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Rebasing of Singapore's National Accounts to Reference Year 2010

By

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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.

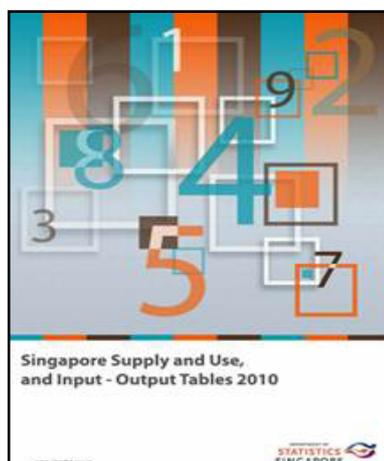
TABLE 6 INCOME COMPONENTS AS A PERCENTAGE OF NOMINAL GDP, 2010 AND 2013

| | 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

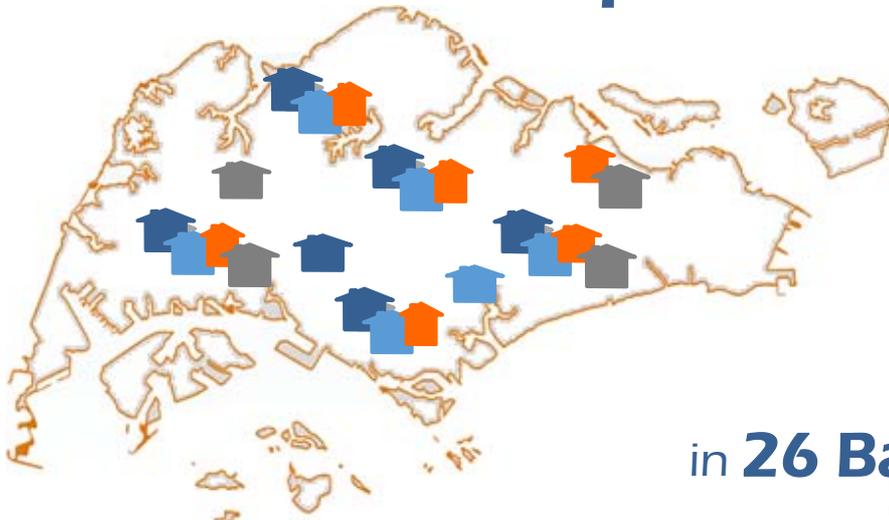


The Singapore Department of Statistics has released the Singapore Supply and Use and Input-Output Tables 2010.

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](#).

Infographics: Highlights of Household Expenditure Survey 2012/13



Covered **11,050 Dwellings**

in **26 Batches**



Over the course of **1 year**

Oct 2012

Sep 2013

Selected households were surveyed over **2 weeks**

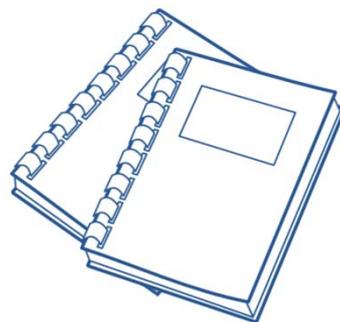
How it compares with other countries...

Singapore's HES of 11,050 dwellings is a relatively large representative sample of the households

| | Singapore | Australia | Canada | Japan | United Kingdom | United States |
|---|---|---|---|--|---|---|
| |  |  |  |  |  |  |
| Population * (Million)  | 5.2 | 22.3 | 34.3 | 127.8 | 63.3 | 311.6 |
| Sample in Latest HES (Number of Households)  | 11,050 | 9,800 | 17,600 | 57,000 | 11,500 | 7,000 |

* Refers to 2011 data.

Data were collected via...



Expenditure
Diary Recording
by respondents

Supplemented with...

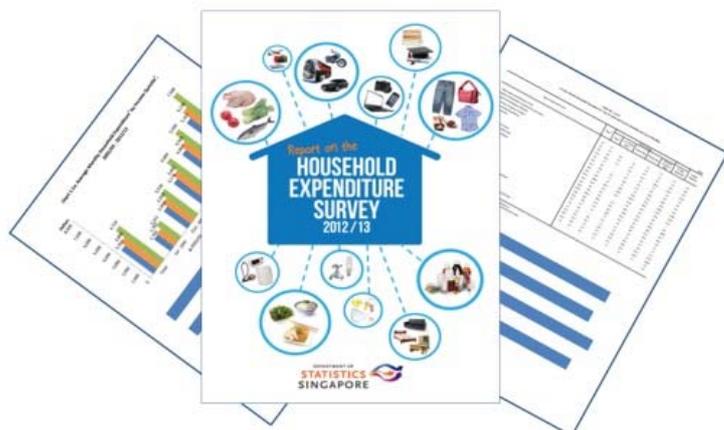
Administrative Sources



to **Improve Data Quality**
and
Reduce Response Burden

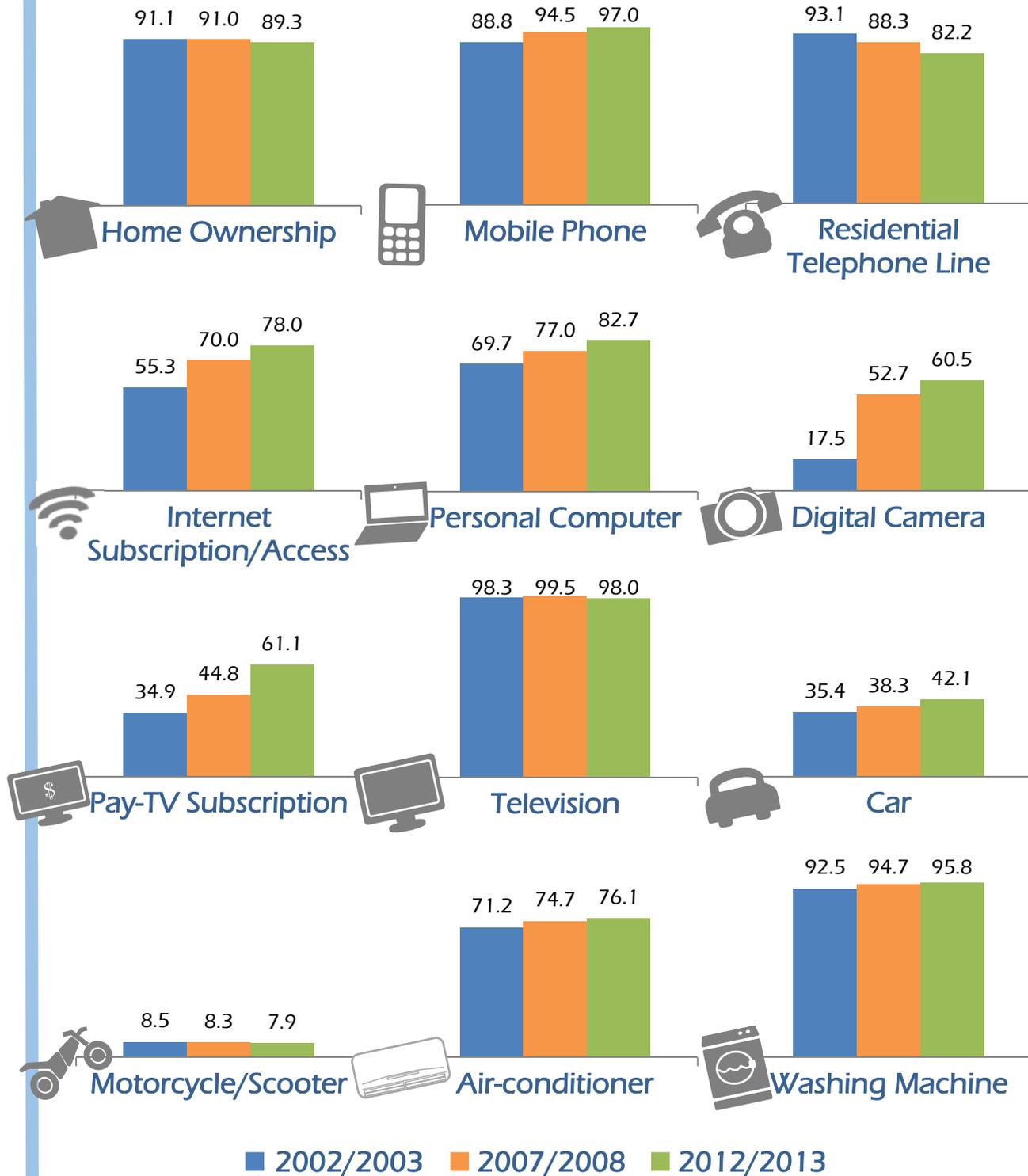


HES 2012/13
Report



OWNERSHIP of Consumer Durables

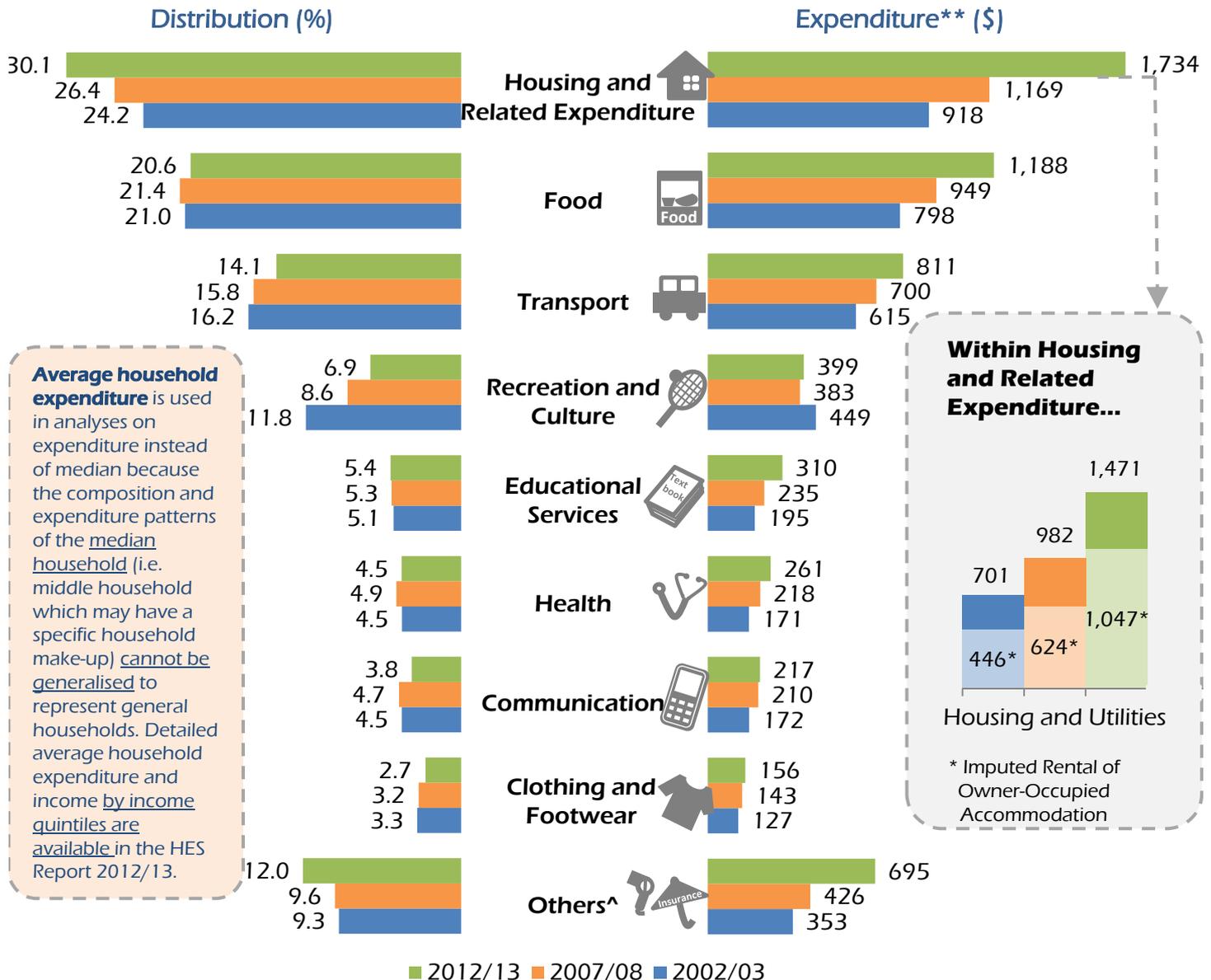
Per Cent



HOUSEHOLD EXPENDITURE



Expenditure excludes imputed rental of owner-occupied accommodation. As it is neither a cash outlay nor income, imputed rent is included only when analysing the detailed share of household expenditure by goods and services.

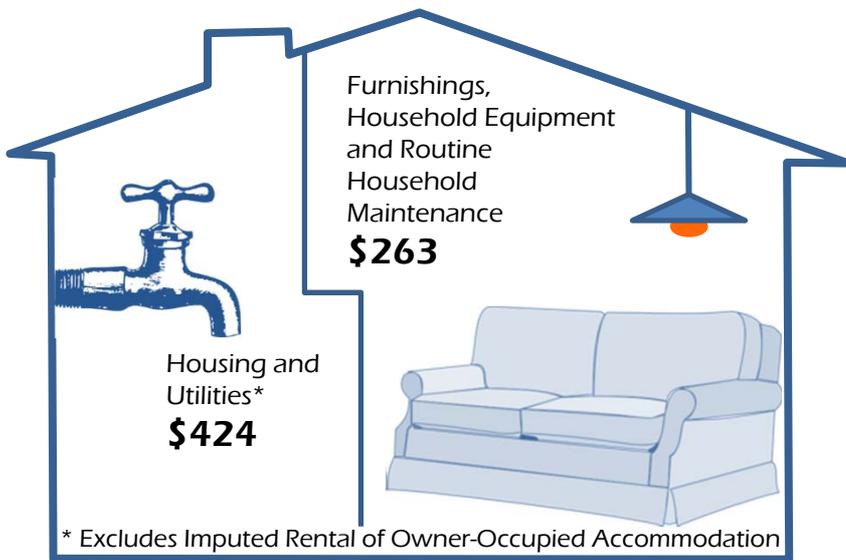


** Expenditure includes imputed rental of owner-occupied accommodation.

[^] Others include expenditure on miscellaneous goods and services, including personal care services such as hairdressing, social support services and insurance, and expenditure on alcoholic beverages and tobacco and accommodation services.

Key **2012/13** Average Monthly Household Expenditure on...

Housing and Related Expenditure



Recreation and Culture

Package Tours and Holiday Expenses

\$154



Recreational and Cultural Services

\$138



Educational Services

University Education

\$105

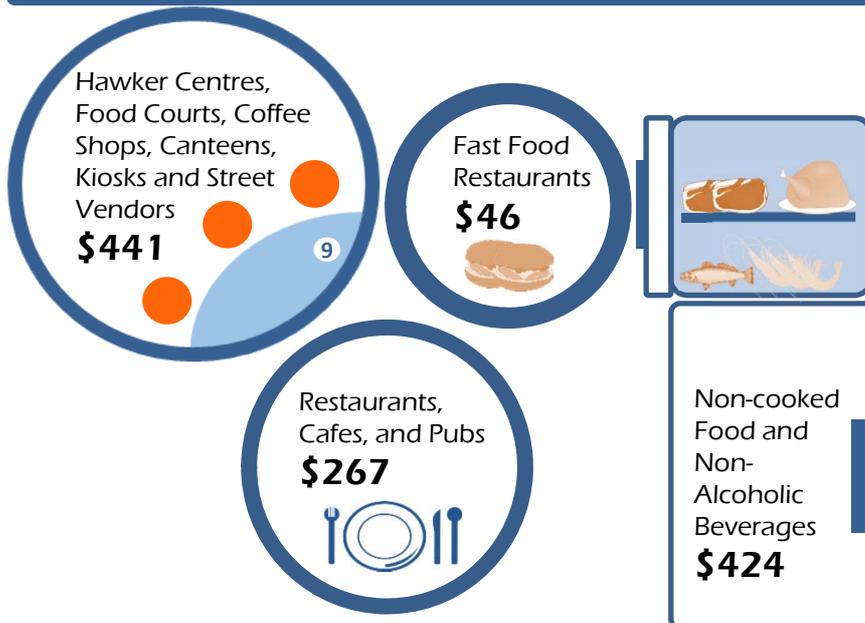


Private Tuition and Other Educational Courses

\$106



Food



Health

Outpatient Services

\$117



Medical Products, Appliances and Equipment

\$78



Communication

Telephone and Telefax Services

\$205



Clothing and Footwear

Clothing

\$122

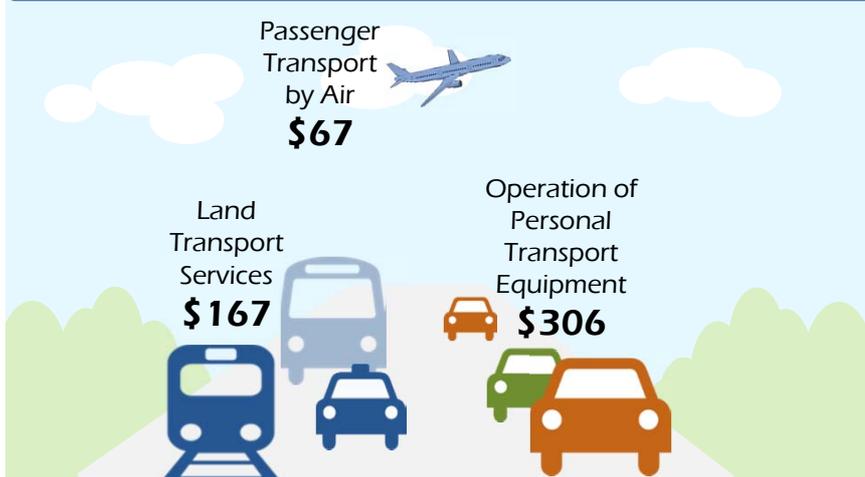


Footwear

\$34



Transport



Others

Personal Care

\$138



Insurance

\$294

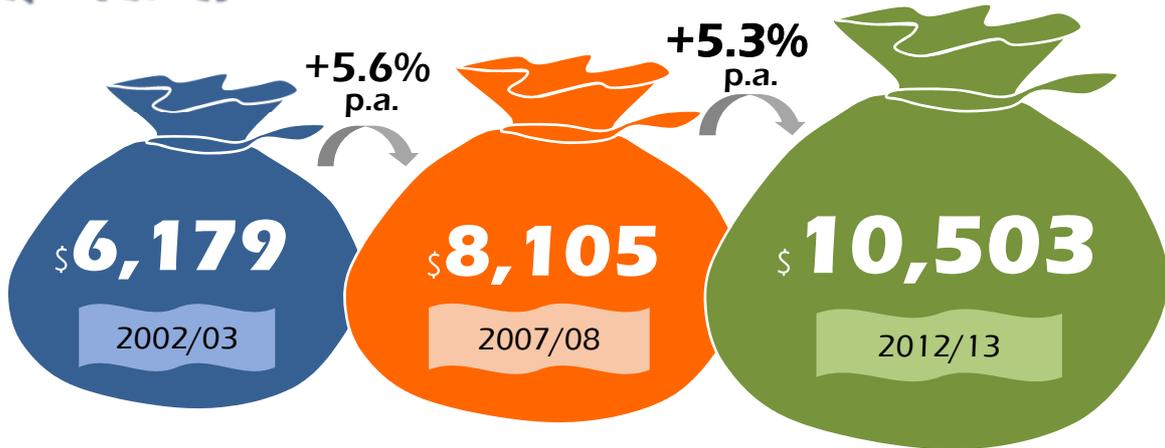


Household Income

from all sources

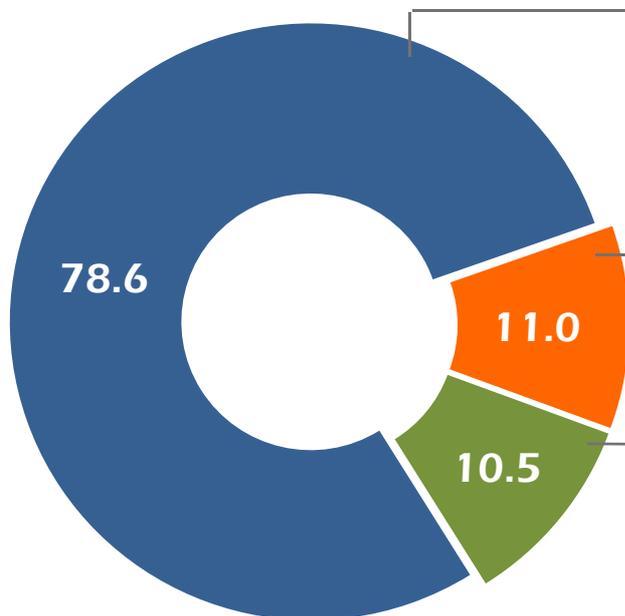


Average Monthly Household Income*
increased **5.3%** per annum from
2007/08 to 2012/13



* While household income is generally compared with household expenditure at the overall household level, income and expenditure on a per member basis provide further insights to the comparison over time where changes could be partly attributed to changes in household size. Both sets of detailed data are [available in the HES 2012/13 Report](#).

Employment Income contributed to **79%** of total household income from all sources



Employment Income

| | | |
|----------------|----------------|----------------|
| \$5,288 | \$6,805 | \$8,251 |
| 2002/03 | 2007/08 | 2012/13 |

Average Annual Growth: **+3.9%**
(2007/08 – 2012/13)

Business Income

| | | |
|--------------|--------------|----------------|
| \$608 | \$892 | \$1,151 |
| 2002/03 | 2007/08 | 2012/13 |

Average Annual Growth: **+5.2%**
(2007/08 – 2012/13)

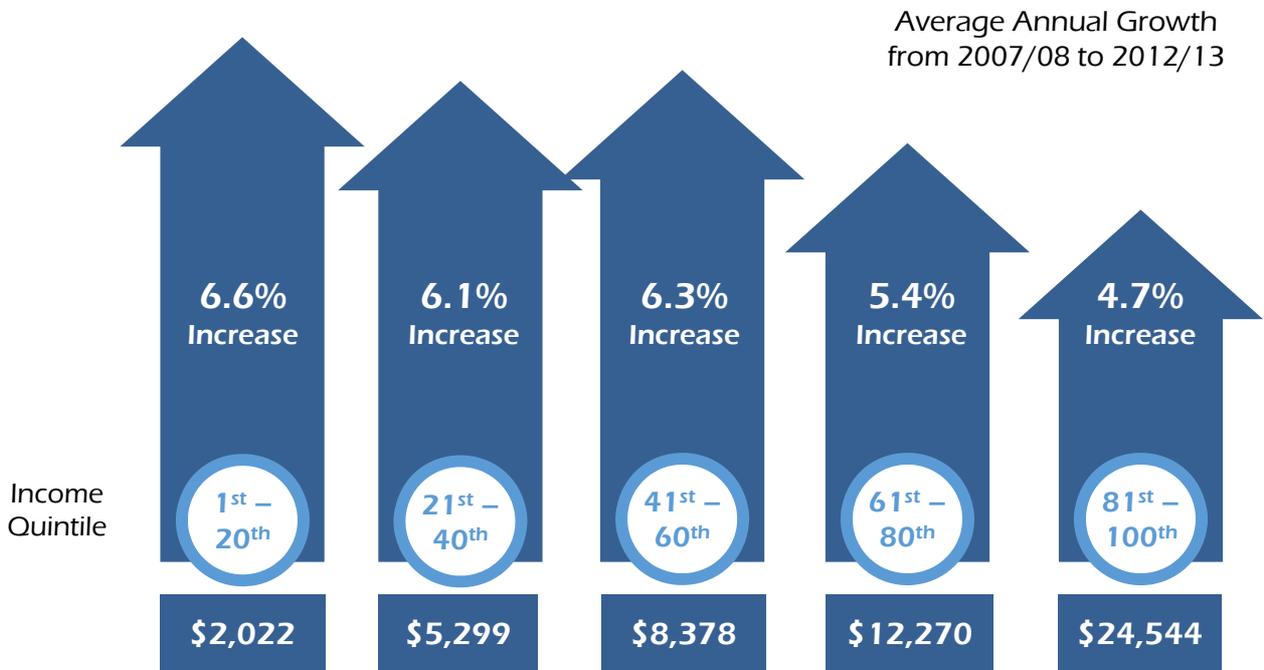
Non-Work Income

| | | |
|--------------|--------------|----------------|
| \$282 | \$408 | \$1,101 |
| 2002/03 | 2007/08 | 2012/13 |

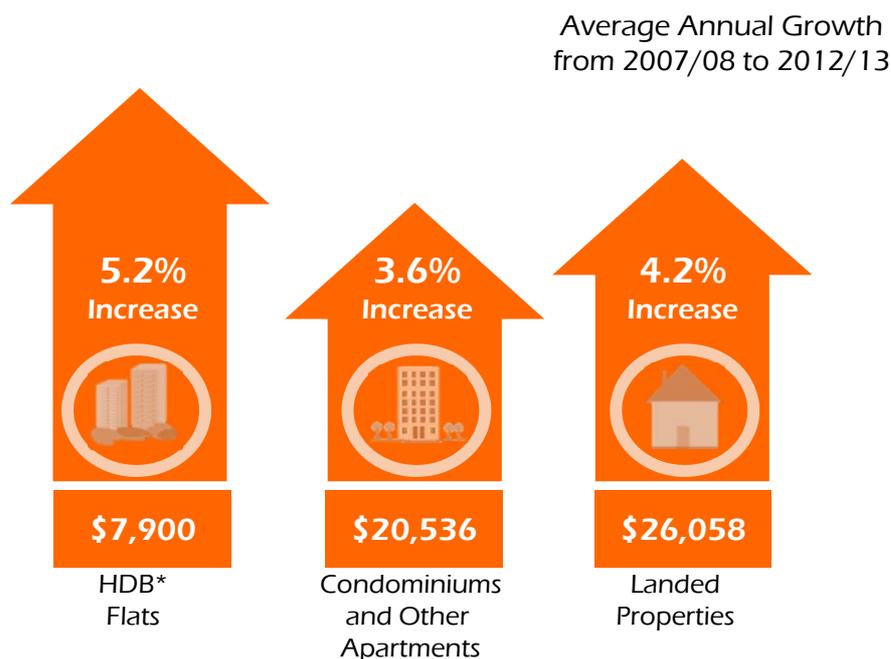
Average Annual Growth: **+22.0%**
(2007/08 – 2012/13)

Over the Last 5 Years...

Growth in Average Monthly Household Income for **All Income Groups**



Higher Income Growth among Households staying in **HDB Flats***

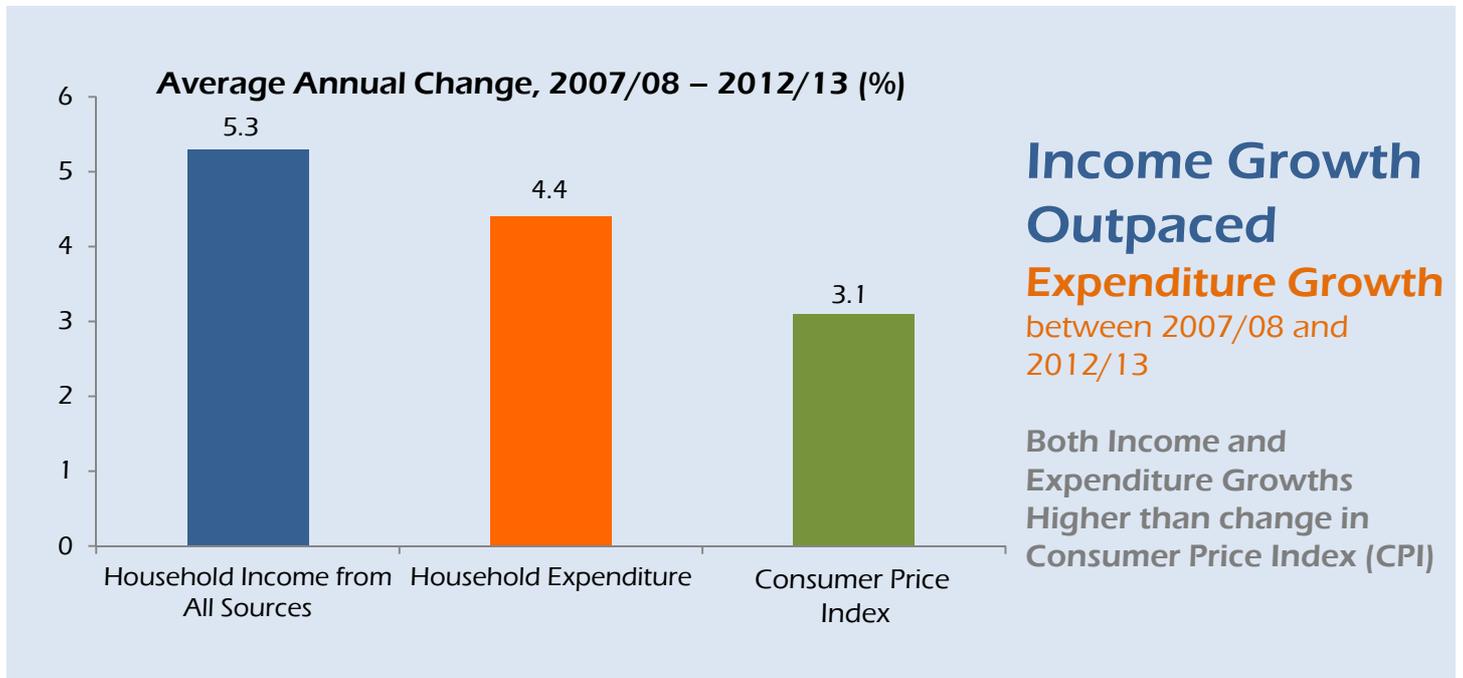


*HDB flats include non-privatised Housing and Urban Development Corporation (HUDC) flats.

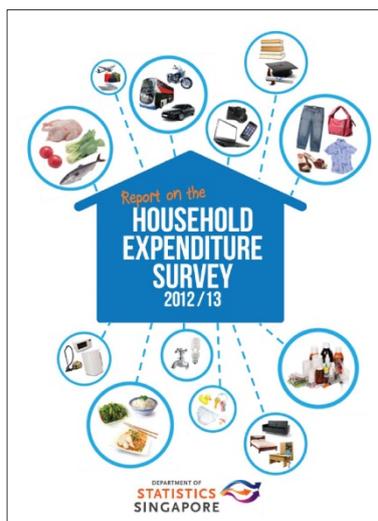
Income and Expenditure Growth

Higher than Inflation

Increase in household expenditure partly reflects lifestyle changes and spending on better quality products and services



Report on the Household Expenditure Survey 2012/13



This report presents the key findings from the Household Expenditure Survey (HES) 2012/13.

Topics covered include household consumption expenditure, households' income, as well as households' socio-economic characteristics and ownership of selected consumer durables.

Changes compared to the results of the previous HES conducted in 2007/08 were highlighted in the analyses. Detailed statistical tables are also included for users who are interested to know more. The full report may be accessed via the [SingStat Website](#).

Overseas Visitors

The Singapore Department of Statistics (DOS) welcomed visitors from Australia and the United States over the last six months. The visits provided an excellent platform for professional exchanges and sharing.

Topics of discussion included the global economic outlook, compilation of key economic indicators, as well as the methodologies used in the review of indicators and trend estimation.

Other topics covered included leveraging on technology for data collection, analysis and compilation, dissemination strategies for data visualisation, as well as end-user computing and mobile technology strategies, with a focus on mobile applications for data collection and dissemination.

Australia

Australian Bureau of Statistics

- Mr Patrick Hadley
Chief Information Officer and
First Assistant Statistician
Technology Services Division

United States

The Conference Board

- Dr Ataman Ozyildirim
Director, Business Cycles and Growth
Research
- Mr Derrick Kon
Director, Associate Services

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The *Statistics Singapore Newsletter* is issued half-yearly by the Singapore Department of Statistics.

It aims to provide readers with news of recent research and survey findings.

It also serves as a vehicle to inform readers of the latest statistical activities in the Singapore statistical service.

Contributions and comments from readers are welcomed.

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