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COMPILATION OF QUARTERLY GDP IN SINGAPORE

Introduction

1. The Singapore Department of Statistics (DOS) compiles annual estimates of GDP using all three approaches, viz. output, expenditure and income. Historical series of annual real and nominal GDP estimates using the output and expenditure approaches are available from 1960, while annual nominal income-based GDP estimates are available from 1980.

2. Since the mid-1970s, DOS has also compiled the quarterly estimates of real GDP using the output approach. A complementary quarterly series of real GDP using expenditure approach was compiled since the late 1980s. Quarterly estimates of output-based nominal GDP were introduced in 2000.

3. This paper outlines the data sources and methodology adopted by DOS for the compilation of timely, quarterly estimates of GDP.

Data Sources

4. Since detailed information from comprehensive annual surveys are not available during the compilation of quarterly GDP estimates, the approach to the compilation of quarterly GDP estimates differs from that for the compilation of annual GDP estimates. This is particularly so for output-based GDP.

5. Since quarterly GDP estimates have to be timely, a practical approach to their compilation has to be based on short-term economic indicators. Where direct indicators are unavailable, proxy indicators that correlate well with the level of economic activity in the particular industry have to be found or developed.

6. DOS makes use of a vast and diverse range of administrative and survey data to derive suitable and appropriate indicators for use in the compilation of quarterly GDP estimates.

7. The main data sources for the compilation of quarterly GDP estimates include the following:

GDP by output approach:

- External trade statistics
- Construction statistics
- Transportation and telecommunication statistics
- Employment and remuneration statistics
- Monthly Surveys of Industrial Production
- Monthly Surveys of Retail Trade
- Monthly Surveys of Catering Trade
- Quarterly Surveys of Wholesale Trade
- Quarterly Business Expectations Surveys
- Quarterly Surveys of Financial Institutions
- Survey of Quarterly Business Receipts
- Survey of Quarterly National Income Estimates

GDP by expenditure approach:

- External Trade Statistics
- Income and Expenditure Accounts of Statutory Boards
- Government Financial Statements
- Balance of Payments Statistics
- Public Sector Capital Expenditure on Machinery and Equipment Survey

8. The survey of Quarterly National Income Estimates is a survey designed specifically to collect additional data required for the compilation of quarterly GDP estimates. The scope and coverage of this survey was expanded in 1997 to cater to the development and compilation of quarterly estimates of nominal output-based GDP.

Methods of Compilation

9. Quarterly GDP estimates are compiled using a mixture of volume and value indicators. Volume indicators measure the quantity of output produced, materials inputs or employment. Some examples of volume indicators used in our compilation of output-based GDP are: index of industrial production, utility sales, air and sea cargo tonnage etc. Value indicators measure the value of the output, material inputs or the wages of the workers employed. Some examples in this category are: certified progress payments of construction works, value of stocks and shares transaction, value of loans and advances etc.

10. Estimates of nominal and real GDP estimates make use of these volume and value indicators differently. In compiling nominal GDP estimates, volume

indicators are extrapolated directly to obtain quarterly estimates of constant price value-added. These are inflated to current price value-added using appropriate price indices. Conversely, in compiling real GDP estimates, value indicators are used directly to obtain quarterly estimates of current price value-added, but are deflated with appropriate price indices to obtain estimates of constant price value-added.

11. GDP estimates for expenditure approach are compiled mainly using a commodity flow approach. Constant price GDP estimates are compiled through the deflation of the current price components with appropriate price deflators drawn from components of a wide range of price indices, including the consumer price index, wholesale price indices, construction price index, property price index and tender price index.

Benchmarking and Seasonal Adjustment Techniques

12. Since the approach and data sources used in the compilation for quarterly and annual GDP are not the same, the quarterly GDP estimates are re-aligned or benchmarked annually with the annual GDP estimates. These annual GDP estimates are considered to be more reliable, as they are based on more comprehensive data. Benchmarking of quarterly estimates with annual estimates ensure that the sum of the quarterly estimates is the same as the annual estimate, while preserving as far as possible the trend and growth rates of the original quarterly estimates.

13. DOS adopts the proportional Denton benchmarking method. Unlike the simple pro rata distribution approach, the Denton procedure avoids the problem of discontinuities between fourth quarter and the first quarter of the following year. This is done through quadratic minimisation of the differences between the re-aligned and original series, subject to the constraint that the yearly sums of the re-aligned estimates are equal to the annual estimates. The benchmarked series are seasonally adjusted using the X-11 procedure.

14. Seasonal adjustments of GDP series are performed quarterly using seasonal factors established in the annual re-analysis of the benchmarked quarterly estimates. During the process, the components of GDP are analysed separately. Seasonally adjusted total GDP is obtained by aggregating its components.

15. The seasonal patterns of overall GDP as well as some of the industries such as manufacturing are very stable and strong. Seasonal adjustment removed the dip consistently recurring in the first quarter of the year caused by the Chinese New Year falling at that time of the year. Traditionally, many firms close during the

long Chinese New Year holidays, resulting in the fall of output during the first quarter of the year. (This is the Chinese New Year effect.) Similarly, seasonal effects exhibited in fourth quarter each year due to increases in production to meet year-end festive demand were also removed.

16. On the type of expenditure on GDP, the components on transport equipment, increase in stocks, net exports of goods and services do not exhibit any stable seasonal pattern and are therefore not seasonally adjusted. Components on private consumption expenditure, government consumption expenditure and gross fixed capital formation are found to be influenced by seasonal variations and adjusted accordingly.

Revision and Publication of Quarterly GDP

17. Singapore releases advance estimates of output-based GDP within 10 days from the end of the reference quarter. Preliminary estimates of both output- and expenditure-based GDP are released in the *Quarterly Economic Surveys of Singapore* within 9 weeks from the end of the reference quarter. Revisions to these preliminary quarterly estimates as a result of annual benchmarking are released with the annual GDP estimates in the *Annual Economic Survey of Singapore* within two months from the end of the reference year. Complete historical series are available in TREND, which is an on-line time series database available for public subscription.

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