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Rebasing of Singapore's National Accounts to Reference Year 2010

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Introduction

The Singapore Department of Statistics (DOS) recently completed the rebasing of Singapore's national accounts from base year 2005 to 2010. Estimates of constant price gross domestic product (GDP) are now expressed in terms of 2010 prices.

The rebasing exercise also reconciled the three estimates of GDP from the production, expenditure and income approaches, and provided the opportunity for conceptual and methodological reviews and improvements.

This article highlights the major enhancements in concepts, methodologies and data sources undertaken in this rebasing exercise.

One notable improvement is the adoption of the recommendation in the United Nations System of National Accounts 2008 (2008 SNA) to capitalise research and development (R&D) expenditure in the national accounts.

The impact of the rebasing exercise on key national accounts aggregates is also presented.

Rebasing and Reconciliation

Constant price or real GDP estimates are essentially volume indices, which measure changes in the volume of economic activity while keeping relative prices constant.

However, prices of goods and services change over time. As a result, the relative price weights of the base year become less representative over time. It is therefore necessary to periodically rebase the national accounts to update the relative base year price weights to a new and more recent reference year.

In line with international practice, DOS rebases the national accounts once every five years to take into account underlying changes in relative prices.

In addition to the revaluation of the national accounts, the rebasing exercise also reconciles the three estimates of GDP compiled independently from the production, expenditure and income approaches.

The updated supply and use tables (SUT) or reference year 2010 were used to derive and reconcile the three estimates of GDP. The reconciliation process as well as methodological and data improvements have generally resulted in reducing statistical discrepancies between the three GDP estimates.

Changes and Improvements

Changes in Conceptual Treatment

Capitalisation of R&D Expenditure

DOS has adopted the 2008 SNA recommendation to capitalise R&D expenditure in the national accounts. As such, R&D expenditure is now treated as gross fixed capital formation (GFCF), instead of intermediate consumption (IC) in the national accounts. This new treatment recognises the contribution of R&D to the economy's future productive capacity.

As outlined in the 2008 SNA, R&D is defined as creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock of knowledge to devise new applications. R&D includes basic research, applied research and experimental development.

Conceptually, the value of R&D should be determined in terms of the economic benefits it is expected to provide in

the future. In practice, as most R&D is undertaken and used for internal production, the conventional approach is to value R&D on the basis of its cost of production.

Data from the national R&D survey conducted by the Agency for Science, Technology and Research are used to estimate the value of R&D activities in Singapore. The recognition of R&D expenditure as investment raises the level of current price or nominal GDP.

From the production and income approaches of GDP, nominal gross value-added (GVA) and gross operating surplus (GOS) are revised upwards as a result of the change in treatment of R&D expenditure from IC to capital formation. From the expenditure approach of GDP, GFCF is raised as a result of the addition of R&D expenditure as part of capital formation.

The impact of capitalising R&D expenditure on Singapore's national accounts is presented below. The levels of annual nominal GDP have been revised upwards, by 2.1 to 2.2 per cent from 2010 to 2013 (Table 1).

TABLE 1 REVISION TO NOMINAL GDP LEVEL ARISING FROM THE CAPITALISATION OF R&D EXPENDITURE, 2010 - 2013

Year	Revision to Nominal GDP Level (Per Cent)
2010	2.2
2011	2.1
2012	2.1
2013	2.1

Several other economies, such as Australia, Hong Kong, Canada and the United States, have capitalised R&D expenditure in their national accounts.

The capitalisation of R&D expenditure in Singapore's national accounts therefore further aligns the country's national accounting practices with those of other economies and improves the international comparability of Singapore's GDP estimates.

Employers' Pension Scheme

The 2008 SNA recommends that employers' pension contributions, made on behalf of their employees, should be recognised as part of compensation of employees (CoE) in the national accounts. Employment-related pension contributions are considered as part of the compensation package received by employees for the work they do.

In Singapore's context, private pension schemes are relatively rare due to the mandatory employers' Central Provident Fund contributions for citizens and permanent residents. Hence, the conceptual review for this rebasing exercise focused on government pension/savings and retirement schemes.

The impact of incorporating government pension contributions on overall CoE is minimal. At the overall economy level, CoE has been revised upwards marginally, by about 0.2 per cent for the years 2010 to 2013. Correspondingly, its impact on value-added at the overall economy level is relatively insignificant.

Refinements in Methodologies

Informal Sector

The informal sector refers to self-employed individuals who engage in production activities and are not included in business surveys, for example, hawkers, taxi drivers, real estate agents, remisiers, freelance tutors and babysitters.

The methodologies used to estimate the value-added of the informal sector have been reviewed and refined in this rebasing exercise. New categories of self-employed workers, such as sports coaches, were also identified and included to align with changing consumption patterns in Singapore.

Improvements in Data Sources

Census of Construction

The Building and Construction Authority conducted the Census of the Construction Industry for reference year 2010 to provide the benchmark estimate for construction value-added for the updating of the SUT and rebasing of the national accounts.

With the incorporation of the census results, the construction industry's value-added has been revised upwards by about \$1.6 billion in 2010. Correspondingly, the construction industry's GVA share has been raised from 4.2 per cent before rebasing to 4.7 per cent after rebasing.

Impact on Major Macro-Economic Aggregates

The revisions arising from the rebasing exercise are not entirely due to the reconciliation of the GDP estimates and

the revaluation of the national accounts to the new base year. Revisions also result from the conceptual and methodological changes introduced, as well as from improvements and updates in data sources.

Nominal GDP

Nominal GDP estimates have been revised upwards, by 0.6 per cent to 1.3 per cent over the period from 2010 to 2013 (Table 2).

TABLE 2 GDP AT CURRENT MARKET PRICES, 2010-2013

Year	Before Rebasings	After Rebasings	Percentage Change [(b)-(a)]/(a)
	(a)	(b)	
	\$ Million		Per Cent
2010	318,096.0	322,361.1	1.3
2011	342,512.6	344,712.4	0.6
2012	355,281.2	358,542.6	0.9
2013	370,064.5	372,813.9	0.7

While the nominal value-added estimates for manufacturing, construction, wholesale and retail trade, business services and other services industries have been revised upwards, these have been partially offset by downward revisions of the estimates for transportation and storage, accommodation and food services, information and communications, finance and insurance, as well as ownership of dwellings.

GDP Growth Rates

Revisions in real GDP growth are moderate, ranging between -0.2 percentage points and

0.6 percentage points from 2010 to 2013 (Table 3).

TABLE 3 REAL GDP GROWTH, 2010-2013

Year	Per Cent	
	Before Rebasings	After Rebasings
2010	15.1	15.2
2011	6.0	6.1
2012	1.9	2.5
2013	4.1	3.9

Revisions in the growth rates of individual industries show greater variation than that of the overall economy, particularly for construction, wholesale and retail trade, as well as information and communications.

Composition of GDP Components

Component Share by Industry

The industries' relative GVA shares have been updated arising from the rebasing exercise. The GVA shares of manufacturing, construction, wholesale and retail trade, and other services industries have been revised upwards, while the GVA share of accommodation and food services has been revised downwards (Table 4).

Component Share by Expenditure

In terms of the expenditure components of GDP, the relative share of GFCF has been revised upwards, while that of private consumption expenditure has been revised downwards (Table 5).

TABLE 4 NOMINAL GVA SHARE BY INDUSTRY, 2010 AND 2013

	Per Cent			
	2010		2013	
	Before Rebasing	After Rebasing	Before Rebasing	After Rebasing
Total	100.0	100.0	100.0	100.0
Goods Producing Industries	27.3	27.7	24.5	25.1
Manufacturing	21.5	21.4	18.6	18.8
Construction	4.2	4.7	4.4	4.9
Utilities	1.6	1.6	1.5	1.4
Service Producing Industries	68.8	68.5	70.6	70.3
Wholesale & Retail Trade	19.1	19.2	18.2	18.5
Transportation & Storage	8.5	8.4	7.0	6.9
Accommodation & Food Services	2.2	1.9	2.5	2.2
Information & Communications	3.7	3.6	4.0	3.9
Finance & Insurance	11.2	10.9	12.2	11.9
Business Services	13.8	13.8	15.6	15.4
Other Services Industries	10.4	10.7	11.1	11.4
Ownership Dwellings	3.9	3.8	4.9	4.5

TABLE 5 EXPENDITURE COMPONENTS AS A PERCENTAGE OF NOMINAL GDP, 2010 AND 2013

	Per Cent			
	2010		2013	
	Before Rebasing	After Rebasing	Before Rebasing	After Rebasing
Private Consumption Expenditure	37.6	35.5	39.2	37.3
Government Consumption Expenditure	10.5	10.2	10.5	10.3
Gross Fixed Capital Formation	23.8	26.1	23.6	26.1
Changes in Inventories	-0.4	1.7	3.2	3.2
Net Exports of Goods and Services	28.5	26.4	23.5	23.2

Note: Figures are expressed as a share of expenditure-based GDP.

The higher share of GFCF is largely attributed to the inclusion of R&D expenditure in capital formation.

Component Share by Income

Likewise, the current price income-based GDP estimates have been benchmarked and reconciled. The shares of CoE and taxes less subsidies on production and on imports have been revised downwards (Table 6). Correspondingly, the share of GOS has increased.

Conclusion

The successful completion of the rebasing exercise has improved the coherence and reliability of Singapore's GDP estimates, enhancing their relevance to the underlying and changing economic conditions. In addition, the adoption of the 2008 SNA recommendation on the capitalisation of R&D expenditure and the continuing improvements in methodologies and data sources have also enhanced the international comparability of Singapore's GDP estimates.

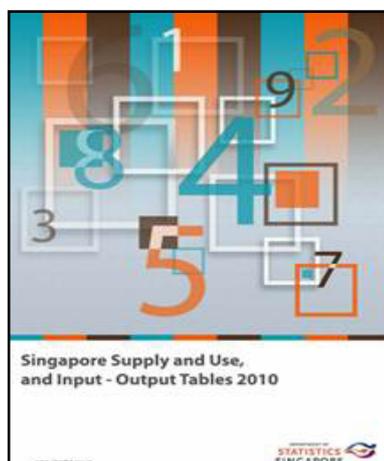
TABLE 6 INCOME COMPONENTS AS A PERCENTAGE OF NOMINAL GDP, 2010 AND 2013

	Per Cent			
	2010		2013	
	Before Rebasing	After Rebasing	Before Rebasing	After Rebasing
Compensation of Employees	40.6	39.1	42.5	41.1
Gross Operating Surplus	52.3	54.0	49.2	50.8
Taxes less Subsidies on Production & on Imports	7.1	6.9	8.3	8.1

Note: Figures are expressed as a share of income-based GDP.

More information on the rebasing exercise may be found in the Information Paper "Rebasing of Singapore's National Accounts to Reference Year 2010" on the SingStat website at: http://www.singstat.gov.sg/publications/publications_and_papers/national_accounts/ip-e40.pdf

Singapore Supply and Use and Input-Output Tables 2010



The Singapore Department of Statistics has released the Singapore Supply and Use and Input-Output Tables 2010.

The Supply and Use Tables have been used to reconcile the three GDP estimates in the recently completed rebasing of Singapore's national accounts to reference year 2010.

Further information is available in the publication 'Singapore Supply and Use and Input-Output Tables 2010' on the [SingStat Website](http://www.singstat.gov.sg).