the revisions of quarterly data when revisions may systematically affect an entire year of estimates.

## Sources, Timing, and Vintages of the ITA and IIP Estimates

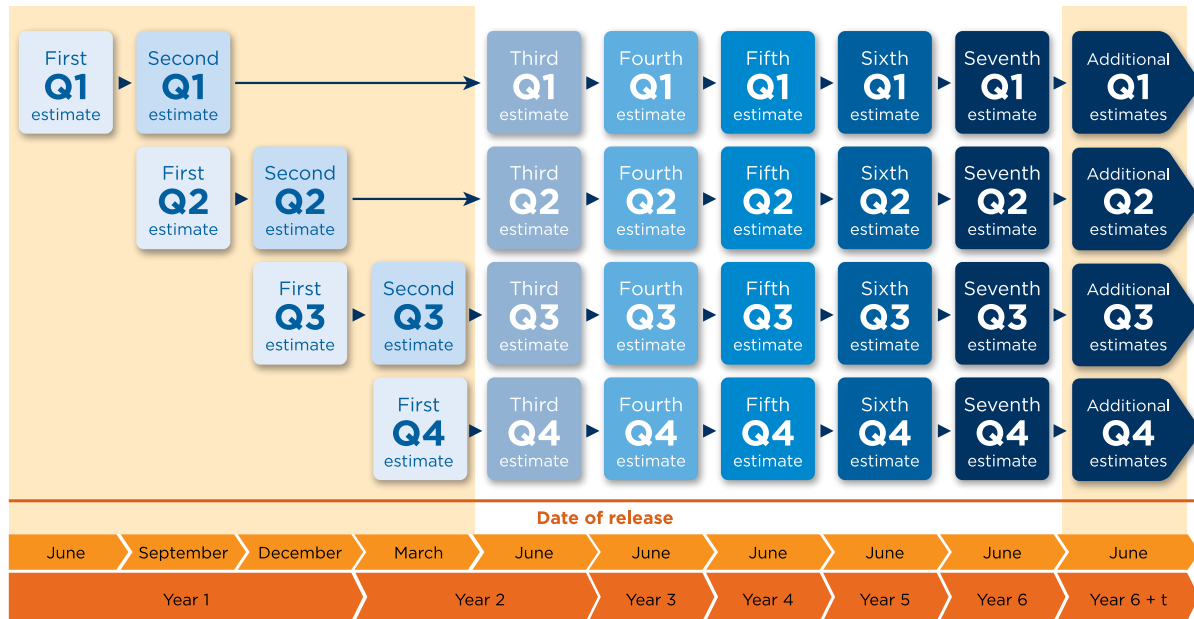
### ITA estimates

The ITAs are a comprehensive record of U.S. international transactions—that is, transactions between U.S. residents and foreign residents. They are composed of three major categories: the current account, the capital account, and the financial account.<sup>11</sup> Broadly, the current account measures international transactions that are most closely associated with current production, consumption, and income, including trade in goods and services. The capital account measures transactions that result in changes to the stock of nonproduced, nonfinancial assets, such as the purchase or sale of rights to natural resources, or that are considered capital transfers, such as debt forgiveness. The financial account measures international transactions in financial assets and liabilities, such as transactions in U.S. and foreign stocks and bonds. Current-account transactions and financial-account transactions are much larger in value than capital-account transactions and are the primary focus in this article of the analysis of ITA revisions.

The ITAs are based on a variety of data sources. Major data sources include BEA's own survey programs, U.S. Census Bureau trade in goods data, and U.S. Treasury Department Treasury International Capital (TIC) surveys. Other key sources include other U.S. government agencies, statistical offices of partner countries, and nongovernment sources such as subscription databases and nonprofit organizations.<sup>12</sup> For the estimation process, some source data cover the most recent reference period (the “current period”), but other source data do not. In the absence of up-to-date source data for the current period, BEA uses various projection methods, such as more timely indicator series, time-series methods, or extrapolation of prior-period data.<sup>13</sup>

The release of the preliminary quarterly ITAs and later revisions to these data follow a well-established schedule. Chart 3 provides a visual guide to the revision and update schedule. The first estimates for a quarter are released approximately 80 days after the final day of that quarter.<sup>14</sup> The first revision to a given quarter's estimates (i.e., the second estimate) is released three months after the first estimate. In June of each year, an annual update to the ITAs is released, which revises the estimates for all four quarters of the previous year, creating the third estimate. Note that the second estimate of the fourth quarter of any given year coincides with the annual update, so the second and third estimate for the fourth quarter are the same. For the purposes of this article, the results of the first subsequent annual update are defined to be the “third estimate” for all quarters. Estimates are further revised in the next two (June) annual updates and, if warranted, in subsequent June annual updates. Annual revisions reflect the incorporation of updated quarterly data, as well as results from annual or benchmark surveys, and updates to seasonal factors.<sup>15</sup> Annual updates may also reflect the incorporation of new methodologies, definitions, or classifications which are applied to earlier time periods to maintain time series consistency.<sup>16</sup> The most recent annual update was in June 2024; this vintage of the ITA estimates studied in this article is termed the “latest estimate.”

**Chart 3. Timeline of Quarterly International Transactions Estimate Vintages**



Note. This timeline did not fully apply to the quarter-end international investment position statistics until 2021.  
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This framework of four estimate vintages—first, second, third, and latest—is used in this article to provide structure to the analysis of the revisions to the quarterly ITA estimates. Although this does not completely encompass all of the estimates and ignores some irregularly timed revisions, it captures most of the key features of BEA's estimate and revision release schedule.

## IIP estimates

The IIP Accounts measure the stocks of U.S.-owned financial assets in other countries and U.S. liabilities to residents of other countries. Investment is presented separately by whether the investment constitutes a U.S. asset or a U.S. liability. Investment (financial assets and liabilities) is further classified into five functional categories including direct investment, portfolio investment, financial derivatives other than reserves, other investment, and reserve assets. The net IIP is the difference between U.S. assets and U.S. liabilities.

The IIP Accounts are based on several data sources; primary among them are BEA's quarterly, annual, and benchmark direct investment surveys and the Treasury Department's TIC surveys. Other key sources for the IIP Accounts estimates are other government agencies, private sector sources, and partner countries.<sup>17</sup>

This study looks at both the quarterly and annual IIP tables. The quarterly IIP tables present estimates of the quarter-end IIP assets and liabilities by component. The first estimate of the quarter-end position is released about 90 days after the last day of the reference quarter. The estimate is revised with the release of the next quarter's first estimate. Each year in the June annual update, the quarterly position estimates for all four quarters of the previous year are revised. The following June these estimates are revised again. This study primarily examines the revisions between the first estimate and the initial June annual update and the first estimate and the second June annual update.

The annual IIP tables present estimates of the yearend asset and liability positions by component and the sources of change between the yearend position and the previous year's yearend position. Sources of change include financial account transactions, price changes, exchange rate changes, and changes in volume and valuation not included elsewhere (n.i.e.). Over much of the period studied in this article, the first estimate of the year-to-year source of changes in position for a given year was released in June of the following year.<sup>18</sup> For comparability across years, the first June estimates of the annual IIP series are taken as the early estimates in this article.

## Methodology

This section provides an overview of the definitions and formulas used in this article. The chief goals are to explain in more detail the calculations used in different article sections and to describe the various methods used to calculate the mean revisions and the mean absolute revisions. In calculating mean revisions and mean absolute revisions, scaled revisions are often used, but the suitability of the three scaling methods noted below differs by account type and the objective of the analysis.

### Revisions and average revisions

A revision is the difference between an earlier-vintage estimate and a later-vintage estimate. Published ITA and IIP estimates are expressed in current-dollar levels.<sup>19</sup> A revision for period  $t$ ,  $r_t^{e,l}$  can be expressed as

$$r_t^{e,l} = E_t^l - E_t^e$$

where  $E$  denotes a current-dollar (level) estimate, the  $t$  subscript denotes the period (quarter) for which the estimate applies, the  $e$  superscript denotes early vintage, and the  $l$  superscript denotes later vintage. The revision examined most frequently in this article is the first-to-third revision. This is given by

$$r_t^{1,3} = E_t^3 - E_t^1$$

Two simple measures—both averages—are used in this article to assess the overall size and direction of revisions. The first, the average of the revisions for an account over a given period, is called the mean revision. For a scaled revision,  $R_t^{e,l}$ , the mean revision ( $MR^{e,l}$ ) is:<sup>20</sup>

$$MR^{e,l} = \frac{1}{T} \sum_{t=1}^T R_t^{e,l}$$

where  $t$  indexes quarters and  $T$  is the number of quarters over which the average is calculated. The mean revision indicates whether revisions are generally positive or negative. A positive mean revision means that the earlier estimates generally undershoot the later estimates; a negative mean revision means that the earlier estimates generally overshoot the later estimates. Mean revisions of higher magnitudes indicate greater over- or undershooting. A near-zero mean revision suggests either that early estimates are quite close to later estimates or that early-estimate overshooting and undershooting largely offset one another.

Because revisions can be positive or negative, they may be offsetting. Therefore, it is also useful to look at the mean absolute revision ( $MAR_{e,l}$ ), which is the average of the absolute value of the revisions over a given period:



$$MAR^{e,l} = \frac{1}{T} \sum_{t=1}^T |R_t^{e,l}|$$

Because positive and negative revisions are not offsetting in the mean absolute revision, a mean absolute revision is at least as large as the mean revision for the same period. Although a large positive or large negative mean revision necessarily implies a large mean absolute revision, a small mean revision has no implication for the mean absolute revision. Revisions may both center around zero and be highly variable; in such a case, the mean absolute revision will be large, and the mean revision will be small. In general, small mean absolute revisions, like small (that is, near zero) mean revisions, are indicators of reliability in early estimates.

## Revision scaling methods

Most of the revisions considered in this article are scaled revisions. The use of scaled revisions addresses two difficulties encountered in the analysis of current-dollar estimates. First, these estimates tend to increase over time, due to economic growth and inflation, giving greater weight to later period revisions than earlier period revisions. Second, comparisons of current-dollar revisions across accounts would be misleading because of the relative sizes of the accounts. That is, a revision of a given current-dollar value may be relatively small for one account but large for another.<sup>21</sup> Scaling addresses both of these difficulties by removing the effects of growth and inflation and by putting revisions across accounts on a comparable basis.

A scaled revision,  $R$ , is calculated simply by dividing the unscaled revision by a scaling term and multiplying it by 100 to express it as a percentage. For the first to third revision,  $R$  is

$$R_{m,t}^{1,3} = 100 * \left( \frac{r_t^{1,3}}{S_{m,t}^{1,3}} \right) = 100 * \frac{E_t^3 - E_t^1}{S_{m,t}^{1,3}}$$

where  $S$  denotes the scaling term and the  $m$  subscript denotes whatever scaling method is used.

The selection of a scaling method entails a tradeoff between simplicity and suitability. Some methods are more intuitive than others but are not adequate to deal with every type of account in the ITAs or IIP Accounts. In addition, no single scaling method gives a complete picture of the size of revisions. The use of multiple scaling methods has the benefit of allowing for consideration of the pattern of revisions from a variety of perspectives. This article will apply three scaling bases: item value, sum of unsigned components, and trend quarter-to-quarter absolute changes.

## Scaling by item values

The first scaling method used in this study is scaling by the value of the estimate itself. Under this “item value” scaling method, the revision is expressed as a percentage of the earlier-vintage estimate. The scaling term for this scaling method (denoted by  $iv$ ) is

$$S_{iv,t}^{e,l} = |E_t^e|$$

For example, if exports of goods are revised from \$100 billion to \$104 billion, the scaled revision is 4 percent. This scaling method stands out for its intuitiveness and simplicity. Use of this method is most appropriate when account size and revision size are expected to be directly correlated.

Item value scaling is used in this article for most accounts in the current account and for most positions in the IIP Accounts. Its use would be misleading for two different types of accounts: (1) accounts with both positive and negative observations, and (2) accounts that are constructed as the sum of positive and negative components, or as the difference of positive components, even if the observations themselves all have a common sign.

A variation of item value scaling is used for the analysis of the annual change of most of the positions in the IIP Accounts. To promote interpretability, these annual changes are scaled by the beginning-of-year position, not by the annual changes themselves.<sup>22</sup>

## Scaling by the sum of unsigned components

This scaling method is similar to the item-value-scaling method, except that the early vintage estimate used as the scaling term is replaced by the sum of the unsigned components of the early vintage estimate. This scaling term (denoted by  $sc$  for sum of unsigned components) is

$$S_{sc,t}^{e,l} = \sum_j |c_{t,j}^e| = \sum_{j^+} c_{t,j^+}^e - \sum_{j^-} c_{t,j^-}^e$$

where the  $j^{\text{th}}$  component of the estimate is  $c_{t,j}^e$ . The components are divided into two groups: positively signed components, indexed by  $j^+$ , and negatively signed components, indexed by  $j^-$ . Note that by construction, the estimate itself equals the sum of the signed components:

$$E_t^e = \sum_j c_{t,j}^e = \sum_{j^+} c_{t,j^+}^e + \sum_{j^-} c_{t,j^-}^e$$

This scaling method is used for current-account balances and net IIP positions. For instance, the balance on goods is calculated as exports of goods less imports of goods. The scaling factor in this method is exports of goods plus imports of goods. In general, its use is appropriate for accounts with both positively and negatively signed components, as long as these components are known. If all components take the same sign, this scaling term is equivalent to the item-value-scaling term. Mean revisions and mean absolute revisions constructed using this method are quantitatively comparable to item-value-scaled mean revisions and mean absolute revisions. Thus, it is meaningful to compare numerically, for instance, the item-value-scaled mean absolute revision of exports to the mean absolute revision of the trade balance scaled by the sum of its unsigned components.

For example, consider a balance on goods with an initial quarterly estimate of  $-\$200$  billion based on the difference between total exports of goods of  $\$400$  billion and total imports of  $\$600$  billion. If the quarterly estimate of the balance is revised to  $-\$220$  billion, the percent revision scaled by the sum of unsigned (absolute value) components is  $(-220 - (-200))/(400 + 600) = -0.02$  or  $-2$  percent.

A variation of scaling by the sum of unsigned components is used for the analysis of the annual change of the net positions in the IIP Accounts. To promote interpretability, these annual changes are scaled by the sum of unsigned components of the beginning-of-year position.

## Scaling by trend quarter-to-quarter absolute changes

Some accounts in the ITAs are net accounts whose components are unmeasured (or not fully measured). For such accounts, item value scaling is not appropriate, and scaling by the sum of unsigned components is not possible, because these components are unmeasured. Chief among the accounts with these characteristics are the financial accounts.<sup>23</sup> Accordingly, another scaling method is needed.

The use of scaling by “trend quarter-to-quarter absolute changes” has the virtue of general applicability; that is, it could, in principle, be used for any account. However, it does not share with the other two scaling methods already discussed the same level of intuitive simplicity. Nor does it share with the other two methods a rough comparability with growth rate methods used in other BEA revisions studies. The method of scaling by trend quarter-to-quarter absolute changes is predicated on the size of revisions being related to the “typical” quarter-to-quarter change in account value in addition to the gross volume of transactions; that is, an account whose value varies greatly from one quarter to the next will tend to be more difficult to measure—and thus be subject to greater revision—than one whose value varies little.

Because quarter-to-quarter changes can be either positive or negative, the method uses absolute changes. For many series, the absolute changes vary considerably from quarter to quarter. In addition, any single quarter-to-quarter change can be arbitrarily close to zero. To provide a more stable scaling term, and one that is not liable to become vanishingly small, a measure of the typical change is required.

Most of the series examined in this article grow over time, so trend values of the absolute changes are used instead of a simple average of the absolute changes. This limits the extent to which early scaling terms are overweighted and later scaling terms are underweighted. Specifically, individual scaling terms for each observation (quarter) are generated using the Hodrick-Prescott filter, with the smoothing parameter set to 1,600.<sup>24</sup>

Algebraically, the scaling term (using an *ac* subscript to denote absolute changes) is

$$S_{ac,t}^{e,l} = trend \{|\Delta(E_t^L)|\} = trend \{|E_t^L - E_{t-1}^L|\}$$

where  $trend \{x\}$  denotes the trend extracted from the application of the Hodrick-Prescott filter to series  $x$ , and  $L$  denotes that the latest vintage estimates are used in extracting the trend.

This scaling method is used in this article primarily for the financial account in the ITAs. Because it scales by a function of changes rather than levels, mean revisions and mean absolute revisions obtained using this method are not quantitatively comparable to those obtained using the prior two methods.

To illustrate the computation of the trend quarter-to-quarter absolute change scaling term, table 1 presents the latest estimates of net U.S. acquisition of financial assets excluding financial derivatives (ITA line 67). The table also includes the absolute value of the quarter-to-quarter change in the latest estimates and the fitted trend, which is based on a longer series of data.<sup>25</sup> The fitted trend isolates the trend in the quarter-to-quarter change in the latest estimates, which tended to rise in the early part of the full analysis period. For 2016Q1, the scaling term (from table 1) is \$184.822 billion, the first estimate is \$66.803 billion, and the third estimate is \$39.498 billion. The resulting scaled revision is computed as  $(39.498 - 66.803)/184.822 = -0.148$  or -14.8 percent.

**Table 1. Illustrating Trend Quarter-to-Quarter Absolute Change Scaling**

Date	Latest estimates	Absolute quarter-to-quarter change <sup>1</sup>	Fitted trend <sup>2</sup>
	(in millions of dollars)		
2015Q1	330,095	216,390	150,324
2015Q2	32,752	297,343	159,441
2015Q3	-99,202	131,954	168,185
2015Q4	-119,542	20,340	176,629
2016Q1	37,590	157,132	184,822
2016Q2	351,872	314,282	192,718
2016Q3	41,773	310,099	200,250
2016Q4	-94,797	136,570	207,431

1. Based on latest estimates.
2. Based on trend in absolute quarter-to-quarter changes.

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Table 2 summarizes the three scaling methods and how they are used in this article.<sup>26</sup>

**Table 2. Scaling Methods**

Scaled by	Most suitable for	Accounts analyzed in this article
Item values	Accounts that measure aggregation of transactions or activities	Current-account components, components of the IIP
Sum of unsigned components	Net accounts that measure differences in measured transactions	Current-account balances, the net IIP
Trend quarter-to-quarter absolute changes	Net accounts that measure differences in unmeasured transactions	Financial accounts

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## Revisions to quarterly percent changes

The only uses of non-scaled revision measures in this article are the mean and mean absolute percentage-point revision in quarterly percent changes. As the quarterly percent change is itself scaled by the previous quarter's value, the revision to the quarterly percent change is not (further) scaled. This revision is the later-vintage quarterly percent change less the earlier-vintage quarterly percent change, expressed in percentage points. The quarterly percent revision calculation is given by

$$QR_t^{e,l} = 100 * \left\{ \left( \frac{E_t^l}{E_{t-1}^l} - 1 \right) - \left( \frac{E_t^e}{E_{t-1}^e} - 1 \right) \right\}$$

where  $QR$  is the quarterly percent revision for quarter  $t$  from an early vintage,  $e$ , to a later vintage,  $l$ . Following on this calculation, the mean percentage-point revision is given by

$$\frac{1}{T} \sum_{t=2}^T QR_t^{e,l}$$

and the mean absolute percentage-point revision is given by

$$\frac{1}{T} \sum_{t=2}^T |QR_t^{e,l}|$$

## Analysis of Revisions to the Quarterly ITAs

In this section, revisions to the quarterly ITAs from 2014 through 2023 are analyzed. The year 2014 was chosen as the starting point because in June of that year BEA implemented a comprehensive restructuring of the ITAs to better align the statistics with the most current international statistical standards. Because key ITA aggregates were defined differently prior to the restructuring, it would be difficult to include estimates prior to 2014 in the analysis.<sup>27, 28</sup>

### Mean revision, mean absolute revisions, and direction of revision to the quarterly ITAs

#### Current-account components

Table 3 presents the mean percent revision and mean absolute percent revision, using item value scaling, from the first to the third estimates for 12 major components of the ITAs from 2014 through 2023. An asterisk in the mean percent revision column indicates that the value is statistically significantly different from zero at the 5-percent level. (The values in the mean absolute percent revision column were not evaluated for statistical significance; by definition, mean absolute percent revisions are non-negative.)

Of the 12 results in the mean percent revision column, nine are greater than zero and seven of the nine are statistically significant, indicating that many initial estimates of key ITA aggregates undershoot later estimates.<sup>29</sup> However, the magnitude of undershooting is small compared to the actual item values. The mean percent revision for the more aggregated data series such as exports of goods and services and income receipts (line 1) and imports of goods and services and income payments (line 34) is less than one percent. The largest mean percent revision is for secondary income receipts (5.15 percent).

By construction, the mean absolute percent revisions are larger in magnitude than the corresponding mean percent revisions, but they are still relatively small. The mean absolute percent revision of the top-level aggregates (ITA table 1.2 lines 1 and 34) are both less than 1 percent. As with the mean percent revision, the largest mean absolute percent revision is for secondary income receipts (5.87 percent).

**Table 3. Quarterly Current-Account Components: Mean Revisions and Mean Absolute Revisions, Item Value Scaling, First to Third Estimates, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision	Mean absolute percent revision
1	Exports of goods and services and income receipts	0.52*	0.75
2	Exports of goods and services	0.49*	0.84
3	Goods	-0.22*	0.41
13	Services	1.98*	2.61
26	Primary income receipts	0.00	1.71
33	Secondary income receipts	5.15*	5.87
34	Imports of goods and services and income payments	0.36*	0.60
35	Imports of goods and services	0.11	0.31
36	Goods	-0.08	0.34
45	Services	0.99*	1.76
58	Primary income payments	1.05*	2.29
64	Secondary income payments	1.29	4.38

\* The mean revision is statistically different from zero at the 5 percent significance level.

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Table 4 summarizes the direction of first-to-third revisions, providing further evidence of a tendency of some first estimates to undershoot third estimates. For 10 of the 12 series in the table, the number of upward revisions is larger than the number of downward revisions, and in seven of those the share of upward revisions is statistically significantly different from the expected 50 percent if upward and downward revisions are equally likely. For two series—exports and imports of goods—the share of upward revisions is statistically significantly less than 50 percent.

**Table 4. Quarterly Current-Account Components: Direction of Revisions, First to Third Estimates, 2014–2023**

ITA table 1.2 line	Series	Upward revisions	Downward revisions	Percent revised up
1	Exports of goods and services and income receipts	33	7	82.5*
2	Exports of goods and services	29	11	72.5*
3	Goods	13	27	32.5*
13	Services	30	10	75.0*
26	Primary income receipts	22	18	55.0
33	Secondary income receipts	32	8	80.0*
34	Imports of goods and services and income payments	27	13	67.5*
35	Imports of goods and services	23	17	57.5
36	Goods	13	27	32.5*
45	Services	27	13	67.5*
58	Primary income payments	25	15	62.5
64	Secondary income payments	28	12	70.0*

\* The percent revised up is statistically different from 50 percent at the 5 percent significance level.

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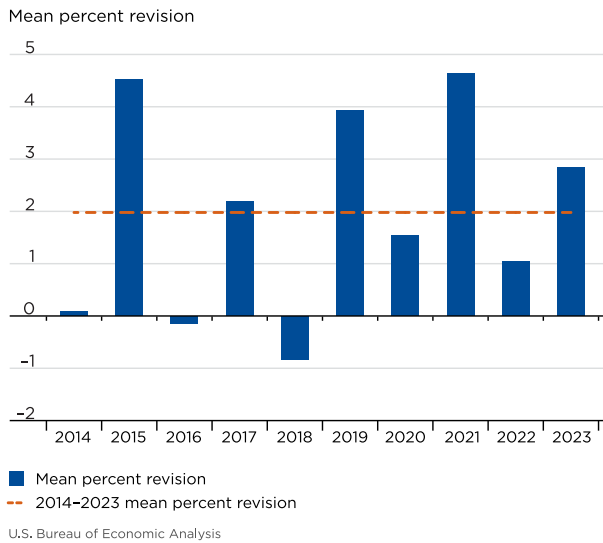
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The two series presented in tables 3 and 4 with the largest degrees of undershooting in the first estimates compared with third estimates are secondary income receipts and exports of services. As already noted, the mean percent revision of secondary income receipts is 5.15 percent. Of the first estimates of secondary income receipts, 80 percent are revised up. For exports of services, the mean percent revision is 1.98 percent, and 75 percent of first estimates are revised up.

Chart 4 presents the mean percent revision of the first-to-third revisions of exports of services by year of the study period. The large upward revisions to the 2015 estimates partly stemmed from improvements in the source data and methodology for estimating international travel expenditures implemented during the 2016 annual update.<sup>30</sup> The large upward revision to the 2021 first estimates resulted from newly available and revised source data from BEA's services surveys during the 2022 annual update, including the incorporation of data from the 2019 Benchmark Survey of Financial Services Transactions Between U.S. Financial Services Providers and Foreign Persons.

Chart 5 presents the annual mean percent revision to the first-to-third estimates of secondary income receipts. Nearly 30 percent (or 1.5 percentage points) of the large overall mean percent revision results from the 2021 annual update to the 2020 estimates. This revision was due to incorporation of the results of the 2018 Benchmark Survey of Insurance Transactions by U.S. Insurance Companies with Foreign Persons as the basis for extrapolation of insurance-related transfers.<sup>31</sup> Previously published estimates relied on the 2013 Benchmark Survey.

**Chart 4. Annual Mean Revision of Exports of Services, First to Third Estimates, 2014-2023**



**Chart 5. Annual Mean Revision of Secondary Income Receipts, First to Third Estimates, 2014-2023**

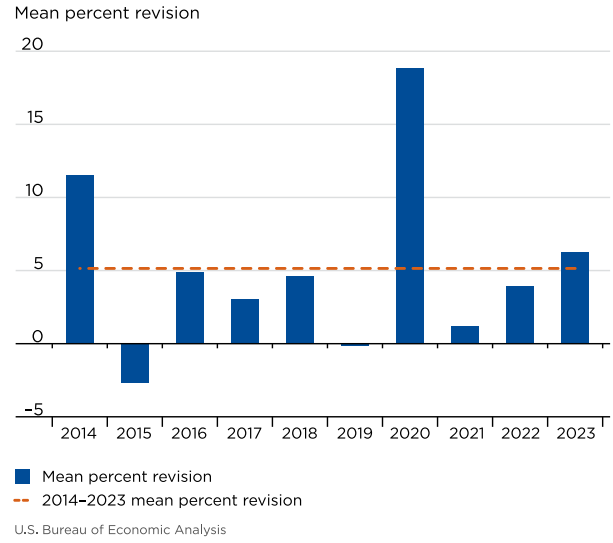


Table 5 presents the mean percent revision and mean absolute percent revision for each of four revisions (first estimate to second estimate, second to third, third to fourth, and fourth to latest) as well as the overall revision from the first to the latest estimates. It shows, for instance, that estimates of secondary income receipts and exports of services are, on average, little revised from the first to second estimate; the bulk of the mean percent revision shown in table 3 comes from the revision from the second to third estimate. Table 5 further shows that revisions continue to be predominantly upward for these two series beyond the third estimate. Moreover, other series, such as imports of services and primary income payments, also are consistently revised upward after the third estimate.

**Table 5. Selected Current-Account Components: Mean Revisions and Mean Absolute Revisions, Item Value Scaling, Selected Vintages, 2014–2023**

ITA table 1.2 line	Series	Mean percent revisions					Mean absolute percent revisions				
		First to second	Second to third	Third to fourth	Fourth to latest	First to latest	First to second	Second to third	Third to fourth	Fourth to latest	First to latest
1	Exports of goods and services and income receipts	0.01	0.46*	0.52*	0.99*	1.89*	0.44	0.66	0.65	1.15	2.01
2	Exports of goods and services	-0.02	0.48*	0.63*	0.59*	1.60*	0.39	0.71	0.70	0.63	1.68
3	Goods	-0.06*	-0.22*	0.09	0.08	-0.07	0.10	0.41	0.28	0.22	0.49
13	Services	0.08	1.92*	1.80*	1.62*	5.10*	1.20	2.08	1.84	1.65	5.23
26	Primary income receipts	0.11	-0.26	0.13	2.02*	1.94*	1.01	1.30	1.61	2.73	4.07
33	Secondary income receipts	-0.02	5.28*	1.50	1.24*	7.62*	1.28	6.10	3.15	1.69	7.72
34	Imports of goods and services and income payments	0.01	0.31*	0.21*	0.34*	0.86*	0.32	0.56	0.45	0.42	0.92
35	Imports of goods and services	0.03	0.04	0.12*	0.16*	0.36*	0.16	0.29	0.27	0.23	0.54
36	Goods	0.00	-0.10	-0.04	-0.02	-0.13	0.08	0.34	0.24	0.14	0.44
45	Services	0.16	0.70*	0.85*	1.01*	2.68*	0.91	1.23	1.07	1.21	2.97
58	Primary income payments	-0.06	1.10*	0.72*	2.41*	3.86*	1.31	2.00	1.32	2.73	4.06
64	Secondary income payments	-0.13	1.23	0.01	-2.55*	-1.10	1.52	3.98	2.91	2.65	6.03

\* The mean revision is statistically different from zero at the 5 percent significance level.

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Overall, the initial revision, from the first estimate to the second estimate one quarter later, has notably small mean percent revisions. In only one series (exports of goods) is this revision statistically significantly different from zero. The next three mean percent revisions are substantially larger in magnitude than the first-to-second revision. For the majority of series, the largest mean percent revisions (excluding the overall revision) are the fourth-to-latest revisions. For four series, second-to-third mean percent revisions are largest; for one series, third-to-fourth revisions are largest.

The mean absolute revision follows a similar pattern. The first-to-second revision is relatively small compared to the other revisions. The subsequent revisions are larger. For a majority of the series, the largest mean absolute revision is between second and third estimates.



## Current-account balances

Table 6 presents the mean percent revision of various balances, including the widely watched current-account balance (line 109). Because these balances are the net of two separate sets of transactions, the revisions are scaled by the sum of the unsigned components, rather than by the value of the balances themselves.<sup>32</sup>

The mean percent revisions and mean absolute percent revisions are quite small. The mean percent revision has a magnitude of less than 1 percent for all six series, and the mean absolute percent revision is less than 1 percent for the current-account balance. For all six series, the share of upward revisions is not statistically significantly different from 50 percent. Together these results suggest that when the “export” side of the balance is revised up, the “import” side also tends to be revised up so that the revision of the difference of the two is not systematically upward or systematically downward.

**Table 6. Quarterly Current-Account Balances: Mean Revisions, Mean Absolute Revisions, and Direction of Revisions, First to Third Estimates, Sum-of-Unsigned-Components Scaling, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision	Mean absolute percent revision	Upward revisions	Downward revisions	Percent revised up
109	Balance on current account	0.05	0.41	23	17	57.5
110	Balance on goods and services	0.15*	0.35	26	14	65.0
111	Balance on goods	-0.04	0.20	20	20	50.0
112	Balance on services	0.75*	1.40	25	15	62.5
113	Balance on primary income	-0.44	1.34	16	24	40.0
114	Balance on secondary income	0.92	2.99	25	15	62.5

\* The mean percent revision is statistically different from zero at the 5 percent significance level.

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## Financial-account components

Table 7 presents a summary of the first-to-third revisions of the two financial account component totals—net U.S. acquisition of financial assets (line 67) and net U.S. incurrence of liabilities (line 91).<sup>33</sup> Because these accounts measure transactions on a net basis, and because the underlying gross components are not observed, their revision should not be scaled like revisions of the current-account series. Instead, their revisions and absolute revisions are scaled by their trend quarter-to-quarter absolute change.<sup>34</sup> For purposes of comparison, table 7 includes top-line current account aggregates (lines 1 and 34) scaled using the same trend quarter-to-quarter absolute change method.

**Table 7. Financial Account Components: Mean Revisions, Mean Absolute Revisions, and Direction of Revisions, First to Third Estimates, Trend Quarter-to-Quarter Absolute Change Scaling, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision	Mean absolute percent revision	Upward revisions	Downward revisions	Percent revised up
67	Net U.S. acquisition of financial assets excluding financial derivatives	3.06	21.70	21	19	52.5
91	Net U.S. incurrence of liabilities excluding financial derivatives	3.98	18.15	24	16	60.0
<b>Addenda:</b>						
1	Exports of goods and services and income receipts	23.68*	30.93	33	7	82.5**
34	Imports of goods and services and income payments	12.84*	27.78	27	13	67.5**

\* The mean percent revision is statistically different from zero at the 5 percent significance level.

\*\* The percent revised up is statistically different from 50 percent at the 5 percent significance level.

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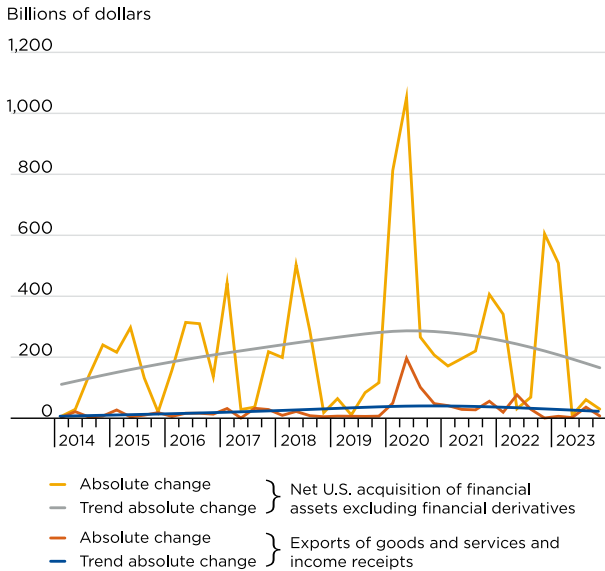
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Compared to revisions of current-account series, the mean percent revisions of the financial account components are small. The mean percent revision of the net acquisition of U.S. assets is 3.06 percent, and the mean percent revision of the net incurrence of liabilities is 3.98 percent. These figures are much smaller than comparable figures from total exports and income receipts (23.68 percent) and total imports and income payments (12.84 percent). The mean absolute percent revisions are larger, but they are still smaller than the comparable results for exports and imports.

There is no apparent directional bias in the first estimates of the financial account components. Compared with top-line current-account aggregates, the financial account aggregates exhibit less tendency to undershoot on the first estimates. Net acquisition of financial assets is revised up 52.5 percent of the time, and net acquisition of financial liabilities is revised up 60.0 percent of the time; neither is statistically significantly different than 50 percent.

The fact that mean revisions to financial account aggregates are smaller than those for current-account aggregates is partly a consequence of the high degree of volatility of estimates in the financial account. The high relative volatility of financial account aggregates (see chart 6, which shows the moving average of the quarterly absolute change for net acquisition of financial assets and for exports of goods and services and income receipts) is reflected in the scaling terms used in table 7. For a given dollar revision, therefore, the scaled revision of the financial account aggregate is much smaller.

**Chart 6. Absolute Quarterly Changes for Selected Components of the ITA Current and Financial Accounts, 2014-2023**



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## Analysis of the Statistical Discrepancy

At the conceptual level, any combined surplus or deficit from the current and capital accounts must be exactly accounted for in the financial account. If U.S. residents import more goods and services than they export and the difference is not offset in capital transfers or other areas of the current account (primary and secondary income), the resulting deficit must be financed by borrowing (incurring liabilities) from foreign residents. In ITA table 1.2, net lending/borrowing from current- and capital-account transactions (line 116) should, in principle, equal net lending/borrowing from financial account transactions (line 117). In practice, these two estimates are measured and calculated separately, and the difference between the two estimates is referred to as the statistical discrepancy.<sup>1</sup>

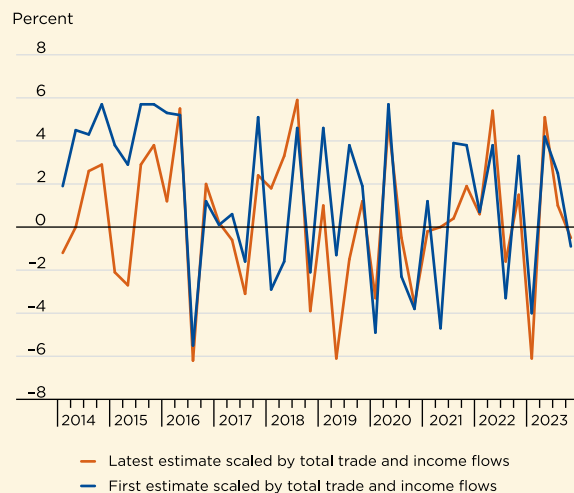
The statistical discrepancy is subject to the same process of initial estimate and later revisions as the other components of the ITAs. Chart I in this box presents two vintages of the statistical discrepancy (line 108), scaled by the sum of total trade and income flows, that is, line 1 (exports of goods and services and income receipts) and line 34 (imports of goods and services and income payments) to account for the fact that nominal values in the accounts are growing over time. Table I presents summary statistics for the same two vintages as well as third estimates.

Chart I presents the first and the latest vintage estimates of the scaled statistical discrepancy, which are both roughly centered around zero for the period of analysis, ranging from about -6.0 percent to 6.0 percent. In 2014–2015, the latest vintage discrepancy is clearly closer to zero than the first vintage. In the later part of the study period, the first and latest vintages track each other closely, reflecting the small size of revisions between initial estimates and the latest estimates. Over the full period, the scaled discrepancy in the initial estimates is centered slightly further away from zero, with an average value of 1.4 percent, compared with 0.4 percent in the latest estimates (table I).

The scaled values of the absolute statistical discrepancy (not shown in the chart) follow a similar pattern. In the early part of the study period, the scaled discrepancies in the latest vintages are closer to zero than in the first estimates, whereas in the more recent quarters, the scaled discrepancies in the two vintages track each other closely. In 2014–2023, the scaled discrepancy averages 3.4 percent in the initial estimate and 2.5 percent in the latest estimate.

The statistical discrepancy can be either positive or negative. An unbiased statistical discrepancy should be positive about as often as it is negative. For the first estimates over the sample period, the statistical discrepancy was positive in 67.5 percent of the quarters, and the share was statistically significantly different from 50 percent. The share of positive discrepancies decreased to 60 percent in the latest estimates, though that share was not statistically significantly different from 50 percent.

**Chart I. Two Vintages of the Quarterly Statistical Discrepancy, Scaled by Total Trade and Income Flows, 2014–2023**



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**Table I. ITA Statistical Discrepancy: Summary Statistics, Selected Vintages, 2014–2023<sup>1</sup>**

	First estimate	Third estimate	Latest estimate
Mean	1.4*	1.3*	0.4
Mean absolute	3.4	2.5	2.5
Share of quarterly estimates greater than zero (percent)	67.5**	75.0**	60.0

\* Statistically different from zero at the 5 percent significance level.

\*\* The share of quarterly estimates greater than zero is statistically different from 50 percent at the 5 percent significance level.

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1. Percentage of the sum of total exports and income receipts and total imports and income payments, ITA table lines 1 and 34.

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1. For more information on the statistical discrepancy, see chapter 21 in *U.S. International Economic Accounts: Concepts and Methods*.

## Impact of ITA revisions: quarterly percent change revision, directional reliability, and turning points

This section examines other measures of the revision process that are independent of the scaling measure and provide an assessment of the reliability of the first estimates in terms of revisions of percentage change, direction accuracy of the data series, and the ability of first estimates to capture trends and turning points.

### Quarterly percent change revisions

The ITAs present estimates of levels only, whereas some other BEA statistics, such as GDP and the NIPAs, also include percent changes. Percent changes are deemphasized in the ITAs because the ITAs are presented in nominal, not real, terms and, therefore, may be affected by price and exchange rate changes. However, percent changes can be useful for comparing relative changes across accounts. A review of the reliability of quarterly percent changes provides a complementary tool to evaluate the reliability and usefulness of the ITA statistics.

The revision in percentage change is computed by subtracting the quarterly percent change of the first estimate vintage from the quarterly percent change of the third (or latest) estimate vintage.<sup>35</sup> To illustrate, if the first estimate of a quarter's percent change from the prior (second estimate) quarter was 1.0 percent and the third estimate percent change for the same set of quarters was 1.2 percent, then the mean percentage point first-to-third revision would be 0.2 percentage point.

Mean percentage point revisions are generally small and centered around zero (table 8). For first-to-third and first-to-latest estimates of current account components in 2014–2023, the mean percentage point revisions of quarterly change are mostly well below 1 percentage point in magnitude, and none of the first-to-third revisions are statistically significant. For the first-to-latest revision, only that of secondary income receipts is statistically significant.

**Table 8. Current-Account Components: Mean Revisions and Mean Absolute Revisions of Quarterly Percent Changes, First to Third and Latest Estimates, 2014–2023**

ITA table 1.2 line	Series	First to third revision		First to latest revision	
		Mean percentage points revision	Mean absolute percentage points revision	Mean percentage points revision	Mean absolute percentage points revision
1	Exports of goods and services and income receipts	0.05	0.54	0.12	0.58
2	Exports of goods and services	-0.07	0.56	0.08	0.68
3	Goods	-0.11	0.54	-0.06	0.68
13	Services	0.02	1.23	0.38	1.44
26	Primary income receipts	0.29	1.23	0.11	1.40
33	Secondary income receipts	0.35	1.87	0.93*	2.39
34	Imports of goods and services and income payments	0.05	0.54	0.12	0.62
35	Imports of goods and services	0.03	0.38	0.07	0.53
36	Goods	-0.01	0.40	-0.01	0.48
45	Services	0.24	1.16	0.45	1.48
58	Primary income payments	-0.02	1.87	0.05	2.17
64	Secondary income payments	0.29	2.25	0.65	2.38

\* The mean revision is statistically different from zero at the 5 percent significance level.

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The small mean percentage point revisions are in partial contrast to the mean percent revisions to levels shown in tables 3 and 5. Part of this appears to be a consequence of certain revisions in annual updates affecting all estimates for a given account systematically (that is, consistently raising or consistently lowering them) without strongly impacting the growth rate between one period and the next.<sup>36</sup>

Mean absolute percent point revisions in table 8 are considerably larger than mean percentage point revisions, but they are generally smaller than the mean absolute percent revisions to levels in tables 3 and 5.

In other respects, the results of the analysis of the revision in percentage changes are similar to the results of the analysis of revision in levels. Like revisions to levels, revisions to percent changes in both exports and imports of goods tend to be small. Additionally, revisions to percent change in both exports and imports of services tend to be larger in magnitude than those for goods. Finally, the largest revisions, by component, are in secondary income receipts and payments.

## Directional reliability and capturing turning points

Another consideration for evaluating a series' reliability is whether the first estimate correctly predicts the direction of movement of later estimates.

Table 9 presents a summary of the reliability of directional change of major components of the ITAs. It shows the relative frequency with which the quarter-to-quarter directional change of the series (i.e., increase or decrease) is the same between the first estimate and the third or latest estimate. For example, for exports, the direction of change of the estimates from the previous quarter to the quarter of the release matched the direction of change presented in the third estimate in 38 out of the 40 quarters (95.0 percent) in the period from 2014 to 2023, and it matched the direction presented in the latest estimate in 39 out of the 40 quarters (97.5 percent). The directional reliability was somewhat lower for imports of goods and services and income payments, where the direction of change in the first estimates matched the direction of change in the third and latest estimates in 35 out of 40 quarters (87.5 percent). Among the current account components, the directional reliability was lowest for services exports and imports and secondary income payments.

**Table 9. ITA Components: Directional Reliability of the Quarterly Change, First Estimates Compared with Third and Latest Estimates, 2014–2023**

ITA table 1.2 line	Series	Same quarter-to-quarter direction (percentage of quarters)	
		First to third estimate	First to latest estimate
	<b>Current Account</b>		
1	Exports of goods and services and income receipts	95.0	97.5
2	Exports of goods and services	97.5	90.0
3	Goods	92.5	95.0
13	Services	75.0	75.0
26	Primary income receipts	95.0	92.5
33	Secondary income receipts	87.5	77.5
34	Imports of goods and services and income payments	87.5	87.5
35	Imports of goods and services	97.5	97.5
36	Goods	95.0	97.5
45	Services	75.0	72.5
58	Primary income payments	90.0	90.0
64	Secondary income payments	77.5	82.5
	<b>Financial Account</b>		
67	Net U.S. acquisition of financial assets excluding financial derivatives	87.5	82.5
91	Net U.S. incurrence of liabilities excluding financial derivatives	95.0	92.5
107	Financial derivatives other than reserves, net transactions	97.5	97.5
	<b>Balances</b>		
109	Balance on current account	82.5	82.5
110	Balance on goods and services	87.5	90.0
111	Balance on goods	92.5	100.0
112	Balance on services	67.5	52.5
113	Balance on primary income	75.0	72.5
114	Balance on secondary income	87.5	87.5
117	Net lending or net borrowing from financial-account transactions	82.5	85.0

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Directional reliability was generally high in the financial accounts. The quarter-to-quarter direction of the third and latest estimates matched the quarter-to-quarter direction of the first estimate more than 80 percent of the time for all series. Balances are subject to revisions to series on each of the credit and debit sides. The balance on goods and services in first estimates matched the direction of change in third estimates 87.5 percent of the time and matched the direction in the latest estimates 90.0 percent of the time, both somewhat lower than the percentages for exports of and imports of goods and services. Directional reliability varied in the balances and was lowest for the balance on services trade.

A turning point is defined as a quarter that shows an increase (or decrease) in series level following a quarter that showed a decrease (or increase). Table 10 shows the identification and misidentification of turning points by the first estimate, compared with turning points identified in the latest estimate. For the first estimate to appropriately capture turning points, it should identify the same turning points as the latest estimate without falsely identifying other turning points (false positives).



**Table 10. ITA Components: Matching of Turning Points in First and Latest Estimates, Number of Quarters, 2014–2023**

ITA table 1.2 line	Series	In latest estimate							
		Nonturning point		Upward turning point			Downward turning point		
		In first estimate							
		Match	False positive <sup>1</sup>	Match	False negative <sup>2</sup>	Downward turning point	Match	False negative <sup>2</sup>	Upward turning point
	<b>Current Account</b>								
1	Exports of goods and services and income receipts	26	2	6	0	0	6	0	0
2	Exports of goods and services	20	8	6	0	0	5	1	0
3	Goods	20	5	7	0	0	8	0	0
13	Services	20	4	7	1	0	2	4	2
26	Primary income receipts	25	4	3	2	0	4	2	0
33	Secondary income receipts	7	9	10	2	0	10	2	0
34	Imports of goods and services and income payments	22	6	3	3	0	4	2	0
35	Imports of goods and services	28	2	5	0	0	5	0	0
36	Goods	29	1	5	0	0	5	0	0
45	Services	24	4	3	2	1	0	5	1
58	Primary income payments	27	1	4	1	1	2	4	0
64	Secondary income payments	9	7	12	0	0	10	1	1
	<b>Financial Account</b>								
67	Net U.S. acquisition of financial assets excluding financial derivatives	10	4	11	0	2	10	3	0
91	Net U.S. incurrence of liabilities excluding financial derivatives	9	3	13	1	0	13	1	0
107	Financial derivatives other than reserves, net transactions	14	0	13	0	0	12	1	0
	<b>Balances</b>								
109	Balance on current account	16	1	9	2	0	8	3	1
110	Balance on goods and services	17	4	8	1	0	9	1	0
111	Balance on goods	17	0	11	0	0	12	0	0
112	Balance on services	12	6	4	6	1	4	5	2
113	Balance on primary income	7	11	5	3	3	7	3	1
114	Balance on secondary income	7	5	13	1	0	12	2	0
117	Net lending or net borrowing from financial-account transactions	7	5	13	1	0	11	2	1

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1. A false positive is a quarter that is identified as a turning point in the first estimate but not in the latest estimate.
2. A false negative is a quarter that is not identified as a turning point in the first estimate but is in the latest estimate.

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Turning points are more common in net accounts, that is, the various financial-account and current-account balances. For example, among 40 estimates of exports of goods and services and income receipts in study period, only 12 were turning points, similarly for imports of goods and services and income payments. For the current-account balance, 23 of the 40 estimates were turning points. All that is required for a turning point to occur for these balances is a switch in terms of which of the two underlying components grows faster than the other (on an absolute, not a relative, basis). For accounts that are not measured on a net basis, a turning point occurs when one quarter's growth in transactions switches to a contraction, or vice versa.

Overall, the first estimates identified most of the turning points in the latest estimates, especially for higher-level current-account aggregates. For exports of goods and services and income receipts, only 2 first estimates were false positives, and the first estimates matched all actual turning points. For imports of goods and services and income payments, 6 first estimates among 28 nonturning points were false positives, and 5 first estimates among 12 turning points were false negatives. The first estimate identified nonturning points particularly poorly for secondary income receipts and payments; however, the first estimates of these series identified turning points relatively well.

The financial accounts also match turning points generally well. For net U.S. acquisition of financial assets, 4 first estimates among 14 nonturning points were false positives, and 3 first estimates among 26 turning points were false negatives. For 2 of the 13 upward turning points, the first estimates showed downward turning points. For net U.S. incurrence of liabilities, 3 of the 12 nonturning points were false positives in the first estimates, and only 2 of the 28 turning points were false negatives.

The current-account balance also did well at capturing turning points, with only 1 false positive out of 17 nonturning points, 5 false negatives among the 23 turning points, and 1 quarter where the first estimate showed an upward turning point and the latest estimate showed a downward turning point. Of the other balances, the first estimates of the balance on primary income matched turning points least successfully.

## ITA Revisions and the COVID-19 Pandemic

This study reviews the reliability of the ITAs and IIP Accounts for 2014 through the most recent revised available data (2022 or 2023) and thus covers the period during which the COVID-19 crisis and subsequent recovery occurred. This box compares mean revisions for key components of the ITAs in the period leading up to the beginning of the COVID-19 pandemic and in the period during and after the pandemic, to assess whether the pandemic had an impact on the size of the revisions. While the pandemic and associated recession had a large impact on estimates of the *levels* of the transactions in the ITAs, the impact on revisions of these transactions has been more attenuated.

Table I presents the mean percent revision and the mean absolute percent revision for key ITA series for the 6 years up to the beginning of the COVID-19 pandemic (2014–2019) and the 4 years following the beginning of the pandemic (2020–2023).<sup>1</sup>

**Table I. Quarterly Current-Account Components: Mean Revisions and Mean Absolute Revisions, Item Value Scaling, First Estimates to Third Estimates, by Selected Time Period, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision		Mean absolute percent revision	
		Pre-COVID-19, 2014–2019	COVID-19 and post-COVID-19, 2020–2023	Pre-COVID-19, 2014–2019	COVID-19 and post-COVID-19, 2020–2023
1	Exports of goods and services and income receipts	0.70	0.27	0.73	0.79
2	Exports of goods and services	0.38	0.64	0.73	1.00
3	Goods	-0.23	-0.20	0.38	0.45
13	Services	1.62	2.51	2.20	3.22
26	Primary income receipts	1.09	-1.62	1.45	2.11
33	Secondary income receipts	3.54	7.55	4.69	7.64
34	Imports of goods and services and income payments	0.23	0.56	0.61	0.58
35	Imports of goods and services	-0.01	0.28	0.26	0.38
36	Goods	-0.02	-0.17	0.26	0.45
45	Services	0.02	2.44	1.05	2.84
58	Primary income payments	1.22	0.80	2.81	1.50
64	Secondary income payments	0.33	2.72	5.10	3.32

**ITA** International Transactions Accounts

Note. Shading indicates that the difference between the values (either mean percent revision or mean percent absolute revision, as appropriate) for the two time periods is statistically significant at the 5 percent significance level.

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Magnitudes of the mean percent revision and mean absolute percent revision were often larger in the later period than the earlier one. In 9 of the 12 series, the magnitude of the mean percent revision was greater in the pandemic period. The differences were largest for secondary income receipts, where the mean percent revision increased from 3.54 percent to 7.55 percent, for imports of services, where the mean percent revision increased from 0.02 percent to 2.44 percent, and for secondary income payments, which increased from 0.33 percent to 2.72 percent.

Standard statistical tests can be used to determine if the differences between two sets of revisions are statistically significant. Perhaps in part because of the relatively short time spans, the mean revisions for only three series—primary income receipts, imports of goods and services, and imports of services—are significantly different from each other in the two time periods.

Similarly, for only three series—imports of goods, imports of services, and primary income payments—was the mean absolute percent revision statistically significantly different between the two time periods and in one of those cases (primary income payments) the post-COVID mean absolute revision was lower than the pre-COVID mean absolute revision.

1. 2020 Q1 was chosen as the beginning of the pandemic on the basis of the declaration of a public health emergency in March 2020.

## Seasonal Adjustment Revisions

Each June, as part of annual updates, seasonal factors—the factors that are applied to quarterly estimates that are not seasonally adjusted in order to generate seasonally adjusted estimates—are updated for the most recent years. In addition, series that are not currently seasonally adjusted are examined to determine whether seasonal adjustment should be initiated.<sup>1</sup> These updates and new adjustments are one source of the differences between the first or second estimates and the third estimates and the differences between the third estimates and subsequent estimates. This section describes the extent to which revisions to seasonal factors affect revisions to the entire series.

The impact of seasonal adjustment on the revision process can be analyzed by comparing the revisions to the seasonally adjusted and not seasonally adjusted series for a given account in ITA table 1.2. The difference between the revisions reflects the role of the seasonal adjustment and is presented in the columns of table I labeled “Seasonal factor.” The impact of seasonal adjustment factors on the mean percent and mean absolute percent first-to-third revisions and first-to-latest revisions is typically small. The mean percent revision of the seasonal adjustment factors for first-to-third revisions and first-to-latest revisions is near zero for all major series. Mean absolute percent revisions are also generally small, ranging from 0.10 percent to 0.61 percent for first-to-third revisions, and 0.23 percent to 1.93 percent for first-to-latest revisions.

**Table I. Contribution of Seasonal Adjustment Factors to Revisions of Quarterly Estimates, First to Third and Latest Estimates, Item Value Scaling, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision			Mean absolute percent revision		
		Seasonally adjusted	Not seasonally adjusted	Seasonal factor	Seasonally adjusted	Not seasonally adjusted	Seasonal factor
	<i>First-to-third revision</i>						
1	Exports of goods and services and income receipts	0.52	0.59	-0.07	0.75	0.85	0.32
2	Exports of goods and services	0.49	0.58	-0.09	0.84	0.84	0.41
3	Goods	-0.22	-0.10	-0.12	0.41	0.24	0.40
13	Services	1.98	2.01	-0.04	2.61	2.65	0.61
26	Primary income receipts	0.00	0.01	-0.01	1.71	1.82	0.35
33	Secondary income receipts	5.15	5.16	-0.02	5.87	5.85	0.10
34	Imports of goods and services and income payments	0.36	0.41	-0.05	0.60	0.64	0.20
35	Imports of goods and services	0.11	0.17	-0.06	0.31	0.30	0.24
36	Goods	-0.08	-0.02	-0.06	0.34	0.10	0.28
45	Services	0.99	1.03	-0.04	1.76	1.81	0.50
58	Primary income payments	1.05	1.09	-0.03	2.29	2.33	0.23
64	Secondary income payments	1.29	1.31	-0.02	4.38	4.56	0.44
	<i>First-to-latest revision</i>						
1	Exports of goods and services and income receipts	1.89	1.95	-0.06	2.01	2.07	0.52
2	Exports of goods and services	1.60	1.69	-0.09	1.68	1.81	0.81
3	Goods	-0.07	0.06	-0.12	0.49	0.26	0.53
13	Services	5.10	5.14	-0.03	5.23	5.46	1.93
26	Primary income receipts	1.94	1.95	-0.01	4.07	4.05	0.38
33	Secondary income receipts	7.62	7.63	-0.01	7.72	7.76	0.23
34	Imports of goods and services and income payments	0.86	0.90	-0.05	0.92	0.99	0.23
35	Imports of goods and services	0.36	0.42	-0.06	0.54	0.53	0.31
36	Goods	-0.13	-0.07	-0.06	0.44	0.24	0.32
45	Services	2.68	2.72	-0.05	2.97	3.01	0.61
58	Primary income payments	3.86	3.90	-0.04	4.06	4.09	0.42
64	Secondary income payments	-1.10	-1.07	-0.03	6.03	6.30	1.07

ITA International Transactions Accounts

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The impact of the seasonal adjustment factors can also be gauged by comparing the quarter-to-quarter percentage changes for the first estimates and later estimates and is presented in table II.

The seasonal adjustment process has considerable impact on revisions of the quarter-to-quarter percentage change in the estimates. For the first-to-third estimates, the mean of the account estimates of the seasonal impact is 0.52 and ranges from 0.13 to 1.07. For the first-to-latest revision the mean of the account estimate of the seasonal impact is 1.03 and ranges from 0.33 to 3.65. For several components, the seasonal factor mean absolute revision is similar in magnitude to the overall mean average revision.

**Table II. Contribution of Seasonal Adjustment Factors to Revisions of Quarterly Percent Change Estimates, First to Third and Latest Estimates, 2014–2023**

ITA table 1.2 line	Series	Mean absolute percentage points revision		
		Seasonally adjusted	Not seasonally adjusted	Seasonal factor
	<i>First-to-third revision</i>			
1	Exports of goods and services and income receipts	0.54	0.54	0.50
2	Exports of goods and services	0.56	0.60	0.61
3	Goods	0.54	0.23	0.53
13	Services	1.23	1.59	1.07
26	Primary income receipts	1.23	1.30	0.52
33	Secondary income receipts	1.87	1.84	0.13
34	Imports of goods and services and income payments	0.54	0.50	0.31
35	Imports of goods and services	0.38	0.23	0.36
36	Goods	0.40	0.09	0.40
45	Services	1.16	1.34	0.79
58	Primary income payments	1.87	1.96	0.35
64	Secondary income payments	2.25	2.59	0.61
	<i>First-to-latest revision</i>			
1	Exports of goods and services and income receipts	0.58	0.88	0.90
2	Exports of goods and services	0.68	1.34	1.31
3	Goods	0.68	0.25	0.72
13	Services	1.44	3.93	3.65
26	Primary income receipts	1.40	1.52	0.61
33	Secondary income receipts	2.39	2.30	0.38
34	Imports of goods and services and income payments	0.62	0.60	0.33
35	Imports of goods and services	0.53	0.29	0.42
36	Goods	0.48	0.09	0.45
45	Services	1.48	1.43	0.87
58	Primary income payments	2.17	2.21	0.54
64	Secondary income payments	2.38	3.55	2.20

**ITA** International Transactions Accounts

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- 
- Also, series that have been adjusted in the past are evaluated to determine if seasonal adjustment should be discontinued.

## Analysis of Revisions to the IIP Accounts and their Changes

This section analyzes the second set of core accounts in BEA's International Economic Accounts, the U.S. International Investment Position Accounts; it examines both the quarter-end and yearend data in IIP table 1.2 and the annual data in IIP table 1.3.

### U.S. quarter-end and yearend International Investment Position Accounts

Table 11 presents the mean percent revisions and mean absolute percent revisions of quarter-end and yearend first estimates of key IIP Accounts. The period covered for revisions of the quarter-end position begins with the first quarter of 2014 and runs through 2023 for the initial June annual update and through 2022 for the second June annual update. The period covered for revisions of the yearend position begins with the yearend 2013 position and runs through the yearend 2022 position.

**Table 11. Quarter-end and Yearend IIP Components: Mean Revisions and Mean Absolute Revisions, Selected Vintages and Years**

IIP table 1.2 line	Series <sup>1</sup>	Quarter-end estimates				Memorandum: yearend estimates	
		Initial to first subsequent annual update, 2014–2023		Initial to second subsequent annual update, 2014–2022		First subsequent annual update to second subsequent annual update, 2013–2022	
		Mean percent revision	Mean absolute percent revision	Mean percent revision	Mean absolute percent revision	Mean percent revision	Mean absolute percent revision
1	<b>U.S. net international investment position<sup>2</sup></b>	<b>-0.13*</b>	<b>0.23</b>	<b>-0.29*</b>	<b>0.35</b>	<b>-0.23</b>	<b>0.30</b>
2	Net position excluding financial derivatives <sup>2</sup>	-0.15*	0.25	-0.32*	0.38	-0.25	0.33
4	<b>U.S. assets</b>	<b>0.04</b>	<b>0.46</b>	<b>0.06</b>	<b>0.56</b>	<b>0.17</b>	<b>0.50</b>
5	U.S. assets, excluding financial derivatives	0.07	0.46	0.08	0.56	0.13	0.48
7	Direct investment at market value	-0.09	0.70	-0.01	0.97	-0.25	0.57
8	Equity	-0.33*	0.70	-0.20	0.69	-0.35	0.44
9	Debt instruments	1.35*	3.19	1.02	4.33	0.26	2.32
10	Portfolio investment	0.11	0.49	-0.06	0.81	0.05	0.59
11	Equity and investment fund shares	0.33*	0.70	0.40*	0.71	0.20	0.73
12	Debt securities	-0.45*	0.86	-1.18*	1.81	-0.36	1.64
15	Financial derivatives other than reserves, gross positive fair value	-0.44	1.20	-0.49	1.71	0.18	1.62
21	Other investment	0.25	0.85	0.63*	1.05	1.01	1.13
27	Reserve assets	0.01	0.01	0.01	0.01	0.00	0.00
36	<b>U.S. liabilities</b>	<b>0.27*</b>	<b>0.43</b>	<b>0.56*</b>	<b>0.65</b>	<b>0.54*</b>	<b>0.59</b>
37	U.S. liabilities, excluding financial derivatives	0.31*	0.42	0.61*	0.66	0.53*	0.58
39	Direct investment at market value	0.35	0.78	0.57*	1.29	0.26	0.78
40	Equity	0.27	0.66	0.60*	1.03	0.29	0.64
41	Debt instruments	0.60	1.91	0.14	3.09	-0.13	2.26
42	Portfolio investment	0.23*	0.42	0.55*	0.67	0.49	0.66
43	Equity and investment fund shares	0.38*	0.69	0.71*	0.92	0.74	0.87
44	Debt securities	0.10	0.41	0.40*	0.69	0.27	0.64
51	Financial derivatives other than reserves, gross negative fair value	-0.53	1.32	-0.68	1.90	0.05	1.80
57	Other investment	0.55*	0.73	1.04*	1.16	1.15*	1.21

\* The mean revision is statistically different from zero at the 5 percent significance level.

**IIP** International investment position

1. Item value scaling unless otherwise specified
2. Sum-of-unsigned components scaling

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The scaling method varies based on the series. For the U.S. net international investment position (IIP table 1.2 line 1) and the net position excluding financial derivatives (line 2), the scaling factor is the sum of the unsigned components, because these series are the net of two measured series. The remaining series use item value scaling.<sup>37</sup>



Revisions are small for both the quarter-end and yearend net positions. For the component series, revisions are also generally small (compared to current account components in the ITAs), but with some variation across the components.

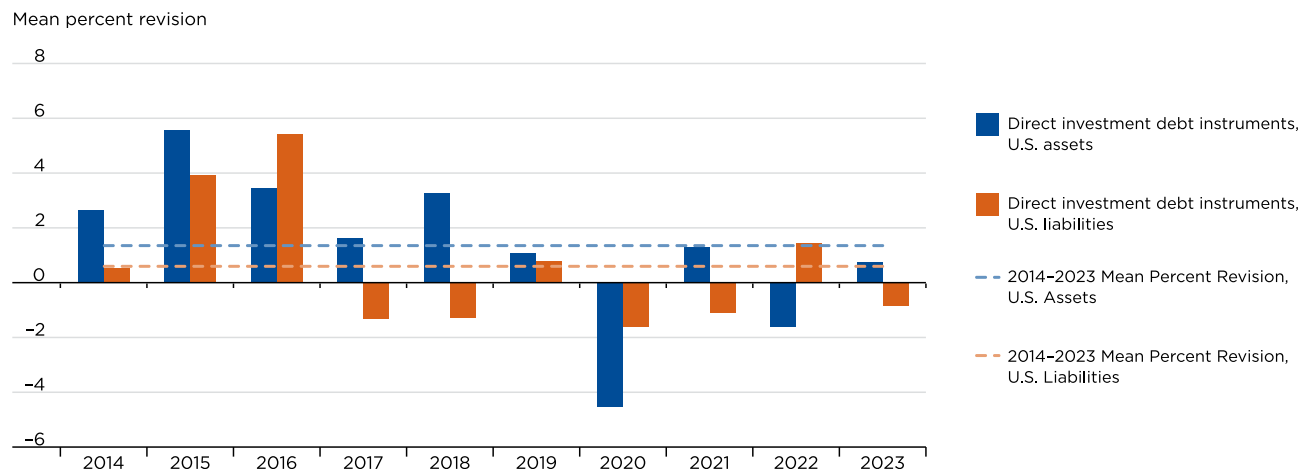
Mean percent revisions of total U.S. liabilities are notably larger than the revisions for U.S. assets. The mean percent revisions for both quarter-end and yearend position for U.S. liabilities are statistically different from zero.

Among the subcomponents of the IIP, there are also differences in the size of the mean revisions, especially in the quarter-end position estimates. Among U.S. assets, the mean percent revision for direct investment debt instruments is more than 1 percent, and it is statistically significant for the quarter-end position, suggesting consistent undershooting in the quarter-end series. Portfolio investment debt securities show some evidence of overshooting, with a mean percent revision that is statistically significant and negative in the quarter-end series.

Among U.S. liabilities, several mean revisions also indicate a small degree of undershooting in the quarter-end estimates. For example, the mean percent revision for portfolio investment equity and investment fund shares is positive and statistically significant for the quarter-end data series, as is the mean percent revision for other investment.

Chart 7 presents a more detailed look at the annual averages of the revisions to the quarter-end position in direct investment debt instruments, which have relatively large mean percent and mean absolute percent revisions. For U.S. assets, revisions are mostly large and positive in the early years of the series and then turned negative in the later years. For U.S. liabilities, large revisions of 2015 and 2016 estimates drove the results. The large revisions in the direct investment debt instruments series may be due to the difficulty of projecting yet-to-be reported transactions in debt, which tend to be large and volatile, between affiliated units of multinational enterprises in the preliminary quarterly statistics.

**Chart 7. Annual Mean Revision of Direct Investment Debt Instruments, Initial Estimates to First Subsequent June Estimates, 2014–2023**



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## Changes to the yearend IIP Accounts

The quarter-end and yearend IIP Accounts present the accumulated stock of U.S.-owned financial assets in other countries and U.S. liabilities to residents of other countries at a specific point in time. Changes in the position are also of analytical interest to understand how U.S. assets and liabilities with foreign residents evolve over a period. IIP table 1.3 presents details on changes in the IIP position as composed of financial-account transactions and other changes. The financial account of the ITAs is directly related to the IIP Accounts because financial-account transactions directly increase or decrease U.S. assets or liabilities. Other changes, which are not transactions, consist of price changes, exchange-rate changes, and other changes in volume and valuation n.i.e.<sup>38</sup> The analysis that follows is based on annual statistics from IIP table 1.3.<sup>39</sup> The period covered for revisions of changes in the yearend position is 2013 through 2022.

Table 12 presents the mean percent revision of the yearly change in IIP components between the initial June estimates and the next June estimates. Two different scaling methods are used in these tables. For the U.S. net international investment position (IIP table 1.3 line 1) and the net position excluding financial derivatives (line 2), the scaling factor is the sum of the unsigned components of the beginning-of-year position, because these positions are the net of two measured positions. The remaining series are scaled by beginning-of-year positions.

**Table 12. Yearly Change in IIP Components: Mean Percent Revisions, Initial June Estimates to Next June Estimates, 2013–2022**

IIP table 1.3 line	Series <sup>1</sup>	Total change in position	Change attributable to:				
			Financial-account transactions	Other changes			
				Total	Price changes	Exchange-rate changes	Changes in volume and valuation n.i.e.
1	<b>U.S. net international investment position<sup>2</sup></b>	<b>-0.22*</b>	<b>-0.07*</b>	<b>-0.15</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
2	Net position excluding financial derivatives <sup>2</sup>	-0.24*	-0.08*	-0.16	-0.09	0.01	-0.08
5	<b>U.S. assets, excluding financial derivatives</b>	<b>0.18</b>	<b>-0.03</b>	<b>0.22</b>	<b>-0.09</b>	<b>0.02</b>	<b>0.28*</b>
7	Direct investment at market value	-0.33*	-0.36*	0.03	0.05	-0.05	0.04
8	Equity	-0.40*	-0.36*	-0.03	0.05	-0.06	-0.03
9	Debt instruments	0.22	-0.16	0.37	n.a.	n.a.	0.37
10	Portfolio investment	0.23	0.07	0.16	-0.22	0.11	0.27
11	Equity and investment fund shares	0.23	0.17	0.06	-0.30	0.13	0.24
12	Debt securities	0.22	-0.16	0.38	-0.02	0.07*	0.33
21	Other investment	0.97	0.30	0.67	0.00	-0.04	0.71
27	Reserve assets	0.00	0.00	0.00	0.00	0.00	0.00
37	<b>U.S. liabilities, excluding financial derivatives</b>	<b>0.57*</b>	<b>0.12</b>	<b>0.45*</b>	<b>0.10</b>	<b>0.00</b>	<b>0.35*</b>
39	Direct investment at market value	0.35	0.27	0.07	0.02	n.a.	0.06
40	Equity	0.26	0.24	0.02	0.02	n.a.	0.00
41	Debt instruments	0.66	0.42	0.24	n.a.	n.a.	0.24
42	Portfolio investment	0.47	0.04	0.43	0.16	0.00	0.27
43	Equity and investment fund shares	0.78	0.10	0.68	0.31	0.00	0.37
44	Debt securities	0.20	-0.02	0.22	0.06	0.00	0.16
57	Other investment	1.22*	0.23*	0.99*	n.a.	-0.02*	1.01*

\* The mean revision is statistically different from zero at the 5 percent significance level.

**n.a.** Not applicable; no estimates published in IIP table 1.3

**n.i.e.** Not included elsewhere

**IIP** International investment position

1. Scaled by the beginning-of-year position, unless otherwise specified
2. Scaled by the sum-of-unsigned, beginning-of-year component positions

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First estimates of changes to the overall net investment position show small signs of overshooting relative to the next June annual update. The mean percent revision of the net IIP is -0.22 percent, which is accounted for by mean percent revisions of -0.07 percent in financial account transactions and -0.15 percent in other changes. Mean percent revisions for the changes of many of the components are positive, although the amounts are generally small (less than 1 percent of the beginning-of-year position) and not statistically significant.

Table 13 presents the mean absolute percent revision of the yearly change in IIP components. The absolute revisions are generally small. The mean absolute revisions for changes in the net position excluding derivatives are all less than 0.5 percent. For both U.S. assets and U.S. liabilities, the largest revisions are for direct investment debt instruments and other investment.

**Table 13. Yearly Change in IIP Components: Mean Absolute Percent Revisions, Initial June Estimates to Next June Estimates, 2013–2022**

IIP table 1.3 line	Series <sup>1</sup>	Total change in position	Change attributable to:				
			Financial-account transactions	Other changes			
				Total	Price changes	Exchange-rate changes	Changes in volume and valuation n.i.e.
1	<b>U.S. net international investment position<sup>2</sup></b>	<b>0.27</b>	<b>0.08</b>	<b>0.23</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
2	Net position excluding financial derivatives <sup>2</sup>	0.29	0.09	0.25	0.11	0.02	0.19
5	<b>U.S. assets, excluding financial derivatives</b>	<b>0.38</b>	<b>0.20</b>	<b>0.38</b>	<b>0.15</b>	<b>0.03</b>	<b>0.36</b>
7	Direct investment at market value	0.37	0.38	0.11	0.07	0.06	0.12
8	Equity	0.41	0.40	0.09	0.08	0.07	0.08
9	Debt instruments	1.48	1.13	0.60	n.a.	n.a.	0.60
10	Portfolio investment	0.47	0.32	0.56	0.30	0.11	0.50
11	Equity and investment fund shares	0.73	0.37	0.61	0.38	0.14	0.51
12	Debt securities	1.11	0.97	0.81	0.13	0.07	0.82
21	Other investment	1.15	0.39	0.83	0.00	0.04	0.86
27	Reserve assets	0.00	0.00	0.00	0.00	0.00	0.00
37	<b>U.S. liabilities, excluding financial derivatives</b>	<b>0.59</b>	<b>0.16</b>	<b>0.46</b>	<b>0.10</b>	<b>0.01</b>	<b>0.38</b>
39	Direct investment at market value	0.61	0.54	0.17	0.03	n.a.	0.18
40	Equity	0.51	0.52	0.08	0.04	n.a.	0.09
41	Debt instruments	2.00	1.31	0.96	n.a.	n.a.	0.96
42	Portfolio investment	0.63	0.20	0.52	0.16	0.00	0.42
43	Equity and investment fund shares	0.92	0.20	0.77	0.31	0.00	0.47
44	Debt securities	0.56	0.34	0.36	0.06	0.01	0.35
57	Other investment	1.25	0.27	1.02	n.a.	0.02	1.03

**n.a.** Not applicable; no estimates published in IIP table 1.3.

**n.i.e.** Not included elsewhere

**IIP** International investment position

1. Scaled by the beginning-of-year position, unless otherwise specified.
2. Scaled by the sum-of-unsigned, beginning-of-year component positions.

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## Directional reliability of the IIP Accounts and changes in the IIP Accounts

In this section, the directional reliability of the yearend IIP and the annual changes to the IIP are examined with a similar methodology as used to examine the directional reliability of components of the ITAs.

Table 14 presents the directional reliability of the quarter-end and yearend positions and their components. The directional reliability of the net position and its major components—U.S. assets and U.S. liabilities—is very high. The first quarter-end estimates match the initial June and second June annual updates more than 90 percent of the time. This is not surprising, as these positions generally move in a consistent direction (up) throughout the study period.

**Table 14. Quarter-end and Yearend IIP Components: Directional Reliability of the Initial Estimates Compared with Subsequent June Estimates, Selected Years**

IIP table 1.2 line	Series	Same quarter-to-quarter direction, initial estimates to next June estimate, 2014–2023 (percentage of quarters)	Same quarter-to-quarter direction, initial estimates to second June estimate, 2014–2022 (percentage of quarters)	Same year-to-year direction, initial estimate to next June estimate, 2013–2022 (percentage of years)
1	<b>U.S. net international investment position</b>	<b>95.0</b>	<b>100.0</b>	<b>100.0</b>
2	Net position excluding financial derivatives	97.5	100.0	100.0
5	<b>U.S. assets, excluding financial derivatives</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
7	Direct investment at market value	97.5	97.2	100.0
8	Equity	100.0	100.0	100.0
9	Debt instruments	77.5	72.2	90.0
10	Portfolio investment	97.5	97.2	100.0
11	Equity and investment fund shares	100.0	100.0	90.0
12	Debt securities	100.0	91.7	100.0
21	Other investment	90.0	88.9	100.0
27	Reserve assets	100.0	100.0	100.0
37	<b>U.S. liabilities, excluding financial derivatives</b>	<b>97.5</b>	<b>100.0</b>	<b>100.0</b>
39	Direct investment at market value	100.0	100.0	100.0
40	Equity	100.0	100.0	100.0
41	Debt instruments	77.5	86.1	90.0
42	Portfolio investment	100.0	100.0	100.0
43	Equity and investment fund shares	100.0	100.0	100.0
44	Debt securities	97.5	94.4	100.0
57	Other investment	95.0	97.2	100.0

IIP International investment position

U.S. Bureau of Economic Analysis

The directional reliability of the more detailed components varies considerably. The least directionally reliable components are direct investment debt instruments for both U.S. assets and U.S. liabilities. For U.S. assets, the direction of the first quarter-end estimates match later estimates between 70 and 80 percent of quarters, while the annual estimates match 90 percent of years.

Table 15 presents the directional reliability of the annual change. The reliability of changes to the net position and its major components—U.S. assets and U.S. liabilities—is very high. For the total change, the reliability is 90 percent or 100 percent for every series. Among the detailed sources of other changes, the lowest directional reliability is for changes in volume and valuation n.i.e.<sup>40</sup>

**Table 15. Changes in IIP: Directional Reliability of the Annual Change, Initial June Estimates Compared with Next June Estimates, 2013–2022**

IIP table 1.3 line	Series	Total change in position (percentage of years)	Change attributable to:				
			Financial-account transactions (percentage of years)	Other changes (percentage of years)			
				Total	Price changes	Exchange-rate changes	Changes in volume and valuation n.i.e.
1	<b>U.S. net international investment position</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>n.a.</b>	<b>n.a.</b>	<b>n.a.</b>
2	Net position excluding financial derivatives	100.0	100.0	100.0	100.0	100.0	80.0
5	<b>U.S. assets, excluding financial derivatives</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>70.0</b>
7	Direct investment at market value	100.0	100.0	100.0	100.0	100.0	70.0
8	Equity	100.0	100.0	100.0	100.0	100.0	90.0
9	Debt instruments	90.0	70.0	90.0	n.a.	n.a.	90.0
10	Portfolio investment	100.0	90.0	100.0	100.0	100.0	80.0
11	Equity and investment fund shares	90.0	100.0	100.0	100.0	100.0	80.0
12	Debt securities	100.0	90.0	100.0	100.0	100.0	70.0
21	Other investment	100.0	100.0	80.0	100.0	100.0	80.0
27	Reserve assets	100.0	100.0	100.0	100.0	100.0	n.a.
37	<b>U.S. liabilities, excluding financial derivatives</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>90.0</b>
39	Direct investment at market value	100.0	100.0	100.0	100.0	n.a.	80.0
40	Equity	100.0	100.0	100.0	100.0	n.a.	90.0
41	Debt instruments	90.0	90.0	60.0	n.a.	n.a.	60.0
42	Portfolio investment	100.0	100.0	100.0	100.0	100.0	80.0
43	Equity and investment fund shares	100.0	90.0	100.0	100.0	n.a.	90.0
44	Debt securities	100.0	100.0	100.0	100.0	100.0	70.0
57	Other investment	100.0	100.0	90.0	n.a.	100.0	60.0

**n.a.** Not applicable; no estimates published in IIP table 1.3

**n.i.e.** Not included elsewhere

**IIP** International investment position

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## Conclusion

This article presents an update to the ongoing examination of revisions to BEA's international accounts. It focuses on two of the main sets of statistics produced by BEA relating to trade and investment between the United States and the rest of the world, the International Transactions Accounts and the International Investment Position Accounts.

The analysis finds that revisions, especially to the highest-level aggregate statistics on trade and investment, tend to be small in magnitude. Revisions to key balances, such as the current-account balance and the trade balance, also tend to be small. Furthermore, the first estimates of key components of the ITAs and IIP generally show a direction in change of the series that is consistent with the direction shown by later revisions.

The size and directional reliability of revisions differs across accounts. Revisions to services exports and imports are notably larger, for example, than revisions to goods exports and imports. Among the major ITA components, the largest revisions are in secondary income (payments and receipts). Among the major components of the IIP, direct investment debt instruments have the largest revisions.

BEA strives to ensure that its international accounts estimates are sufficiently timely to be relevant to policy and business decisions while presenting a comprehensive and accurate picture of interactions between the U.S. economy and the rest of the world. In large part, this involves efforts to improve source data coverage, both for the source data collected by BEA and in cooperation with partners such as the U.S. Census Bureau and the Treasury International Capital system.

## Appendix

The t-tests used to assess whether a mean revision is statistically different than zero assume that the revisions of one quarter are independent of the revisions of any other quarter. For revisions of levels in quarterly International Economic Accounts, this assumption may not always well approximate reality. For instance, some later vintage estimates systematically revise an entire year's worth of estimates up or down. Reasons for this could include, among other things, revisions resulting from the incorporation of data from an annual survey or revisions resulting from the incorporation of a new data source or estimation methodology.

Non-independence of the revisions may bias the t-tests towards a “statistically significant” result. Numerical simulations based on a simple example demonstrate this bias. As a baseline, consider revisions in quarter  $t$  ( $R_t$ ) that are independently normally distributed with zero mean and standard deviation  $\sigma$ :

$$R_t \sim N(0, \sigma^2)$$

At a 5-percent significance level, the t-test should indicate statistical significance with a probability of only 5 percent. Next, consider quarterly revisions ( $R_{ty}$ ) that also incorporate a yearly effect ( $R_y$ ):

$$R_{ty} = R_t + R_y$$

where

$$R_t \sim N(0, \sigma_0^2)$$

and

$$R_y \sim N(0, \sigma_1^2)$$

The mean revision of  $R_{ty}$  is still zero, but revisions within any given year are not independent of each other. When t-tests are conducted on the mean of  $R_{ty}$  under the false assumption (given the setup above) that revisions are independently distributed, the likelihood of a statistically significant result increases, with the extent of the increase depending on the relative sizes of the two standard deviations,  $\sigma_0$  and  $\sigma_1$ .

A numerical simulation with 500,000 samples of 40 quarters shows the proportion of statistically significant outcomes:

Ratio of $\sigma_0$ to $\sigma_1$	Probability of statistically significant t-test, percent	
	Nominal	Actual
4	5.0	6.5
2	5.0	9.7
1	5.0	15.4
0.5	5.0	19.6
0.25	5.0	21.3



It also shows the nominal (that is, putative) p-value from the conventional t-test that would need to be used if the goal were to obtain actual 5-percent statistical significance:

Ratio of $\sigma_0$ to $\sigma_1$	Nominal p-value from t-test needed for significance at the 5 percent level
4	3.72
2	1.89
1	0.44
0.5	0.09
0.25	0.04

Unfortunately, it is not possible to determine with certainty whether revisions of a given account are independent across the quarters of a year. Neither is it possible to determine conclusively how large yearly effects are relative to other effects when independence does not hold. However, certain insights can be obtained from further analysis. Two such types of analysis are explored below: looking at mean revisions at an annual level and using regression analysis to estimate the potential yearly effect.

First, if revisions are not actually centered around zero, analysis of revisions of annual estimates would, in principle, reveal that fact, even if revisions of quarterly estimates were not independent within a given year. The difficulty of using this approach with the sample at hand (2014–2023) is that the number of observations shrinks from 40 to 10, which leaves a low-powered test, meaning that with relatively high probability, the t-test will fail to reject the null hypothesis of a zero mean revision. Nonetheless, appendix table A compares the means of revisions of quarterly estimates shown in table 3 for current account components with corresponding means of revisions of annual estimates.

By construction, the mean percent revisions of annual estimates are nearly identical to the mean percent revisions of the quarterly estimates. Based on the annual estimates, five series have nominal statistical significance for the mean percent revisions, is compared with eight series in the quarterly estimates.<sup>41</sup> This provides some evidence that several of the findings of statistical significance in table 3 are legitimate.

Second, individual quarterly series can be tested to provide some indication as to whether yearly effects contribute to the overall revisions. Specifically, consider a regression for all revisions to quarter Q statistics (where Q = 1, 2, 3, or 4) of the following form:

$$R_{ty}^Q = \alpha + \beta R_y^{Q'}$$

where  $R_y^{Q'}$  is defined to be the average revision of the other three same-year quarters. If the estimate of the  $\beta$  coefficient is statistically significant, there is likely a quantitatively important role for year effects on overall revisions. As above, given that only 10 observations are available for each item in the sample, this test is not highly powered. However, power increases with the relative importance of the year effect. Under the model used for the numerical simulation described above, the probability of a statistically significant estimate of  $\beta$  at the 5-percent level is given as:

Ratio of $\sigma_0$ to $\sigma_1$	Probability of statistically significant coefficient estimate, percent
4	6.0
2	12.7
1	50.1
0.5	94.7
0.25	99.9

For the revisions shown in table 3 on revisions to quarterly current account components, regressions of the type just outlined produce the average estimated coefficients and number of significance levels, out of four regressions, for  $\beta$  (appendix table B). Regressions were run separately for each of the four quarters for each item. For the first-quarter regression, the right-hand-side variables were a constant and the average of the same-year revisions for quarters 2, 3, and 4; for the second-quarter regression, the right-hand-side variables were a constant and the average of the same-year revisions for quarters 1, 3, and 4; and so forth. The strongest evidence for the existence of yearly effects is for primary and secondary income receipts and for secondary income payments, for which yearly effects were consistently statistically significant.

It should be recognized that yearly revision effects are likely to be absent, or at least highly attenuated, for revisions of percent changes as compared to revisions of levels. For instance, revisions emerging in an annual update resulting from information that is obtained about previously unrecorded economic activity is more likely to systemically move the estimates for all four quarters of a year than it is to systematically alter the pattern of change from one quarter to the next.

**Appendix Table A. Current-Account Components: Quarterly and Annual Mean Revisions, Item Value Scaling, First to Third Estimates, 2014–2023**

ITA table 1.2 line	Series	Mean percent revision	
		Quarterly	Annual
1	Exports of goods and services and income receipts	0.52*	0.56*
2	Exports of goods and services	0.49*	0.57*
3	Goods	-0.22*	-0.10
13	Services	1.98*	1.96*
26	Primary income receipts	0.00	-0.09
33	Secondary income receipts	5.15*	5.10*
34	Imports of goods and services and income payments	0.36*	0.39*
35	Imports of goods and services	0.11	0.13
36	Goods	-0.08	-0.04
45	Services	0.99*	0.93
58	Primary income payments	1.05*	1.08
64	Secondary income payments	1.29	1.42

\* The mean revision is statistically different from zero at the 5 percent significance level.

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**Appendix Table B. Testing for Contribution of Yearly Effects to Quarterly Current-Account Component Revisions, 2014–2023**

ITA table 1.2 line	Series	Average $\beta$	Number of statistically significant coefficient estimates
1	Exports of goods and services and income receipts	0.613	2
2	Exports of goods and services	0.618	2
3	Goods	-0.445	1
13	Services	0.738	2
26	Primary income receipts	0.975	4
33	Secondary income receipts	0.963	4
34	Imports of goods and services and income payments	0.658	2
35	Imports of goods and services	0.425	0
36	Goods	0.853	1
45	Services	0.888	3
58	Primary income payments	0.718	1
64	Secondary income payments	0.925	4

$\beta$  Coefficient estimated in regression analysis.

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1. The small variations in the time periods are due to data availability. For the ITA statistics, the period of analysis begins with the 2014 restructuring of the accounts and ends with the estimates released in June of 2024, which updated the 2023 estimates. For IIP statistics, the latest year of available statistics is 2023 for the first June annual update and 2022 for the second June annual update.
2. The restructuring complicates revision analysis for estimates initially published before the restructuring. For more information on the restructuring in the context of revision analysis, see Ryan Howley, "[An Analysis of the Reliability of BEA's International Transactions Accounts](#)," *Survey of Current Business* 97 (February 2017). For details on the restructuring, see Maria Borga and Kristy L. Howell, "[The Comprehensive Restructuring of the International Economic Accounts: Changes in Definitions, Classifications, and Presentations](#)," *Survey* 94 (March 2014) and Jeffrey R. Bogen, Mai-Chi Hoang, Kristy L. Howell, and Erin M. Whitaker, "[Comprehensive Restructuring and Annual Revision of the U.S. International Transactions Accounts](#)," *Survey* 94 (July 2014).
3. See Ryan Howley, "[An Analysis of the Reliability of BEA's International Transactions Accounts](#)," *Survey* 97 (February 2017) and Daniel R. Yorgason and Sarah P. Scott, "[An Analysis of Revisions to BEA's International Economic Accounts](#)," *Survey* 92 (November 2012).
4. The IIP Accounts are not seasonally adjusted.
5. BEA publishes regular articles analyzing revisions to its estimates across its major statistical accounts, including the estimates of gross domestic product (GDP) and the National Income and Product Accounts (NIPAs) as well as the regional accounts. For the most recent analysis of the revisions to GDP and related accounts, see Dennis J. Fixler, Eva de Francisco, and Ian Schaaf, "[Revisions to Gross Domestic Product, Gross Domestic Income, and their Major Components](#)," *Survey* (August 2024). For the analysis of revisions to BEA's regional accounts, see Matthew A. von Kerczek and B. Enrique Lopez, "[An Examination of Revisions to the Quarterly Estimates of State Personal Income](#)," *Survey* 92 (August 2012).
6. For more information, please see appendix D in *U.S. International Economic Accounts: Concepts and Methods*.
7. More fundamentally, the accuracy of BEA's estimates cannot be assessed at all, because a proper assessment of accuracy requires that "true" values are known. In reality, the true values that BEA's estimates attempt to approximate are never known. For more information on the difficulty of assessing accuracy and the relationship of accuracy and reliability, see Dennis J. Fixler, Eva de Francisco, and Ian Schaaf, "[The Revisions to GDP, GDI, and Their Major Components](#)," *Survey* (August 2024).
8. In June 2024, BEA started releasing quarterly estimates of the components of change of the IIP; these estimates begin with the first quarter of 2023.
9. Note that for 2023 statistics, the third estimate and the most recent estimate are the same.
10. A positive net international investment position would represent a U.S. net claim on the rest of the world.
11. A fourth "category" of the ITAs is the statistical discrepancy, discussed in more detail in the box "[Analysis of the Statistical Discrepancy](#)."
12. For details, see chapter 3 in *U.S. International Economic Accounts: Concepts and Methods*.
13. For details, see Appendix D in *U.S. International Economic Accounts: Concepts and Methods*.
14. Note that for these statistics, BEA uses calendar-year quarters. Therefore, the first quarter of the year covers January through March, the second quarter covers April through June, etc.
15. Benchmark surveys are more complete and comprehensive than quarterly or annual surveys.
16. The release and update cycles for both the ITAs and the IIP Accounts are discussed in detail in chapter 5 in *U.S. International Economic Accounts: Concepts and Methods*.
17. Primary data sources for the IIP statistics are discussed in chapters 23–27 in *U.S. International Economic Accounts: Concepts and Methods*; appendix D discusses data availability for current quarter estimates and projection methods.
18. In recent years, a preliminary estimate has been released in March, followed by a revised estimate in June. For consistency over the study time period, these March estimates are not included in the analysis in this article.
19. This is in partial contrast with GDP and other NIPA series, which are commonly expressed as growth rates.
20. Unlike the case for revisions of growth-rate estimates, revisions of level estimates typically are scaled to aid in interpretability and/or comparison with other revisions.
21. For example, in the ITA current account, exports of goods have been, on average, about 10.5 times larger than secondary income receipts since 2014. A \$1 billion revision to secondary income receipts would be proportionately larger and more significant than a \$1 billion revision to goods exports.
22. Because a change can be positive one year and negative the next, and because a change can be very close to zero in a given year, scaling by the change can yield results that are difficult to interpret.

23. For example, net flows for some of the financial accounts are estimated by subtracting a beginning-of-period balance from an end-of-period balance. For these accounts, neither gross outflows nor gross inflows—the terms required to compute the sum of unsigned components—are observed.
24. The Hodrick-Prescott filter is a procedure used to separate the quarter-to-quarter deviations from trend in a time series. The choice of 1,600 as the smoothing parameter for quarterly data was originally recommended by Hodrick and Prescott, and it is commonly used. See Robert J. Hodrick and Edward C. Prescott, “Postwar U.S. Business Cycles: An Empirical Investigation,” *Journal of Money, Credit and Banking* 29, no. 1 (February 1997): 1–16.
25. The longer series, which covers 2014Q1–2023Q4, was used to compute the trend in this example and is presented in chart 6 in this article.
26. The table does not separately identify the methods used to scale annual position changes in the IIP Accounts, as these methods are straightforward variants of the first two methods in this table.
27. Refer to the “[Approach of Study](#)” discussion in this article for more detail on the period of analysis.
28. Note that ITA item definitions were also updated in 2020, but the changes were minor and do not impact the analysis.
29. See the [appendix](#) for more information on the t-tests used in this analysis, including some caveats about their application in the analysis of revisions to quarterly statistics.
30. See C. Omar Kebbeh and Eric Bryda, “[Annual Revision of the International Economic Accounts](#),” *Survey* 96 (July 2016) for more information.
31. See Ami Adjoh-Baliki and Jason Sutterley, “[Annual Update of the U.S. International Transactions Accounts](#),” *Survey* 101 (June 2021) for more information.
32. See the discussion of revision scaling methods in the [Methodology](#) section of this article for more information.
33. In addition to these two, there is a third component of the financial accounts, “financial derivatives other than reserves, net transactions” (line 107). This series is not included in table 7. During the study period, revisions were not applicable for this series in most quarters, but a small number of quarters required large revisions. It is anticipated that future revisions to this series will consistently be near zero.
34. See the discussion of revision scaling methods in the [Methodology](#) section of this article for more information.
35. Numerically, revisions to percent change can be roughly compared with revisions to item-value-scaled levels, because both consist of fractions with a level as the denominator. Neither of these revisions can be directly compared with revisions to levels using the other scaling methods discussed in this article.
36. See the [appendix](#) for additional information on such “systematic” revisions.
37. The components of the U.S. net international investment position are U.S. assets (line 4) and U.S. liabilities (line 36). The components of the net position excluding financial derivatives are U.S. assets, excluding derivatives (line 5) and U.S. liabilities, excluding derivatives (line 37).
38. The methods and source data for price, exchange rate, and other changes n.i.e. vary by functional category. For more information, see chapters 23–27 of *U.S. International Economic Accounts: Concepts and Methods*.
39. Although table 1.3 is currently published quarterly, it was only available on an annual basis for most of the period of analysis.
40. Changes in volume and valuation n.i.e. are changes other than transactions, price changes, and exchange rate changes. These changes include entry and exit of assets and liabilities that are not due to transactions, such as the addition of new reporters or other changes to reporting panels in source data.
41. Strictly speaking, the estimates used do not correspond to any annual estimate published in ITA table 1.2. Instead, for comparability with the estimates used for table 3, the first “annual” estimate used in constructing this table equals the sum of the first quarterly estimates.



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