

FEATURE ARTICLE

**SINGAPORE'S GROWTH CYCLE CHRONOLOGY AND PERFORMANCE
OF COMPOSITE LEADING INDICATORS**

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EXECUTIVE SUMMARY

- This article provides an update to Singapore's growth cycle chronology and examines the performance of Singapore's Composite Leading Index (CLI). There were two growth cycles since 2004.
- The first cycle (peak-trough-peak) began in mid-2004, as economic growth moderated following the exceptionally strong growth in the post-SARS period. The second cycle started in early 2008, led by the US housing and financial crisis. The subsequent recovery that began in the second half of 2009 was short-lived, as growth momentum faded by mid-2010.
- Our empirical study shows that the CLI maintains its leading properties, and anticipates cyclical turning points in the economy.

The views expressed in this paper are solely those of the authors and do not necessarily reflect those of the Singapore Department of Statistics, the Ministry of Trade and Industry or the Government of Singapore.

INTRODUCTION

The study of business cycles has been of interest to analysts, economists, market participants and policymakers. Today, composite leading indices are compiled in many countries to monitor economic activity, and to anticipate economic upturns and downturns.

Singapore's Composite Leading Index (CLI) was first developed after the 1985 economic recession. It was subsequently reviewed in 1991. In 2004, Singapore's growth cycle chronology and CLI were updated to ensure their continuing relevance in identifying and anticipating Singapore's growth cycle.¹

Since then, the Singapore economy had undergone a period of growth moderation from 2004 to 2005 and more recently, an economic recession in 2008. The subsequent recovery in 2009 was short-lived; preliminary assessment suggests that the growth momentum faded by mid-2010. This article provides an update of Singapore's growth chronology and examines the performance of Singapore's CLI.

¹ The 2004 review was featured in Economic Survey of Singapore, Second Quarter 2004.

Box 1: Classical Cycle, Growth Cycle and Growth Rate Cycle

In the business cycle literature, there are three types of cycles, namely the classical cycle (level series), the growth cycle (deviation in trend) and the growth rate cycle (period-on-period growth). The US National Bureau of Economic Research (NBER) and The Conference Board tend to focus on the classical cycle, while the OECD's system of composite leading indicators focuses on the growth cycle. As Singapore's economic activity has generally been on an upward trend, it is characterised by growth cycles rather than classical cycles.

To help users understand the relationship between these three cycles, Anas and Ferrara (2002) have introduced the ABCD approach.

In this approach, as shown in the charts below, α and β mark the peak and trough of the growth rate cycle respectively ([Exhibit 1](#)). A and D are, respectively, the peak and trough of the growth cycle ([Exhibit 2](#)), while B and C are, respectively, the peak and trough of the classical cycle ([Exhibit 3](#)).

The approach posits that a slowdown starts with a growth rate cycle peak (labelled α in [Exhibit 1](#)). If the slowdown gathers momentum, the growth rate will fall below the long-term growth rate, leading to a peak in the growth cycle (labelled A in [Exhibit 2](#)). If the slowdown worsens further, the growth rate becomes negative and a classical recession takes place (labelled B in [Exhibit 1](#)). Similarly, an upturn will first start with a growth rate cycle trough (labelled β in [Exhibit 1](#)). As the upturn gathers pace, the growth rate turns positive and a classical cycle trough (labelled C in [Exhibit 3](#)) is observed. Finally, if the upturn continues, the growth rate rises above the long-term growth rate and the growth cycle troughs (labelled D in [Exhibit 2](#)).

Exhibit 1: The Growth Rate Cycle

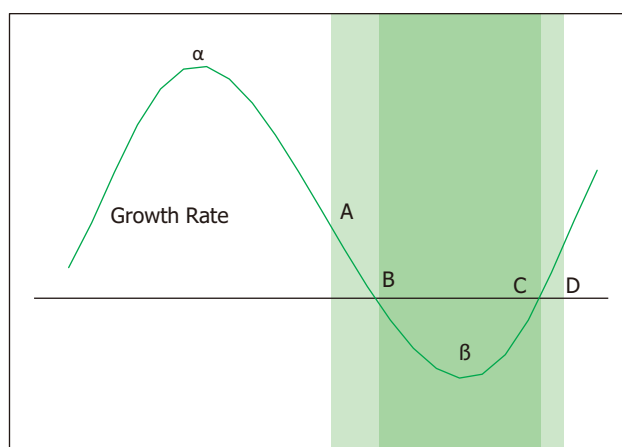


Exhibit 2: The Growth Cycle

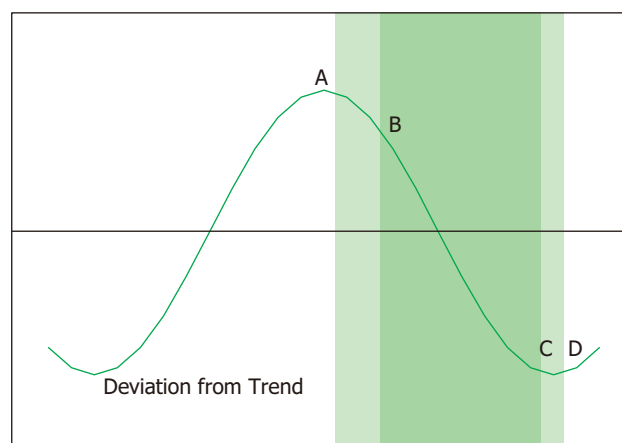
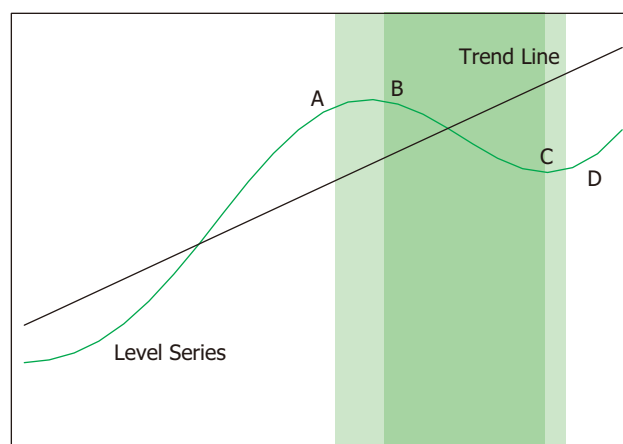


Exhibit 3: The Classical Cycle

SINGAPORE'S GROWTH CHRONOLOGY

Singapore's growth chronology is based on the growth cycles identified from the Composite Coincident Index (CCI) (see Box 1 for an illustration of the different types of business cycles). The CCI is an aggregation of economic indicators (Exhibit 4) that shows coincident relationship with the growth cycles of the economy.

Exhibit 4: Singapore Composite Coincident Indicators

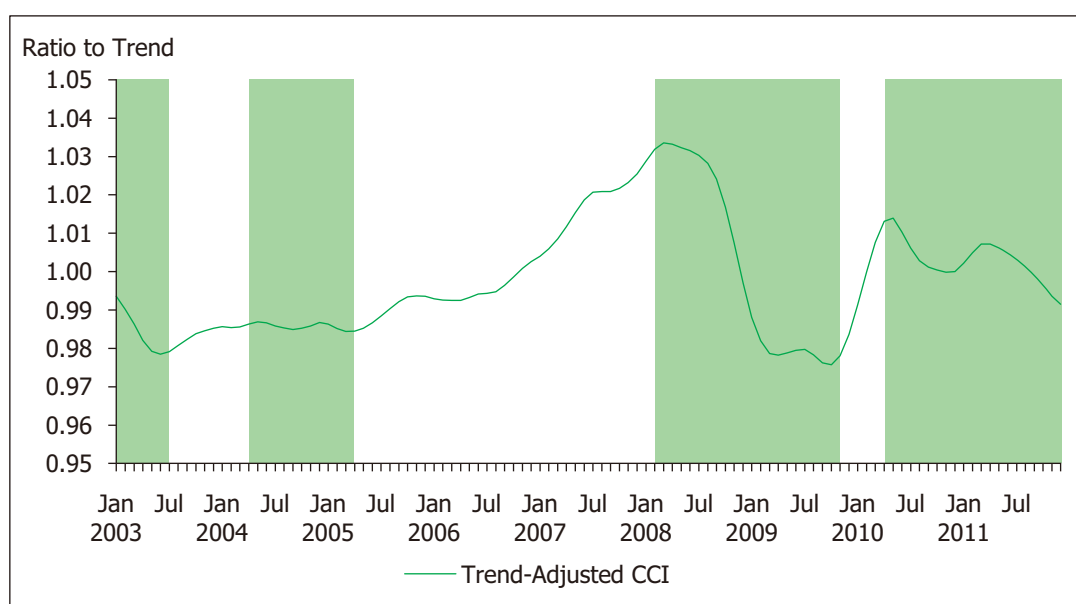
Composite Coincident Indicators
Gross Domestic Product (GDP) at Constant Prices
Index of Industrial Production
Non-Oil Domestic Exports at Constant Prices
Total Employment
Retail Sales Index at Constant Prices, excluding Motor Vehicles

Exhibit 5 presents Singapore's growth cycle chronology for the period from 1984 to 2011. Since the post-severe acute respiratory syndrome (SARS) economic recovery in 2003, the Singapore economy has experienced two growth cycles (Exhibit 6). The first of these two cycles (peak-trough-peak) started in 2004. Economic growth moderated after the exceptionally strong growth in the post-SARS period; Singapore's real gross domestic product (GDP) growth rate eased from 9.2 per cent in 2004 to 7.4 per cent in 2005, as major economies such as the United States (US) and Japan experienced slower growth. The slowdown in Singapore's economic growth reversed in mid-2005, as global economic conditions improved. However in early 2008, the expansion of the Singapore economy ended, as the US economy started its downturn in late 2007 at the onset of the subprime mortgage crisis and subsequently sank into a recession in early 2008.

The second growth cycle that began in early 2008 deepened into a classical recession, as the US housing and financial crisis worsened and spread to the European economies. Singapore's economy rebounded in the second half of 2009, mainly driven by increased pharmaceuticals and electronics production, as well as expansion in the financial services and trade-oriented industries. Against the backdrop of an improving global macroeconomic environment, Singapore's real GDP rose above its pre-recession peak in the first half of 2010. However, the recovery was short-lived, as Singapore's growth cycle peaked in May 2010 (Exhibit 5), marking the end of the growth cycle that began in March 2008.

Exhibit 5: Growth Cycle Chronology of Singapore, 1984-2011

Date of Peak and Trough			Average Duration in Months			
Peak (P)	Trough (T)	Peak (P)	Low-growth (P to T)	High-growth (T to P)	Full Cycle (P to P)	Full Cycle (T to T)
Aug 84	Dec 85	Jun 88	16	30	46	46
Jun 88	Oct 89	Aug 90	16	10	26	36
Aug 90	Oct 92	Sep 94	26	23	49	30
Sep 94	Apr 95	Jul 97	7	27	34	43
Jul 97	Nov 98	Aug 00	16	21	37	35
Aug 00	Oct 01	Apr 02	14	6	20	20
Apr 02	Jun 03	May 04	14	11	25	21
May 04	Mar 05	Mar 08	10	36	46	55
Mar 08	Oct 09	May 10 ²	19	7	26	-

Exhibit 6: Singapore's Growth Cycles, 2003-2011

THE COMPOSITE LEADING INDEX

Composite leading indices have been compiled by organisations, such as The Conference Board and the OECD, to anticipate upturns and downturns in the economy. The CLI is a predictive tool to gauge if, and approximately when, an expansion or recession will take place. It thus serves as a useful advanced warning tool for policymakers.

The Singapore CLI is an aggregation of nine economic indicators ([Exhibit 7](#)) that shows a leading relationship with the growth cycles of the economy. The CLI components or indicators have been selected based on certain key criteria. These include leading cyclical properties, economic significance, timeliness, periodicity and quality of the data.

² The peak date is preliminary as the trend estimates may be substantially revised when new data becomes available.

Exhibit 7: Singapore's Composite Leading Indicators

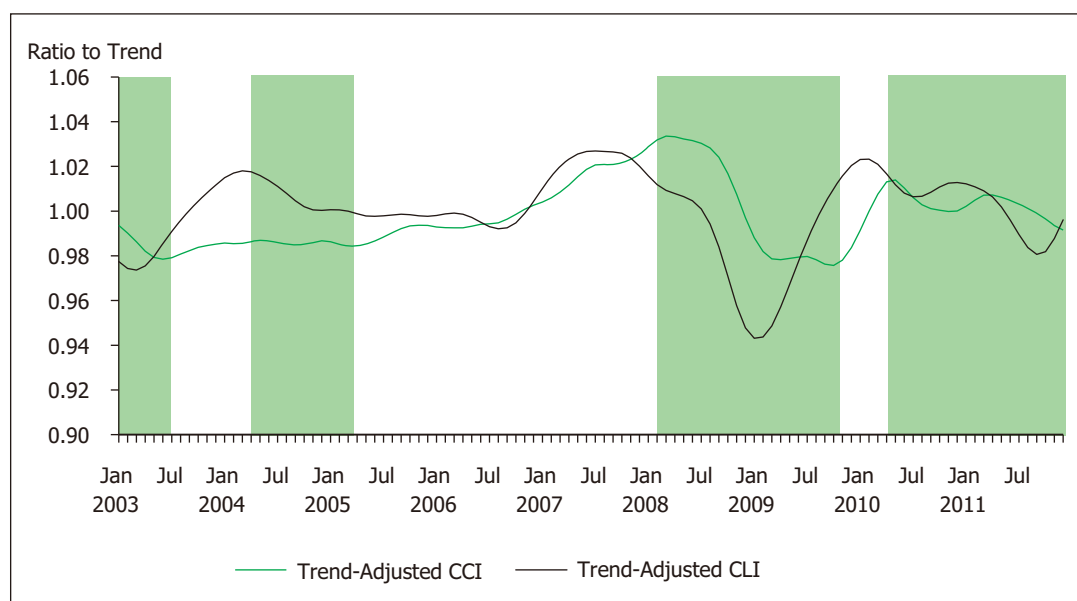
Composite Leading Indicators
Total New Companies Formed
Money Supply (M2)
Stock Exchange of Singapore Indices
Business Expectations for Wholesale Trade
Business Expectations for Stock of Finished Goods (Manufacturing)
US Purchasing Managers' Index (Manufacturing)
Total Non-oil Seaborne Cargo Handled
Domestic Liquidity Indicator
Total Non-oil Retained Imports

The CCI is used as the reference series to assess the performance of the CLI. In the 2004 review, Singapore's CLI was found to have an average lead of 3.4 months over the CCI for 1990-2003. For 2003-2011, Singapore's CLI achieved a better performance, with an average lead of 4.8 months ([Exhibit 8](#)). In particular, the CLI peaked six months before the global recession began in March 2008 and bottomed out nine months in advance of the subsequent recovery. In addition, the CLI anticipated the slowdowns in 2004 and 2010 with a lead of two and four months respectively. This leading cyclical relationship can also be seen from [Exhibit 9](#).

Exhibit 8: Lead/Lags of the CLI over the CCI, 2003-2011

Growth Cycle	CCI Turning Points	CLI Turning Points	Lead[+]/Lag[-] (Months)
Trough	Jun-03	Mar-03	3
Peak	May-04	Mar-04	2
Trough*	Mar-05	Aug-06	-
Peak	Mar-08	Sep-07	6
Trough	Oct-09	Jan-09	9
Peak	May-10	Jan-10	4
Average (2003-2011)			4.8

*The CLI was unable to anticipate the growth cycle trough in March 2005.

Exhibit 9: CLI and CCI Growth Cycles, 2003-2011

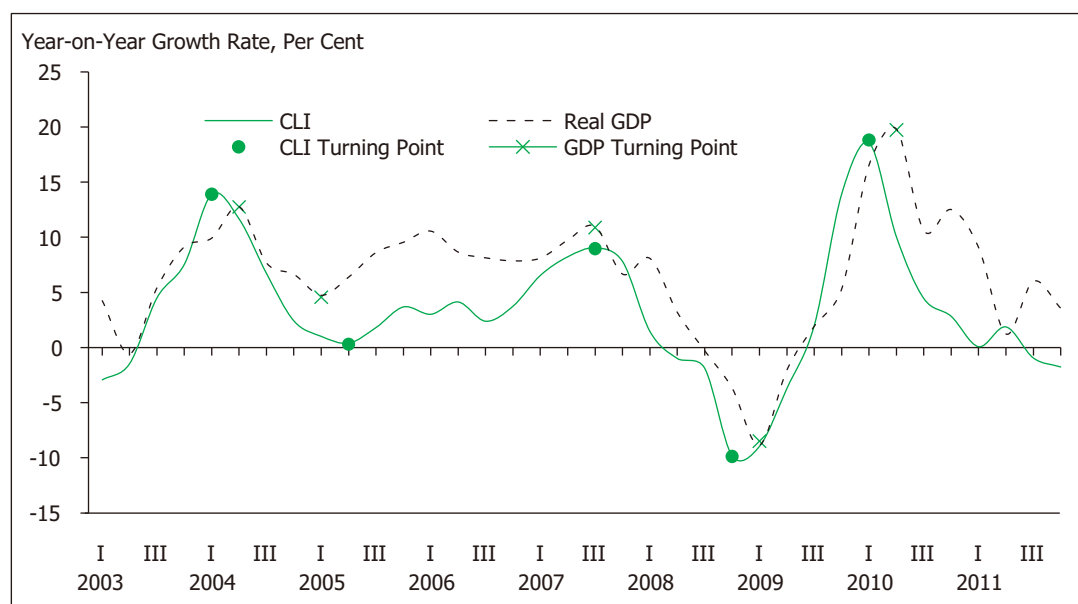
As GDP is an important economic indicator that policymakers and economists focus on, it is useful to assess the lead of the CLI with respect to this indicator. In this assessment, simple quarterly growth measured in year-on-year terms is used. For the period 2004-2011, the CLI enjoyed an average lead of 0.4 quarter over GDP (Exhibit 10).

In addition, the maximum cross-correlation of year-on-year growth in quarterly CLI with year-on-year growth in quarterly GDP is 0.85, with the former leading the latter by one quarter for the period from 2004 to 2011. Exhibit 11 shows that the CLI is strongly correlated to and provides a lead to the real GDP growth cycles.

Exhibit 10: Lead/Lags of Quarterly CLI over Quarterly GDP, 2004-2011

Growth Cycle	GDP Turning Points	CLI Turning Points	Lead[+]/Lag[-] (Quarters)
Peak	2Q04	1Q04	1
Trough	1Q05	2Q05	-1
Peak	3Q07	3Q07	0
Trough	1Q09	4Q08	1
Peak	2Q10	1Q10	1
Average Lead			0.4

Exhibit 11: CLI and Real GDP Year-on-Year Growth, 2003-2011



CONCLUSION

Singapore's growth cycle chronology has been updated with two growth cycles experienced since 2004. The first growth cycle (peak-trough-peak) began in mid-2004, as economic growth moderated following the exceptionally strong growth in the post-SARS period. Economic growth subsequently picked up in early 2005 as global economic conditions improved. The next growth cycle started in early 2008, when the pace of economic growth started easing in line with the slowdown in the global economy. Singapore then entered into a recession, as the US housing and financial crisis worsened and spread to other economies. Singapore, together with key economies around the world, began to recover in the second half of 2009. However, the recovery was short-lived, as the growth momentum faded by mid-2010.

The ability to anticipate economic turning points is important. Our empirical study shows that the CLI maintains its leading properties, and anticipates cyclical turning points of both the CCI and real GDP.

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