



Note on the revision of composite leading and coincident business cycle indicators

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Introduction

Composite business cycle indicators are constructed by integrating various individual economic time series into a single indicator time series that mirrors the movement of and the turning points in the business cycle. The time series included in the composite business cycle indicators represent only a small sample of the total number of available indicators portraying various aspects of economic activity. Three groups of business cycle indicators are distinguished, namely those that change direction ahead of the business cycle (leading indicators), those that move more or less in conjunction with the business cycle (coincident indicators) and those time series that lag behind the business cycle (lagging indicators).

The South African Reserve Bank first published composite business cycle indicators in 1983¹. Various factors, such as structural changes in the economy or the identification of new economic indicators, necessitate the frequent reassessment of the constituent time series of the composite business cycle indicators. The South African Reserve Bank's three composite business cycle indicators were last revised in 1994². Since 1994 important structural changes have occurred in South Africa, both politically and economically. These developments suggested the need for a re-evaluation of all the component time series of the composite business cycle indicators.

The purpose of this note is firstly to describe the evaluation of the previous component time series of the composite leading and coincident business cycle indicators. Secondly, it describes the component time series of the revised composite leading and coincident business cycle indicators, comprising time series that have either been retained or included for the first time³.

The composite leading business cycle indicator

During the latter part of the 1990s it became apparent that some of the component time series of the composite leading business cycle indicator no longer reliably predicted movements in the business cycle. To a significant extent this had been a consequence of policies implemented since 1994 by South Africa's first democratically elected government. These included, among other things, the removal of many trade restrictions between South Africa and the rest of the world and the gradual liberalisation of exchange controls.

A total of 29 economic indicators, including the 21 components previously included in the composite leading business cycle indicator, were evaluated for possible inclusion in the revised composite leading business cycle indicator. All of these time series were subjected to the same evaluation system applied during the 1994 revisions. This evaluation system rates business cycle indicators according to:

- the economic significance of the process represented by the indicator,
- the statistical adequacy of the data,
- the historical conformity to and timing relationship with the business cycle,
- the smoothness of the time series, and
- the timeliness of the data.

¹ Van der Walt, B. E. 1983. *Indicators of business cycle changes in South Africa*. Quarterly Bulletin, No 147, March. Pretoria: South African Reserve Bank.

² Van der Walt, B. E. and Pretorius, W. S. 1994. *Notes on revision of the composite business cycle indicators*. Quarterly Bulletin, No 193, September. Pretoria: South African Reserve Bank.

³ *The revised composite lagging business cycle indicator will be discussed separately in a later issue of the South African Reserve Bank's Quarterly Bulletin.*

Table 1 shows the 21 components that were previously included in the composite leading business cycle indicator and the 13 components that are now included in the revised composite leading business cycle indicator.

Table 1 Component time series of the composite leading business cycle indicator

Previous components	New components
Opinion survey of volume of orders in manufacturing	Opinion survey of volume of orders in manufacturing
Opinion survey of stocks in relation to demand: Manufacturing and trade	Opinion survey of stocks in relation to demand: Manufacturing and trade
Opinion survey of business confidence: Manufacturing, construction and trade	Opinion survey of business confidence: Manufacturing, construction and trade
International business cycle indicator: Industrial production	Composite leading business cycle indicator of major trading-partner countries: Percentage change over twelve months
Commodity prices in US dollars for a basket of South Africa's export commodities: Percentage change over twelve months	Commodity prices in US dollars for a basket of South Africa's export commodities: Six-month smoothed growth rate
Real M1 money supply (deflated with the CPI): Percentage change over twelve months	Real M1 money supply (deflated with the CPI): Six-month smoothed growth rate
Prices of all classes of shares	Prices of all classes of shares: Six-month smoothed growth rate
Number of residential building plans passed	Number of residential building plans passed for flats, townhouses and houses larger than 80m ²
Tender Treasury bill discount rate	Interest rate spread: 10-year bonds less 91-day Treasury bills
Ratio of output prices to unit labour costs in manufacturing	Gross operating surplus as a percentage of gross domestic product
Number of new motor vehicles sold	Labour productivity in manufacturing: Six-month smoothed growth rate
Physical volume of mining production, excluding gold	Job advertisements in the <i>Sunday Times</i> newspaper: Six-month smoothed growth rate
Value of merchandise exports, excluding gold and agriculture	Opinion survey of the average hours worked per factory worker in the manufacturing sector
Overtime hours as percentage of ordinary hours worked in manufacturing	
Company profits, after tax	
Physical volume of gold ore milled	
Net number of new companies registered	
Number of real-estate transactions	
Net gold and other foreign exchange reserves	
Consumer credit at constant prices	
London gold price in rand	

Various previously used component time series were omitted in the new list of components of the composite leading business cycle indicator due to some inconsistencies in the timing relationship with the reference turning points of the business cycle. These were:

- the physical volume of gold ore milled,
- the physical volume of mining production (excluding gold),
- the value of merchandise exports (excluding gold and agriculture),
- the ratio of output prices to unit labour costs in manufacturing,
- the London gold price in rand,
- company profits after tax,
- the net number of new companies registered,
- the number of new motor vehicles sold,
- net gold and other foreign exchange reserves, and
- consumer credit at constant prices.

The time series measuring the number of real-estate transactions has not been published since November 2000 and was accordingly omitted. The series depicting overtime hours as a percentage of ordinary hours worked in manufacturing was omitted because of the non-comparability of the series over time. This indicator was replaced by the results of an opinion survey of the average hours worked per factory worker in the manufacturing sector⁴.

⁴ All the opinion survey data included in the composite leading business cycle indicator are published by the Bureau for Economic Research, University of Stellenbosch.

Some of the time series previously included in the composite leading business cycle indicator were replaced by related or comparable series that received higher ratings during the evaluation process. These include the following:

- The international business cycle indicator, comprising the industrial production indices of South Africa's main trading-partner countries, was replaced by the percentage change over twelve months in the new composite leading business cycle indicator of major trading-partner countries. This indicator comprises the composite leading business cycle indicators of eight of South Africa's main trading-partner countries, weighted according to the value of South Africa's exports to each country⁵.
- The percentage change over twelve months in commodity prices, measured in US dollars, for a basket of South Africa's export commodities, was replaced by the six-month smoothed growth rate in this commodity price index.
- The percentage change over twelve months in the real M1 money supply, deflated by the consumer price index, was replaced by the six-month smoothed growth rate in the real M1 money supply.
- The index of the prices of all classes of shares traded on the JSE Securities Exchange SA (JSE) was replaced by the six-month smoothed growth rate in the prices of all classes of shares traded on the JSE.
- The total number of residential building plans passed was replaced by the number of residential building plans passed for flats, townhouses and houses larger than 80m².
- The tender Treasury bill discount rate was substituted for an interest rate spread indicator, representing the difference between the yield on government bonds with a maturity of ten years and longer, and the interest rate on 91-day Treasury bills.

⁵ The source of the composite leading business cycle indicator of each trading-partner country is the Foundation for International Business and Economic Research in New York.

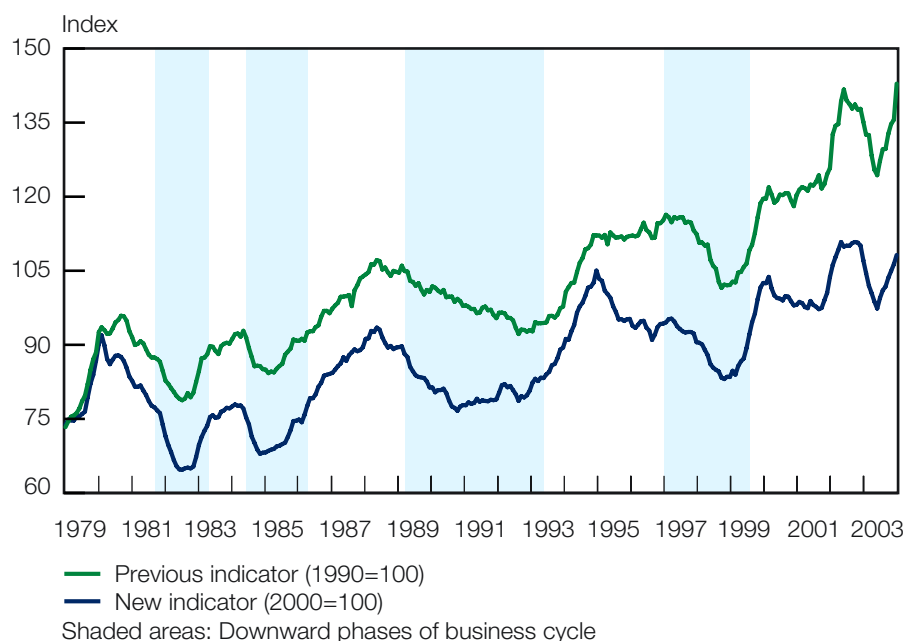
Three of the previous component time series were retained unaltered in the revised composite leading business cycle indicator. These were:

- an opinion survey of volume of orders in manufacturing,
- an opinion survey of stocks in relation to demand in manufacturing and trade, and
- an opinion survey of business confidence in the manufacturing, construction and trade sectors.

Three component time series were included in the revised composite leading business cycle indicator for the first time, namely the six-month smoothed growth rate in the number of square centimeters devoted to job advertisements in the *Sunday Times* newspaper, the six-month smoothed growth rate in labour productivity of the manufacturing sector, and gross operating surplus as a percentage of gross domestic product.

The previous and the new composite leading business cycle indicator are shown in Graph 1. The new composite leading business cycle indicator exhibits a longer lead time than the previous indicator at three of the four business cycle peaks and at two of the four business cycle troughs. The difference in the lead times of two of these turning points is quite noticeable. The new composite leading business cycle indicator reached a trough in October 1990, almost two years prior to the corresponding trough indicated by the previous leading indicator. The new indicator reached a peak in December 1994, preceding the subsequent reference peak in the business cycle by almost two years. This reference peak in the business cycle was not as clearly predicted by the previous composite leading business cycle indicator as by the new composite leading indicator.

Graph 1: Composite leading business cycle indicator



The composite coincident business cycle indicator

The seven time series previously included in the composite coincident business cycle indicator and the five components now included in the revised composite coincident business cycle indicator are shown in Table 2.

Table 2 Component time series of the composite coincident business cycle indicator

Previous components	New components
Gross value added at constant prices, excluding agriculture, forestry and fishing	Gross value added at constant prices, excluding agriculture, forestry and fishing
Value of wholesale, retail and new vehicle sales at constant prices	Value of wholesale, retail and new vehicle sales at constant prices
Utilisation of production capacity in manufacturing	Utilisation of production capacity in manufacturing
Employment in the manufacturing, mining and construction sectors	Total formal non-agricultural employment
Physical volume of manufacturing production: durable goods	Industrial production index
Physical volume of manufacturing production: non-durable goods	
Value of imports at constant prices, excluding minerals	

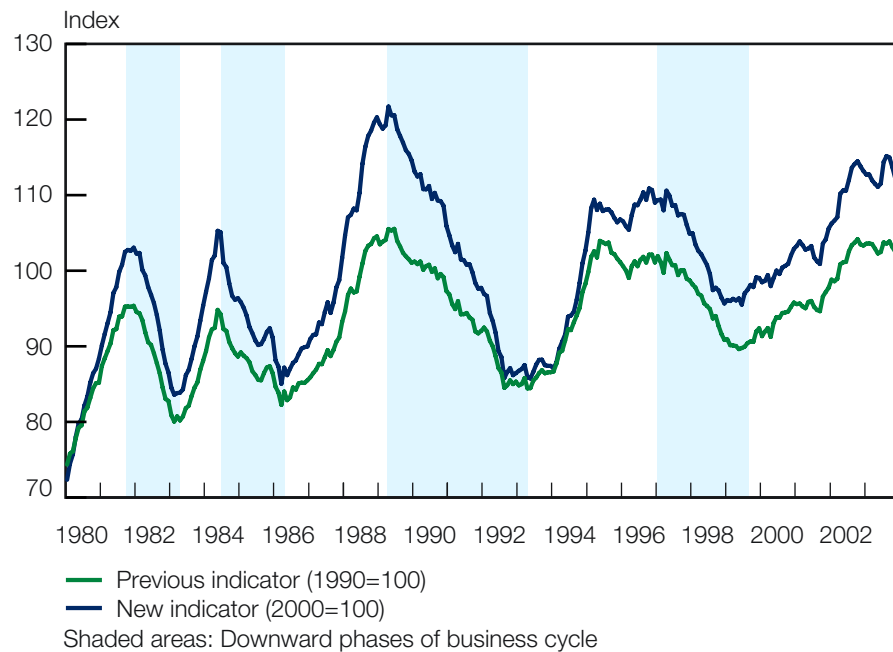
The time series representing the value of imports at constant prices excluding mineral products was omitted from the new composite coincident business cycle indicator because it displayed an inconsistent timing relationship with the reference turning points of the business cycle. Three of the previous component time series of the coincident indicator were retained unaltered, namely:

- the aggregate gross value added at constant prices, excluding agriculture, forestry and fishing,
- the value of wholesale, retail and new vehicle sales at constant prices, and
- the utilisation of production capacity in the manufacturing sector.

The time series reflecting the number of people employed in the manufacturing, mining and construction sectors was expanded to encompass total formal non-agricultural employment. The new industrial production series replaces the two series measuring the physical volume of manufacturing production separately for durable and non-durable goods. This industrial production series comprises the physical volume of total manufacturing production, the physical volume of mining production and the quantity of electricity generated in South Africa. The series are weighted according to the relevant sectors' contributions to the aggregate gross domestic product.

The previous and the new composite coincident business cycle indicator are shown in Graph 2. It is clear from this graph that the specific turning points of the previous and the new coincident indicator are closely correlated. One notable exception, however, occurs during the period 1995 – 1996. Both the previous and the new coincident indicator show a double peak during this period but, unlike in the previous indicator, the second peak of the new indicator is higher than the first one. The revised coincident indicator therefore also correlates closer with the November 1996 reference peak in the business cycle.

Graph 2: Composite coincident business cycle indicator



Timing relationship of the revised indicators

The timing relationship of the composite coincident and leading business cycle indicators is shown in Table 3 along with the reference turning points of the business cycle for the period since August 1981. As is the case in other countries, there is a fairly large dispersion in the number of months by which the leading indicator leads the reference turning points of various cycles.

Table 3 Timing relationship between the composite indicators and reference turning points of the business cycle*

Reference turning points		Timing relationship in months			
		Coincident indicator		Leading indicator	
		Previous	New	Previous	New
Peak	Trough				
August 1981		+4	+4	-11	-18
	March 1983	-1	-1	-8	-8
June 1984		-1	-1	-1	-4
	March 1986	0	0	-13	-16
February 1989		+4	+2	-9	-9
	May 1993	-1	0	-9	-31
November 1996		0	-1	+2	-23
	August 1999	-3	-2	-11	-10
Average:		0	0	-7½	-15
Median:		-½	-½	-9	-13

* A plus (minus) sign indicates that the relevant indicator lags (leads) the reference turning point