Revision Studies of Balance of Payments and International Investment Position Statistics of Hong Kong
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Abstract
Balance of Payments (BoP) and International Investment Position (IIP) statistics of Hong Kong have been compiled since the reference year of 1998 and 2000 respectively. They are important for monetary and financial monitoring and policy deliberations in both the domestic and international contexts. Preliminary figures are subject to revision when estimates of individual components are updated upon the availability of more data. As stipulated in the International Monetary Fund’s Data Quality Assessment Framework for Balance of Payments and International Investment Position Statistics, May 2012, revisions between the preliminary and revised figures have to be tracked with a view to gauging the reliability of the corresponding statistics. In accordance with this practice, the Census and Statistics Department of Hong Kong periodically assesses the revisions to the BoP and IIP statistics and closely monitors the changes resulting from each revision. This article summarises the methodology used for assessment in the revision studies and the main results for the reference years of 2000 - 2010.

Keywords: Data Quality Assessment Framework (DQAF)

1 Introduction
Preliminary quarterly Balance of Payments (BoP) and International Investment Position (IIP) statistics of Hong Kong are released within three months after the respective reference periods. The figures are revised when estimates of individual components are updated upon the availability of more data. This tradeoff between timeliness and accuracy is an international practice which is well-recognised and accepted by data users and compilers. However, large or systematic revisions may signal weaknesses in the data collection or compilation systems that need to be resolved. In this regard, analysis of the revisions between the preliminary and revised figures should be periodically conducted, as stipulated in the International Monetary Fund’s (IMF) Data Quality Assessment Framework (DQAF) for Balance of Payments and International Investment Position Statistics, May 2012. This article summarises the methodology used for assessment in such revision studies with reference to several key quality indicators and presents the main results for the reference years of 2000 - 2010. While annual figures are used in the revision studies of IIP statistics (since quarterly IIP statistics are available as from Q1 2010 only), quarterly figures are used in the revision studies of BoP statistics. In particular, the more recent period of Q1 2006 - Q4 2010 is singled out for presenting a more updated picture of the revision of BoP statistics.

2 Methodology
In IMF’s terminology, the study of revisions is normally related closely to reliability. The concept is introduced in Carson and Laliberte (2002) as “the closeness of the initial estimated value(s) to the subsequent estimated value(s). Assessing reliability involves comparing estimates over time. In other words, assessing reliability refers to revisions.” The number of revisions observed depends on the revision policy of a statistical agency. It is the established practice of Hong Kong that revisions to BoP and

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1 The DQAF provides a structure for comprehensive assessment of the data quality of statistics in respect of a particular data category (e.g. BoP). It covers a set of prerequisites of quality and five dimensions of quality: assurance of integrity, methodological soundness, accuracy and reliability, serviceability, and accessibility.
IIP statistics are regularly scheduled, and preliminary and revised figures are clearly identified as such in press releases and quarterly reports.

The methodology of the revision studies of BoP and IIP statistics of Hong Kong mainly follows that given in the Quality Report of the Euro Area Balance of Payments and International Investment Positions Statistics released by the European Central Bank. Revision is defined as the difference between the preliminary $X_0$ and the latest revised $X_r$ figures, i.e. $R = X_r - X_0$. Quality indicators can then be constructed on $R$ to quantify and assess the effect of revisions.

Details of the key quality indicators presented in this article are as follows:

(a) Mean absolute percentage error (MAPE)

The MAPE is a measure of the revisions relative to the respective preliminary flow (for BoP) or stock (for IIP) estimates. Mathematically,

$$\text{MAPE} = \frac{|R|}{X_0}$$

This indicator is applied to assess the magnitude of revisions to (i) the gross credit and gross debit items in the BoP current account and capital account, and (ii) the assets, liabilities and net balance items in the IIP.

(b) Composition discrepancy (CD)

Suppose a series $X$ has $J$ (non-negative) components, i.e. $X = Y^1 + \cdots + Y^J$. The “share” of the $j$th component $Y^j$ is denoted as $p^j = Y^j / X$. The “composition discrepancy” between the preliminary and revised figures is defined (in a “gross” sense) as the sum of the absolute change of the share of all components, i.e.

$$\text{CD}(t) = \sum_{j=1}^{J} |p^j_r(t) - p^j_0(t)|$$

for period $t = 1, \ldots, T$. The mean and standard deviation of CD$(t)$ are calculated over the time series concerned. These two indicators are applied to compare the composition discrepancies between the preliminary and revised figures in (i) the total gross credit and total gross debit items in the BoP current account, and (ii) the total assets and total liabilities items in the IIP.

(c) Mean absolute comparative error (MACE)

The MACE is a measure of the revisions relative to the corresponding preliminary stock estimates in the IIP. Mathematically,

$$\text{MACE} = \frac{|R|}{\text{IIP}(X_0)}$$

This indicator is applied to assess the magnitude of revisions to the net transaction of assets and net transaction of liabilities items in the BoP financial account. The reason for not using the MAPE indicator in respect of these items is that the observations concerned may have different signs because of the “net transaction” concept adopted in compiling the BoP financial account. As annual IIP statistics are used in this revision study, the corresponding year-end values are employed in the calculation of the MACE.

The revision schedule for the goods and services components of the BoP account is in line with that for the Gross Domestic Product (GDP) estimates, i.e. the goods and services components for the current year and the preceding two years are subject to revision. For IIP statistics and other components of the BoP account, the quarterly and annual preliminary figures for a reference year will be revised in December of the following year.

This indicator is not applied to the BoP capital account of Hong Kong because no component breakdown of capital account is published in Hong Kong.
(d) Root mean square relative error (RMSRE)

The RMSRE is calculated as the square root of the ratio of the average of the squared revisions to the variance of the series of the revised figures. Mathematically,

$$\text{RMSRE} = \sqrt{\frac{R^2}{S^2_{Xr}}}$$

The value of the RMSRE is 0 when the series of the preliminary figures equals that of the revised figures, and is 1 when the series of the preliminary figures is as accurate as the reference forecasts using the time series average. It is less (greater) than 1 when the preliminary figures are more (less) accurate than such forecasts.

The square of the RMSRE can be decomposed into:

(i) The bias component which provides an indication of systematic errors.
(ii) The regression component which is another systematic component that reflects the linear pattern between the series of preliminary and revised figures.
(iii) The unsystematic component which captures the remaining non-linear pattern and reflects random errors.

Subject to successful testing of the stationarity of the series, this indicator is applied to assess the net balance items (gross credit minus gross debit, or net transaction of assets minus net transaction of liabilities) in the BoP account.

(e) Root mean square error (RMSE)

According to IMF’s DQAF, internal consistency implies that “over the long run, the net errors and omissions (NEO) item has not been large and has been stable over time”. The RMSE of NEO is an average measure of the size and the nature of the NEO as a percentage of the gross flow of the BoP current account or that of the GDP. It can be decomposed into the bias and the variance components, i.e.

$$\text{RMSE}^2 = \text{NEO(\%)}^2 + [\text{standard deviation of NEO(\%)^2]}$$

where NEO(\%) denotes the NEO expressed as a percentage of the gross flow of the BoP current account or that of the GDP.

3 Main Results

Balance of Payments (BoP)

In general, the revisions were mild and mainly random. The NEO was stably small and unsystematic, reflecting that the BoP statistics were reliable and internally consistent.

For the BoP current account and capital account, the MAPEs of the gross credit and gross debit items indicated that the preliminary estimates for most gross items were precise (with MAPEs being around 5%). Although relatively large percentage error was recorded in the gross credit item of secondary income, its contribution to the revision to the total gross credit item of the BoP current account was negligible due to its insignificant share. The composition discrepancies of the total gross credit and total gross debit items in the BoP current account maintained stably low. The mean CDs were 1.47% for the total gross credit item (with corresponding standard deviation being 0.82%) and 1.90% for the total gross debit item (with standard deviation being 0.99%), indicating that the change in composition of the BoP current account due to revisions was small. (Charts 1 and 2)
For the BoP financial account, the MACEs of the net transaction of assets and net transaction of liabilities items indicated that revisions to the preliminary estimates for all net items were small (with MACEs being around 1% for direct investment, portfolio investment and other investment, and 3% for financial derivatives). This reflected that the preliminary estimates in the BoP financial account were reliable, and late return cases from survey respondents did not result in significant revisions to the BoP financial account. (Chart 3)

As for the net balance items in the BoP account, the RMSREs indicated that the preliminary estimates were at least as accurate as the reference forecasts using the time series average (with all RMSREs being less than 100%). As most of the revisions came from the unsystematic component, there was in general no observable bias or linear pattern in the revisions to the net balance items in the BoP account. (Chart 4)

The average of the absolute NEOs as a percentage of the gross flow of the BoP current account or that of the GDP were below 1% and 4% respectively, indicating that the size of the NEO was small over the period. The stability of the NEO had also been improved over time as the standard deviation was smaller in the more recent period. Hence, the BoP account was internally consistent. In addition, the RMSEs also showed that the NEOs were mainly composed of variance component across different periods, reflecting that the nature of the NEO was generally unsystematic. (Table 1 and Chart 5)

International Investment Position (IIP)

Estimates of the IIP and its components were precise. Revisions were small and would not change the composition significantly.

The MAPEs of the assets, liabilities and net balance items in the IIP indicated that revisions to the preliminary estimates for all items were small (with MAPEs being around 2% for direct investment, portfolio investment and other investment, and around 1.5% to 4.0% for financial derivatives). The mean CDs were 0.58% for total assets (with corresponding standard deviation being 0.32%) and 1.31% for total liabilities (with standard deviation being 0.70%). Similar to the case of the BoP financial account, the preliminary estimates in the IIP were reliable, and late return cases from survey respondents did not result in significant revisions to the IIP. (Charts 6 and 7)

4 Conclusion

This article summarises the methodology and the main results of the revision studies of BoP and IIP statistics of Hong Kong. Analysis of various key quality indicators showed that the estimates of BoP and IIP statistics of Hong Kong were generally reliable for the reference years of 2000 - 2010. In particular, the BoP account was generally internally consistent. Revisions to the BoP and IIP statistics would continue to be closely monitored and periodically assessed to ensure the quality of the relevant statistics.

Reference


Table 1: NEOs as a percentage of the gross flow of the BoP current account and the GDP

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Q1 2000 – Q4 2010</th>
<th>Q1 2006 – Q4 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a percentage of the gross flow of the BoP current account</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute average</td>
<td>0.85%</td>
<td>0.62%</td>
</tr>
<tr>
<td>Mean</td>
<td>0.56%</td>
<td>0.38%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.97%</td>
<td>0.59%</td>
</tr>
<tr>
<td>As a percentage of the GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute average</td>
<td>3.58%</td>
<td>3.13%</td>
</tr>
<tr>
<td>Mean</td>
<td>2.43%</td>
<td>2.01%</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>3.74%</td>
<td>2.92%</td>
</tr>
</tbody>
</table>

Chart 1: MAPEs of the BoP current account and capital account

Chart 2: CDs of the total gross debit / credit items in the BoP current account

Chart 3: MACEs of the components in the BoP financial account
Chart 4: RMSREs of the BoP current account and financial account

Chart 5: RMSEs of NEOs

Chart 6: MAPEs of the assets, liabilities and net balance items in the IIP

Chart 7: CDs of the total assets and total liabilities items in the IIP