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# USAID STRATEGIC ECONOMIC RESEARCH AND ANALYSIS – ZIMBABWE (SERA) PROGRAM

## UPGRADING THE ZEPARU ECONOMIC BAROMETER

**CONTRACT NO. AID-613-C-11-00001**

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## ACRONYM LIST

ASYCUDA	Automated System for Customs Data
BAZ	Bankers Association of Zimbabwe
BIPPA	Bilateral Investment Promotion and Protection Agreement
CAAZ	Civil Aviation Authority of Zimbabwe
CLI	Composite Leading Indicator
COMESA	Common Market for Eastern and Southern Africa
CZI	Confederation of Zimbabwe Industries
ECOWAS	Economic Community of West African States
EU	European Union
GDP	Gross Domestic Product
GOZ	Government of Zimbabwe
IIP	Index of Industrial Production
IMF	International Monetary Fund
LOLR	Lender of Last Resort
MOF	Ministry of Finance
NAFTA	North American Free Trade Agreement
OECD	Organization for Economic Co-operation and Development
PAYE	Pay As You Earn
QDS	Quarterly Digest of Statistics
RBZ	Reserve Bank of Zimbabwe
SADC	Southern African Development Community
SARB	South Africa Reserve Bank
SERA	Strategic Economic Research and Analysis
STTA	Short Term Technical Assistance
TIMB	Tobacco Industry and Marketing Board
UN WTO	United Nations World Trade Organization
USAID	United States Agency for International Development
US	United States (of America)
VMI	Volume of Manufacturing Index
WAEMU	West African Economic and Monetary Union
WEO	World Economic Outlook

ZEPARU	Zimbabwe Economic Policy Analysis and Research Unit
ZESA	Zimbabwe Electricity Supply Authority
ZETREF	Zimbabwe Economic and Trade Revival Fund
ZETSS	Zimbabwe Electronic Transfer and Settlement System
ZIMRA	Zimbabwe Revenue Authority
ZIMSTAT	Zimbabwe National Statistics Agency
ZSE	Zimbabwe Stock Exchange

## BACKGROUND

The USAID Strategic Economic Research and Analysis — Zimbabwe (SERA) Program has a variety of objectives related to improving the capacity for economic policy formulation and analysis in Zimbabwe, as well as improved economic statistics. A specific component of this program involves providing support to the Zimbabwe Economic Policy and Research Unit (ZEPARU), with particular reference to the Strategic Objective of Strengthened Capacity for Policy Development Institutions.

Keith Jefferis of Econsult Botswana (Pty) Ltd visited Harare, Zimbabwe in April 2012, to provide short-term technical assistance (STTA) under the program. The visit had two specific purposes, being:

1. Upgrading of the ZEPARU Economic Barometer, with a view to improving the technical content and developing new components of the Barometer; and
2. Reviewing a number of ZEPARU research products from 2011 with a view to upgrading for publication in a proposed book, as well as developing the capacity of ZEPARU researchers

Following the visit, there was continued interaction with the USAID SERA program and ZEPARU in order to complete the assignments by the end of June 2012. This document comprises a detailed report of the activities carried under the assignment.

## 1. UPGRADING OF ZEPARU ECONOMIC BAROMETER

The major components of this work were to review the ZEPARU Economic Barometer and make suggestions for improvement; to make suggestions for an economic data appendix to be included in the Barometer; and to help develop a Composite Leading Indicator (CLI) for publication in the Barometer.

### Review of Previous Issues of ZEPARU Economic Barometer

Keith Jefferis reviewed the last two issues of the Economic Barometer (issues #2 and #3, for 2011 Q3 & Q4), and prepared detailed comments for improvement based on the most recent issue (attached as Appendix A). These comments were discussed in detail with the ZEPARU team working on the Barometer. The comments, which included both suggestions for general improvement and related to specific components of the Barometer, were received positively.

The Barometer improved between issues #2 and #3. However there is still some way to go to make it a “must read”. Central to this is ensuring that the Barometer provides “value addition”, i.e. it must provide readers with information, commentary and analysis that they do not get elsewhere. It must avoid simply repeating what is said by the Government of Zimbabwe (GOZ), the Reserve Bank of Zimbabwe (RBZ) or the newspapers – not just because this will not excite people, but also to fulfill the intended ZEPARU mandate to provide relevant and timely analytical policy inputs.

Hence the Barometer needs to “challenge” more. As it stands, there is a lot of repetition of “received wisdom”, much of which may turn out to be incorrect, e.g. that there is \$2.5bn in cash circulating outside of the banking system, or that the cause of low deposits is low interest rates. These notions need to be probed – not necessarily through sophisticated work but through some simple examination of the arguments and use of readily available data. More generally, there is a lot of scope for “value addition” through simple use of data, especially in presenting comparisons with other countries (e.g. circulation of cash, or mineral royalty rates).

The Barometer is also too long – at 51 pages for the main report, it is unlikely that many people will read cover to cover – even if much of the space is taken up by charts and tables. The target should be to trim by (at least) one third – aiming say at 35 pages maximum. The Barometer can be shortened by cutting some sections (e.g. discussion of copper prices); being much more concise in the writing style; reducing / combining charts; and avoiding repetition. The coordinator needs to be stricter on enforcing word/length limits on the contributions from authors of the various sections, as well as on striking out repetitions between sections. The authors need to be driven by “what is the shortest and most concise way that I can get my point across”, rather than writing at length.

More could be done to break up the text through use of “boxes”, especially for items that are not part of the main commentary, e.g. the discussion of the World Bank Doing Business indicators. There are also a fair number of statements that have dubious economic logic. The Barometer needs to be carefully reviewed before finalization to identify such issues – otherwise it will be difficult to build credibility. The presentation of data in tables and charts could be improved. There is too much reliance on presenting monthly data for 2011 without historical data to provide context (not always, but generally). The Barometer could also provide a summary of ZEPARU’s research output – e.g. summarizing the result of a good working paper in a box.

The draft of issue #4 (2012 Q1) of the Barometer was subsequently reviewed. Some of the suggested improvements had been taken on board, but more needs to be done in future editions to improve the writing style and follow the suggestion of moving some material to boxes to break up the text.

## Data Annex

It was agreed that the Barometer should contain a data annex in each edition that would present key economic variables in a time series format. This would provide an information resource that would bring together data that have until now only been available on a fragmented basis from specialized data providers. A data template was prepared, to be completed by the ZEPARU Barometer team, and included in issue #4 of the Barometer. It was suggested that there could be a set of annual data as well as a set of monthly/quarterly data. The composition of each would depend on data availability in terms of frequency of compilation and publication. Key areas to be covered would include: GDP growth; international commodity prices; inflation, interest rates and money supply; trade and balance of payments; foreign exchange rates and reserves; banks and stock exchange; business and production indicators; and the government budget.

The draft Barometer issue # 4 included the dataset along the lines proposed.

## Composite Leading Indicators

Detailed discussions were held regarding the preparation of an Index of Leading Indicators to be included as a high profile component of the barometer. A note was prepared detailing the principles behind the compilation of such an index, and – following discussions with the ZEPARU team and others - reviewing the potential candidate data series for inclusion. Discussions with the Confederation of Zimbabwe Industries indicated that there would be a significant demand from the private sector and other users of economic data for such an Index. It was agreed that the ZEPARU team would compile a dataset for the relevant indicator component series, and that work on data transformation and aggregation into the Composite Leading Indicator (CLI) would continue through email communication between Keith Jefferis and ZEPARU. The initial index would be a preliminary or pilot index, subject to revision and improvement as more and longer data series become available.

A range of variables was proposed for potential inclusion in the index. The data on some proposed components of the index was provided by ZEPARU during June 2012, for those variables where data

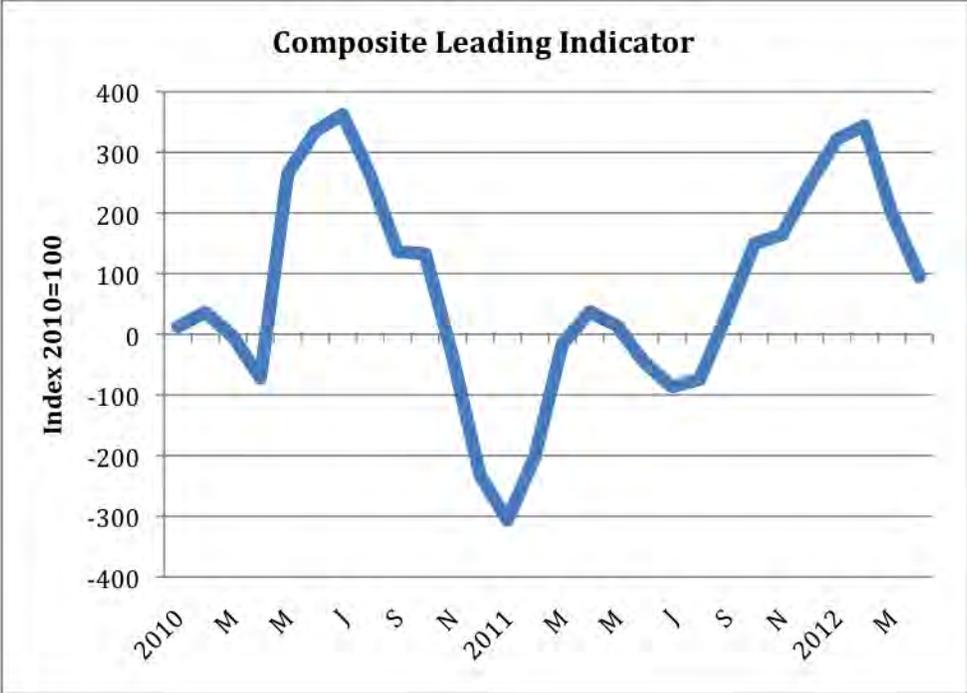
were available. The data was transformed into a form suitable for this purpose (for instance, using growth rates rather than levels; calculating real rather than nominal variables in some cases). A selection was then made of the variables that could potentially be used. The assessment of variables initially suggested for consideration, data variability and whether they could potentially be included is detailed in the table below.

<b>Variables for data collection/ categorization</b>	<b>Time period available June 2012</b>	<b>Comment</b>
<b><i>Early Stage</i></b>		
Capital/intermediate goods imports	Monthly, Jan 2010-Dec 2011 (24 obs)	Include
Building plan approvals	N/A	Exclude N/A
Company registrations	N/A	Exclude N/A
International passenger arrivals, major airports	Monthly, Jan 2010-Mar 2011 (15 obs)	Exclude, time series too short
Investment approvals	N/A	Exclude N/A
<b><i>Expectations-sensitive</i></b>		
Share prices	Monthly, Jan 2009 – Apr 2012	Include
Business confidence/ expectations	N/A	Exclude N/A
<b><i>Prime movers</i></b>		
Money supply (M3)	Monthly, June 2010-April 2012 (23 obs)	Include
Interest rates	Monthly, Mar 2009 – Mar 2012 (37 obs but two missing)	Include
Gold & platinum prices	Monthly, Jan 2008 – April 2012 (52 obs)	Include
<b><i>Rapidly-responsive</i></b>		
Electricity consumption	N/A	Exclude N/A
Fuel imports	Monthly, Jan 2010-Dec 2011 (24 obs)	Include
Motor vehicle registrations (goods vehicles)	Annual only	Exclude, unsuitability periodicity
Retail sales	N/A	Exclude N/A
Index of manufacturing production volume	Monthly, Jan 2009 – Sep 2011 (33 obs)	Include
PAYE receipts	Jan 2009 – April 2012 (40 obs)	Include
Payments system – ZETSS	Jan 2011 – Feb 2012	Exclude, time series too short

As noted above, some variables were excluded for reasons of insufficient data. The resulting variables were then plotted and visually examined and correlation coefficients calculated, and on the basis of statistical and economic criteria, a final selection was made as follows:

- a. Zimbabwe Stock Exchange (ZSE) industrial index (growth rates)
- b. Real M3 (growth rate)
- c. Real Pay As You Earn (PAYE) receipts (growth rate)
- d. Imports of intermediate goods (growth rate)
- e. Composite precious metals prices (growth rate)
- f. Real bank lending rate

The variables were then standardized and aggregated into a single composite indicator, plotted below.



Some further steps are now necessary to continue refining the index.

The next step is to identify turning points in the cycles of the different series, and if necessary shift the series forward or backwards to achieve cycle consistency. Although turning points can be tentatively identified, there is no obvious pattern that will enable cycle-consistency to be achieved. This can be attempted when a longer and more consistent time series, and perhaps more component series, are available.

The CLI and the component series should also be compared with the real GDP data series, as it is this that the CLI series should lead. However, this requires a reasonable period of quarterly GDP data, and such a comparison – which will also enable a clearer focus on leading (rather than coincident or lagging) indicators – will take some time, given the absence of such a GDP data series at present.

In the meantime, the database should be updated on a monthly basis, and the calculations and the CLI series also updated monthly. Effort should also be made to obtain data on other desirable series for possible inclusion.

The preliminary CLI can be published in issue #4 of the ZEPARU Barometer for 2012 Q2, inviting comments from the public with a view to refining further. The contents of Appendix 3 (Construction of a Leading Indicator Series for Zimbabwe) should be made available on the ZEPARU website.

## **2. REVIEW OF RESEARCH PRODUCTS**

Three ZEPARU working papers were reviewed in detail (on the ZSE, financial inclusion, and regional monetary integration). Detailed comments were prepared on each paper, including suggestions for general improvement and specific changes. The intention is to upgrade the working papers to make them suitable for inclusion as chapters in a proposed ZEPARU book of research results, as well as to upgrade the skills of ZEPARU researchers. One-on-one meetings were held with the researchers and the detailed comments were discussed. The comments were well received.

In general the papers all provided the basis for good quality research products. However, more work would be necessary to improve the writing styles and in some cases carry out some further analysis and correct errors to make the suitable for publication in a book.

It was agreed that following the revision of the papers, Keith Jefferis would carry out a further review prior to finalization.

# APPENDIX: CONSTRUCTION OF A LEADING INDICATOR SERIES FOR ZIMBABWE

## 1. Introduction

Leading indicators are commonly used in developed and larger emerging market economies to predict turning points in economic cycles, particularly cycles in real GDP growth rates. This is useful for policymakers in anticipating possible future policy moves, and more generally for economic agents in expanding the range of information that provides the basis for decision-making. Leading indicators may also be complemented by coincident indicators and lagging indicators – the difference being, as the names imply, whether these indicators lead, coincide with or lag the economic cycle. Whereas leading indicators tend to move in advance of the economic cycle, coincident indicators move in time with the cycle. Both leading and coincident indicators can also play a useful role when GDP data are infrequent or only available with a long delay.

The purpose of this note is to initiate the construction of a leading indicator series for Zimbabwe, to be carried out by ZEPARU. The initial exercise will serve as a “pilot”, with the intention of evolving into a substantive index over time as more macroeconomic data become available, both in terms of a wider range of possible components and longer time series.

The note is structured as follows. Section 2 discusses the principles behind constructing a leading indicator series and the desirable components of the component variables. Section 3, along with Annexes 1 and 2, provides information on leading indicator exercises carried out by the Organization for Economic Cooperation (OECD) and the South African Reserve Bank (SARB). Section 4 proposes how a leading indicator series can be constructed for Zimbabwe, including discussion of potential component variables, while Section 5 lays out the next steps for implementing the proposed leading indicator.

### a. Selection of Leading Indicator Variables

For practical purposes a number of different variables that can act as leading indicators as usually combined into an index of Composite Leading Indicators (CLI). One of the first questions to be addressed, therefore, is which variables should be selected to make up the CLI index. Clearly, the variables selected should behave in the desired manner – i.e., they themselves demonstrate cyclical behavior that reflects the economic cycle, and demonstrate turning points in that precede the turning points in the reference cycle. However, this is not sufficient, and a number of other criteria can be used in the selection process<sup>1</sup>:

#### **Economic Relevance**

*Economic significance*: the observation of a leading relationship between a potential components series and the reference series is not in itself sufficient – an economic justification for the relationship is also needed before the potential component series can be accepted as an indicator.

*Breadth of coverage*: series with a broad coverage of economic activity are preferred to narrowly-defined series.

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<sup>1</sup> Taken from “OECD System of Composite Leading Indicators”, OECD, April 2012

## Practical Considerations

*Frequency:* monthly series are preferred to quarterly.

*Revision:* series that are not subject to significant revisions are preferred.

*Timeliness:* data should be timely, being made available very soon after the period to which they refer.

*Length:* long time series with no breaks are preferred.

Potential leading indicators are classified by the OECD into one of four types of economic rationale, which can be used to assess their suitability as leading indicators.

*Early stage:* indicators measuring early stages of production, such as new orders, order books, construction approvals, etc.

*Rapidly responsive:* indicators responding rapidly to changes in economic activity such as average hours worked, profits and stocks.

*Expectation-sensitive:* indicators measuring, or sensitive to, expectations, such as stock prices, raw material prices and expectations based on business survey data concerning production or the general economic situation/climate e.g. confidence indicators.

*Prime movers:* indicators relating to monetary policy and foreign economic developments such as money supply, terms of trade, etc.

For the evaluation of the statistical behavior of potential candidate series, it is clearly necessary to assess how the indicator series behaves in relation to the reference series. The ultimate reference series is real GDP growth, as the broadest indicator of economic activity. For practical purposes, the OECD favors using an Index of Industrial production (IIP) as the reference cycle. This is because in larger economies, IIP data correlates well with real GDP, and yet is typically available more quickly and more frequently than real GDP.

Once the preliminary selection of indicator variables has taken place, they are then subject to further statistical analysis. This includes seasonal adjustment (if necessary); removing outliers; identifying the cycles in the indicators – through de-trending, smoothing and identification of turning points; normalization (ensuring that the series all have common amplitudes); identifying the length and consistency of the lead (relative to the reference series); and establishing the degree of correlation with the reference series. This will lead to a narrower selection of the most suitable series. A variety of advanced statistical techniques are typically used in these processes.

The indicators must then be aggregated to provide an overall CLI. This raises the question of the weights that should be used in the aggregation. In principle, different components can have different weights, based on an evaluation of their historical influence on the reference series. However, this is not always necessary, and the OECD uses equal weights of indicator series in the CLI aggregation.

## b. An Example: Construction of CLIs for Major OECD Non-Members and New Members and For South Africa

In 2006 the OECD undertook an exercise to construct CLI series for major non-member countries and for some of its new members. The first group included Brazil, China, India, Indonesia, Russia and South Africa, and the second group Korea, New Zealand, Czech Republic, Hungary, Poland and the Slovak Republic. Most of these countries have a large number of data series available, and an interesting outcome was that the selection of component series for the CLI varied a great deal across the different

countries. Typically six data series are used in compiling the CLI. The series chosen for each country are shown below. Across all of the 12 countries, the series chosen can be broadly classified as follows:

*Early stage:* production measures (basic goods, intermediate goods, fertilizer, non-ferrous metals); order inflows; cargo handled at ports; building plans approved;

*Expectations sensitive:* business expectations and confidence surveys; share prices; price expectations;

*Prime movers:* exchange rates; interest rates; money supply

*Rapidly-responsive:* hours of work, vacancies and unemployment; stocks; sales (retail, motor vehicles); exports, imports

The most commonly used measures are: share prices (8); business confidence/expectations (7 countries); interest rates (7); money supply (7); and trade measures (5).

## CLI Components in Major OECD Non-Member Countries and New OECD Member Countries

	Brazil	China	India	Indonesia	Russia	South Africa	Korea	New Zealand	Czech Rep	Hungary	Poland	Slovak Rep
<b>Early stage</b>												
Building plans approved						X						
Production measures	X	XX	XX								X	
<i>Basic goods</i>			X									
<i>Intermediate goods</i>			X									
<i>Chemical fertilizer</i>		X										
<i>Non-ferrous metals</i>		X										
<i>Semi non-durable goods</i>	X											
<i>Coal</i>											X	
Cargo handled at ports		X										
Imports from Asia		X										
Order inflow, mfg						X						
Demand level, mfg					X							
<b>Expectations-sensitive</b>												
Business confidence /expectations	X		X				X	X		X	X	X
Consumer confidence								X				
Share price index	X		X	X	X	X			X	X		X
Price expectations, consumers									X			
Sales price expectations, industry									X			X
<b>Prime Movers</b>												
Exchange rate – REER											X	
Exchange rate, USD (inverted)			X	X								
Interest rate measures			X	X		X	X	X		X	X	
<i>Long-term bonds</i>							X					

	Brazil	China	India	Indonesia	Russia	South Africa	Korea	New Zealand	Czech Rep	Hungary	Poland	Slovak Rep
<i>3-month T-Bill</i>								X				
<i>Deposits, inverted</i>			X									
<i>Call, inverted</i>				X								
<i>Central bank base</i>										X		
<i>Spread</i>						X						
<i>3 month interbank</i>											X	
Money supply M2		X			X		X		X			
Money supply, M1			X					X		X		
Prices - crude oil					X							
Terms of trade	X											
<b>Rapidly-responsive</b>												
Hours of work (mfg)										X		
Unemployment (inverted)								X		X		
Vacancies											X	
Stocks - finished goods							X		X			
Stocks – mfd goods							X					
Sales – motor cars						X						
Sales – retail								X	X			X
Net trade					X							X
Exports	X			X								
Imports				X						X		
<b>Other</b>												
Enterprise deposits		X										
BOP, Capital & financial accounts							X					

The South African Reserve Bank (SARB) has constructed series of leading indicators for many years, and details of the component variables are shown below.

Criteria for including a data series in the CLI (SARB Quarterly Bulletin, March 2004)

- 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.
- The timeliness of the data.

The construction of the CLI was changed in 2004. The new CLI components were as follows:

<b>Component</b>	<b>Specific Measure</b>
Opinion survey of volume of orders in manufacturing	
Opinion survey of stocks in relation to demand: manufacturing and trade	
Opinion survey of business confidence: manufacturing, construction and trade	
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	Six-month smoothed growth rate
Real M1 money supply (deflated with the CPI)	Six-month smoothed growth rate
Prices of all classes of shares	Six-month smoothed growth rate
Number of residential building plans passed for flats, townhouses and houses larger than 80m <sup>2</sup>	
Interest rate spread	10-year bonds less 91-day Treasury bills
Gross operating surplus	as a percentage of gross domestic product
Labor productivity in manufacturing	Six-month smoothed growth rate
Job advertisements in the <i>Sunday Times</i> newspaper	Areas of job advertisements in square centimeters, six-month smoothed growth rate
Opinion survey of the average hours worked per factory worker in the manufacturing sector	

The previous CLI series had more components (21 rather than 13 in the new series). The other components used previously were:

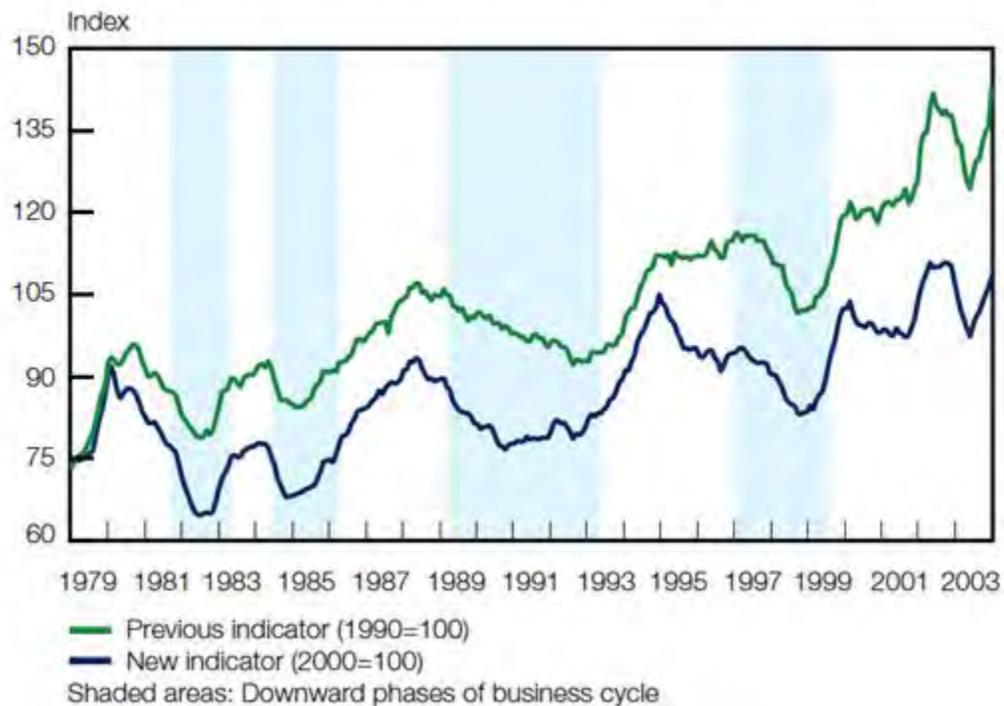
- Treasury bill discount rate
- Number of new motor vehicles sold
- Physical volume of mining production, excluding gold
- Physical volume of gold ore milled
- Value of merchandise exports, excluding gold and agriculture
- Net number of new companies registered

- Number of real-estate transactions
- Net gold and other foreign exchange reserves
- Consumer credit at constant prices
- Gold price in rand

According to SARB, these components had performed well in the past but were dropped from the revised index due to either data availability problems, or because they had a less reliable relationship with the underlying business cycle. This in turn reflected the changing nature of the economy. Also, the fact that the new CLI has 13 components compared to 21 previously makes it more tractable.

The chart below (from SARB) shows the old and new CLI series, and business cycle phases.

Graph 1: Composite leading business cycle indicator



## 1. Construction of a Composite Leading Indicator for Zimbabwe

Constructing a leading indicator series for Zimbabwe is a challenge, for a number of reasons. First, availability of economic data – in terms of the number of variables for which data is compiled and published – is very limited. Second, the economy experienced a structural break with the era of hyperinflation and the introduction of the multicurrency system in 2009. The behavior of the economy on each side of the structural break was quite different. Third, as a result of the structural break, the duration of most economic data series is very limited, and the long-term behavior of different potential variables cannot be assessed. Fourth, GDP data are only produced annually, and hence there is no reference series that can be used to cross check the correlation with potential leading indicators.

Furthermore the quality of the GDP data series is questionable, as it is based on weak statistical foundations<sup>2</sup>.

Despite the statistical shortcomings, the construction of a composite leading indicator series for Zimbabwe can still be a useful exercise. Data series may be short, but nonetheless there is information content that can be utilized. Indeed the lack of statistical information means that any new information has value. A CLI series can therefore be particularly useful in Zimbabwe given the absence of uncertainty over many other data series. This initial exercise will in any case be a pilot project, which can be refined over time as new data become available and as a longer time series for component indicators enables the calibration of the CLI series to be refined.

The following steps can be taken to construct a CLI series.

1. Review the availability of relevant data series, in terms of the established criteria, and make a preliminary selection. The selection criteria should include economic significance, availability, frequency, and timeliness.
2. Compile the data series for the selected variables (from February 2009 onwards) from published sources.
3. Approach other potential sources for unpublished data, and compile data series.
4. Choice of reference series: in the absence of quarterly GDP data, the reference series may have to be a narrower variable, such as the Index of Manufacturing Volume
5. Carry out the relevant transformations, i.e. calculating growth rates, searching for outliers, normalization, identifying peaks and troughs and time-shifting.
6. Compile the aggregate CLI series (backdated as far as possible).
7. Repeat the exercise on a quarterly basis

#### a. Availability of Economic Data Series

At the time of writing, the availability of published economic data series for Zimbabwe is quite limited, and broadly consists of the following groups of data series:

Series	Frequency	Lag (months)	Source
Inflation	Monthly	2	ZIMSTAT
Money supply	Monthly	2	RBZ
Banking sector	Monthly	2	RBZ
Interest rates	Monthly	2	RBZ
Payments system	Monthly	2	RBZ
Stock exchange indices	Monthly	0	ZSE
Fiscal revenues & expenditure	Monthly	2	MOF
Commodity imports & exports	Monthly	2	ZIMRA/

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<sup>2</sup> Such as an out-of-date sampling frame for firm questionnaires, and hence a low response rate. These issues are being addressed by ZIMSTAT, but it will take time for a high quality quarterly GDP series to be available.

			ZIMSTAT
GDP	Annual		ZIMSTAT
Volume of manufacturing index	Monthly		ZIMSTAT
Business tendency survey	3 x a year		ZIMSTAT
Tobacco sales	Annual		TIMB
Crop forecasts	2-3 times a year		

Several of these (or components thereof) are likely to be suitable for inclusion in the CLI. Further consideration is needed of exactly which variable should be used within a broad heading (e.g., which interest rate or money supply measure?). This is discussed further below.

There may also be reason to include other data series from international sources or unpublished domestic sources. Possibilities include the following:

*International - published*

Gold & platinum prices

*Domestic - unpublished*

Mining output

Tobacco sales

Electricity sales

Sales by major retailers

Passenger arrivals – international airports

Building plan approvals

Motor vehicle registrations

New company formations

In the past ZIMSTAT has published a comprehensive set of economic and other data in the Quarterly Digest of Statistics (QDS). ZIMSTAT has indicated that the re-launch of the QDS is imminent, and a further assessment of the availability of data can then be made.

## **b. Data transformation**

The raw data series cannot be used directly for inclusion in a CLI series, which is essentially based around projecting GDP growth rates. The first transformation is therefore to calculate the growth rates of the chosen CLI components. This could be annual growth, quarterly growth or something in between – the SARB series generally uses 6-month growth rates. The choice of time period for the growth calculation will depend on an examination of the different growth rates – short-term growth calculations may be too volatile to be of any use. The decision can best be made after a visual examination of the calculated series.

The growth rates then need to be normalized to give the cycles a common amplitude. This could be done by using a manual scaling factor derived from a visual examination of the magnitude of the cycles of individual series, or by scaling using standard deviations (calculating the standard deviation for the

series, and then dividing the calculated growth rates by the standard deviation). In both cases it may be necessary to remove outliers.

The series then need to be examined for peaks and troughs. Ideally, this can then be used to identify the “lead” factor, i.e. by how many months or quarters does the indicator series lead the reference series? Initially, the Volume of Manufacturing Index should be used as the reference series. Ideally, the individual series will have a consistent lead, in which case each series can be shifted in time to put them all on a common cycle.

Finally the series need to be aggregated, which should initially be done through an equal weighting of the component series – although this may need to be adjusted when a longer time series is available, and the tracking of the reference series can be assessed.

### c. Assessment of potential CLI components.

A preliminary assessment of potential economic series for inclusion in the CLI is provided on the following pages.

**Commentary on Potential Variables to be Included in a CLI for Zimbabwe**

<b>Variable/ categorization</b>	<b>Linkage</b>	<b>Availability/ frequency/ timeliness</b>	<b>Comment/ Suitability</b>	<b>Data quality</b>
<b>Early Stage</b>				
Capital/intermediate goods imports	Proxy for investment, determinant of future productive capacity (capital goods) or indicator of production to come (intermediate goods)	Available from ZIMRA/ZIMSTAT on request Monthly T+2	Need to determine which specific categories of imports are to be included. HIGH	Good – based on customs declarations
Building plan approvals	Indicator of future investment in property, reflects	Previously published in QDS. May be included in new QDS – frequency and lag to be determined	Reconsider when new QDS published MED	Should be good – based on all approvals, but quality depends on source data at local authorities
Company registrations	Indicator of future business activity	Not clear, depends on progress with computerization of registration process	To be considered when computerized MEDIUM	Should be good when computerized – based on actual registrations
International passenger arrivals, major airports	Reflects a variety of factors including (i) tourism activity; (ii) level of confidence in the economy (visiting investors); (iii) diaspora visits; (iv) international travel by residents	Previously published in QDS. May be included in new QDS – frequency and lag to be determined. Otherwise, collect from Civil Aviation Authority of Zimbabwe (CAAZ)	Initially obtain from CAAZ. HIGH	Good – record of actual traffic
Investment approvals	Indication of intended investment in new productive capacity	Zimbabwe Investment Centre Availability/ timeliness/	To be determined. Consider whether enquiries might be an alternative, if recorded	May be highly volatile

<b>Variable/ categorization</b>	<b>Linkage</b>	<b>Availability/ frequency/ timeliness</b>	<b>Comment/ Suitability</b>	<b>Data quality</b>
		frequency to be determined	MED	
<b><i>Expectations-sensitive</i></b>				
Share prices	Share prices reflect expectations of future profits, which depend on future growth. Share prices may also be driven by other factors such as the political environment regarding indigenization, foreign investment etc., which also relate directly to future growth prospects. However note that during hyperinflation, share prices got out of line with economic fundamentals as shares were mostly bought as a store of value rather than for future profits.	Daily, no lag, available directly from ZSE	HIGH	Good
Business confidence/ expectations	A very important and widely used component of CLIs as it is forward looking and relates directly to the private sector. Relates to investment intentions and production/sales expectations, gives picture of business climate.	ZIMSTAT collects on 4-month cycle (problematic), with long delay (2 years?)	Needs dramatic improvement in timeliness of publication. Also move to quarterly cycle. LOW	Probably poor, with low response rates and poor sampling
<b><i>Prime movers</i></b>				
Money supply (M3)	MS=bank deposits, which are the main determinant of bank lending. Increase in MS precedes and increase in lending, which will help to rebuild productive capacity	Published by RBZ Monthly T+2	May be wise to try a real M3 growth as an alternative to nominal HIGH	Good (based on returns from financial institutions)
Interest rates	Influences cost of capital and hence investment	Published by RBZ Monthly	Use weighted average bank lending rate as	Medium (based on returns from

<b>Variable/ categorization</b>	<b>Linkage</b>	<b>Availability/ frequency/ timeliness</b>	<b>Comment/ Suitability</b>	<b>Data quality</b>
		T+2	published by RBZ. HIGH	financial institutions, but may be influenced by weighting process).
Gold & platinum prices	Important determinant of export earnings (and possibly government revenues). Influences ability to import. Affects future investment in mining output both through profit expectations (higher/lower prices) and financing of investment.	International sources Monthly No lag	Consider using futures price (e.g. for 3 month ahead delivery) rather than spot HIGH	Good (actuals)
<b><i>Rapidly-responsive</i></b>				
Electricity consumption	Should be closely correlated with output. However, may be more of a coincident indicator than a leading indicator.	Previously published in QDS. May be included in new QDS – frequency and lag to be determined. Otherwise, collect from ZESA.	Better to have business consumption (agric./mining/mfg.) and separate out households HIGH	Good quality data, single source, accurately measured.
Fuel imports	Should be closely correlated with output. However, may be more of a coincident indicator than a leading indicator.	Available from ZIMRA/ZIMSTAT on request Monthly T+2	MED	Good – based on customs declarations
Motor vehicle registrations (goods vehicles)	Should be closely correlated with output and spending power (incomes). Data on goods vehicle registrations should be better as a leading indicator	To be determined – depends whether computerized. Also timeliness and coverage	Needs investigation of availability MED	Good
Retail sales	Commonly used internationally	Previously published in QDS. May be included in	LOW	Probably poor, depends on survey

<b>Variable/ categorization</b>	<b>Linkage</b>	<b>Availability/ frequency/ timeliness</b>	<b>Comment/ Suitability</b>	<b>Data quality</b>
		new QDS – frequency and lag to be determined.		quality
Index of manufacturing production volume	In principle it could be useful although it may be better to act as the reference indicator	Published by ZIMSTAT. Monthly T+6 (?)	MED	Probably poor, depends on survey quality
PAYE receipts	Depends on employment, which should respond rapidly to output changes, and may also have a forward looking element as employers hire in response to improved prospects	Available on request from MOF Monthly T+2	HIGH	Good
Payments system – ZETSS	Payment system turnover (both volumes and values) should respond rapidly to the level of economic activity	Values published by RBZ Monthly T+2	Obtain both volumes and values HIGH	Good

### Summary of Suitability

<b>HIGH</b>	<b>MED</b>	<b>LOW</b>
Capital/intermediate goods imports	Building plan approvals	Business confidence/expectations
International air passenger arrivals	Fuel imports	Retail sales
Share prices	Motor vehicle registrations	
Money supply (deposits)	Index of manufacturing volume	
Gold & platinum prices	Investment approvals	
Interest rates (lending)	Company registrations	
Electricity consumption		
PAYE receipts		
Payment system – ZETSS		

## 2. Implementation of a CLI Based on Available Data

Following the review of data series and availability for inclusion in a Composite Leading Indicator calculation, a dataset has been compiled by ZEPARU. On the basis of this dataset, an assessment was made of the variables that should be included in the preliminary CLI calculations.

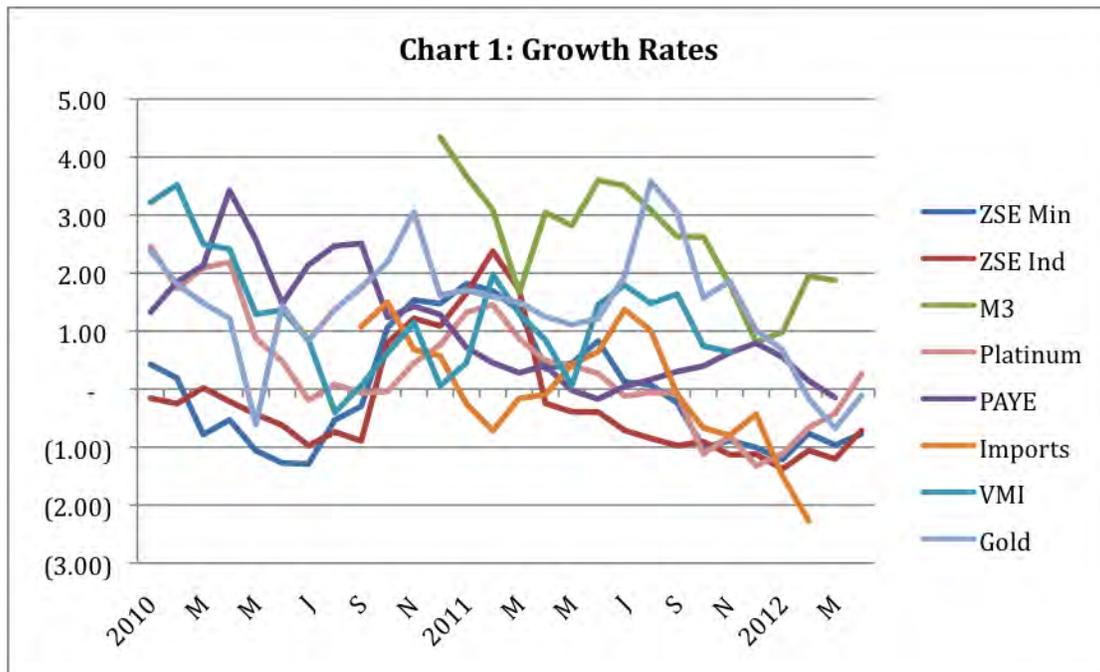
### Availability of Indicator Series

<b>Variable/ categorization</b>	<b>Time period available June 2012</b>	<b>Comment</b>
<b>Early Stage</b>		
Capital/intermediate goods imports	Monthly, Jan 2010-Dec 2011 (24 obs)	Include
Building plan approvals	N/A	Exclude N/A
Company registrations	N/A	Exclude N/A
International passenger arrivals, major airports	Monthly, Jan 2010-Mar 2011 (15 obs)	Exclude, time series too short
Investment approvals	N/A	Exclude N/A
<b>Expectations-sensitive</b>		
Share prices	Monthly, Jan 2009 – Apr 2012	Include
Business confidence/ expectations	N/A	Exclude N/A
<b>Prime movers</b>		
Money supply (M3)	Monthly, June 2010-April 2012 (23 obs)	Include
Interest rates	Monthly, Mar 2009 – Mar 2012 (37 obs but two missing)	Include
Gold & platinum prices	Monthly, Jan 2008 – April 2012 (52 obs)	Include
<b>Rapidly-responsive</b>		
Electricity consumption	N/A	Exclude N/A
Fuel imports	Monthly, Jan 2010-Dec 2011 (24 obs)	Include
Motor vehicle registrations (goods vehicles)	Annual only	Exclude, unsuitability periodicity
Retail sales	N/A	Exclude N/A
Index of manufacturing production volume	Monthly, Jan 2009 – Sep 2011 (33 obs)	Include
PAYE receipts	Jan 2009 – April 2012 (40 obs)	Include
Payments system – ZETSS	Jan 2011 – Feb 2012	Exclude, time series too short

The following steps were then followed to compile the CLI.

1. Transfer data from source database into a new spreadsheet with a common format and aligned date-wise (i.e. monthly). This may involve changing units (e.g. from USD to USD millions) to make more tractable.
2. Calculate a CPI series, with Dec 2008=100 base, using the m-o-m inflation data. Using this, calculate real M3, real PAYE receipts and real bank lending interest rates.
3. Convert monthly data to quarterly data. For flow data (e.g. PAYE receipts, trade, output etc.) this involves calculating a moving average over the quarter (the current month and the previous two months) in any particular month. Stock and price data are left untransformed, although a judgment may later be necessary as to whether quarterly moving averages should be used, if the end-of-month/quarter data are excessively volatile.
4. Calculate annual and six monthly growth rates (in separate spreadsheets) of all variables except for inflation and interest rates.
5. Calculate a composite metals price growth rate, being a simple average of the growth rates of gold prices and platinum prices. This reflects Zimbabwe's two major metals exports, which have approximately equal export values.
6. Plot charts of the annual and six-monthly growth rates of key variables.
  - a. ZSE indices
  - b. Money supply (deposits) and real M3
  - c. Imports
  - d. Metals prices
  - e. Other (ZETSS, PAYE, VMI)
  - f. Interest rates and inflation (levels)
7. A visual inspection reveals that there are missing observations for the bank weighted average lending rate November, December 2010 and February 2011. The observation for ZETSS in October 2011 appears wrong. *These have been replaced by estimated values while source data are checked.*
8. Assessments can now be made of the suitability of the various data series for inclusion in a leading indicator:
  - a. The two ZSE indices move closely together, with the industrial index appearing to display more pronounced cyclical behavior
  - b. The various measures of money supply (bank deposit) growth appear to be quite volatile although the total deposits measure is more stable, and hence preferred as the basis for calculating real monetary growth.
  - c. The ZETSS series is too short to be of use at present (but may become more useful in future with a longer time series)
  - d. The three import growth rates move very closely together, hence only one rate needs to be used. The initial preference is for imports of intermediate goods.
  - e. Gold and platinum prices appear to move independently.

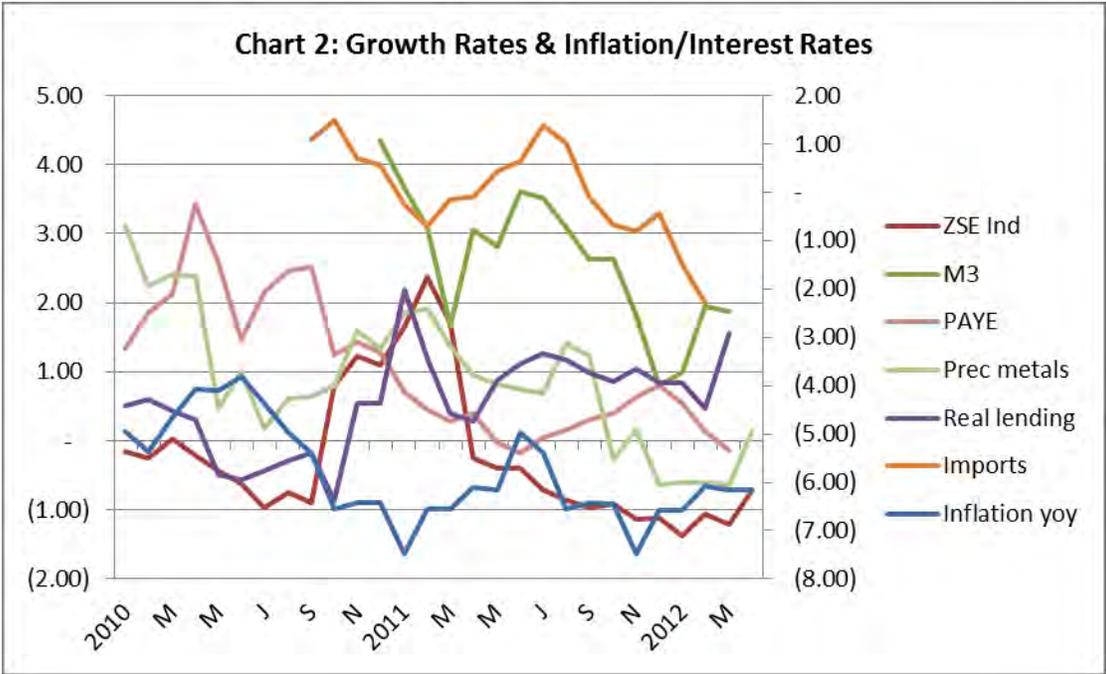
- f. The bank lending rate appears to have more information content than the deposit rate.
9. We therefore conclude that the following variables should be examined more closely for consideration for inclusion in the leading indicators index:
- ZSE mining and/or industrial indices (growth rates)
  - Real M3 (total deposits) (growth rate)
  - Real PAYE receipts (growth rate)
  - VMI (growth rate)
  - Imports of intermediate goods (growth rate)
  - Gold and/or platinum prices (or a composite) (growth rate)
  - Bank lending rate
  - Inflation rate (year-on-year)
10. Given the short data series, it is preferable to use 6-month growth rates, as this will give additional observations based on the source data. It should also be more sensitive to turning points, but not as subject to noise volatility as quarterly growth rates.
11. The data are then normalized by dividing each observation by the standard deviation of the series. Inflation and interest rates are multiplied by minus 1 as high inflation and interest rates create negative growth conditions.
12. The data series are then plotted together for visual inspection (Chart 1). This enables us to identify that there is a broad pattern of declining growth through the first 3 quarters of 2010, and increase through to the first quarter of 2011, a decline through to the end of 2011, and a small upturn early in 2012.



13. Correlation coefficients were calculated for all pairs of variables, shown in the table below.

	ZSE Ind.	Real M3	Lending rate (real, -)	PAYE receipts	Inflation	Imports	VMI	Gold	Platinum	Precious metals avg.
ZSE Mine	86%	69%	28%	-24%	-40%	43%	-5%	46%	42%	54%
ZSE Ind.		45%	10%	1%	-25%	18%	3%	27%	55%	57%
Real M3			23%	6%	26%	62%	-14%	39%	66%	70%
Real lending rate				-64%	-58%	-25%	14%	12%	-6%	1%
PAYE receipts					63%	30%	10%	-5%	44%	34%
Inflation						37%	33%	-24%	40%	24%
Imports							-8%	62%	31%	50%
VMI								15%	65%	70%
Gold									17%	

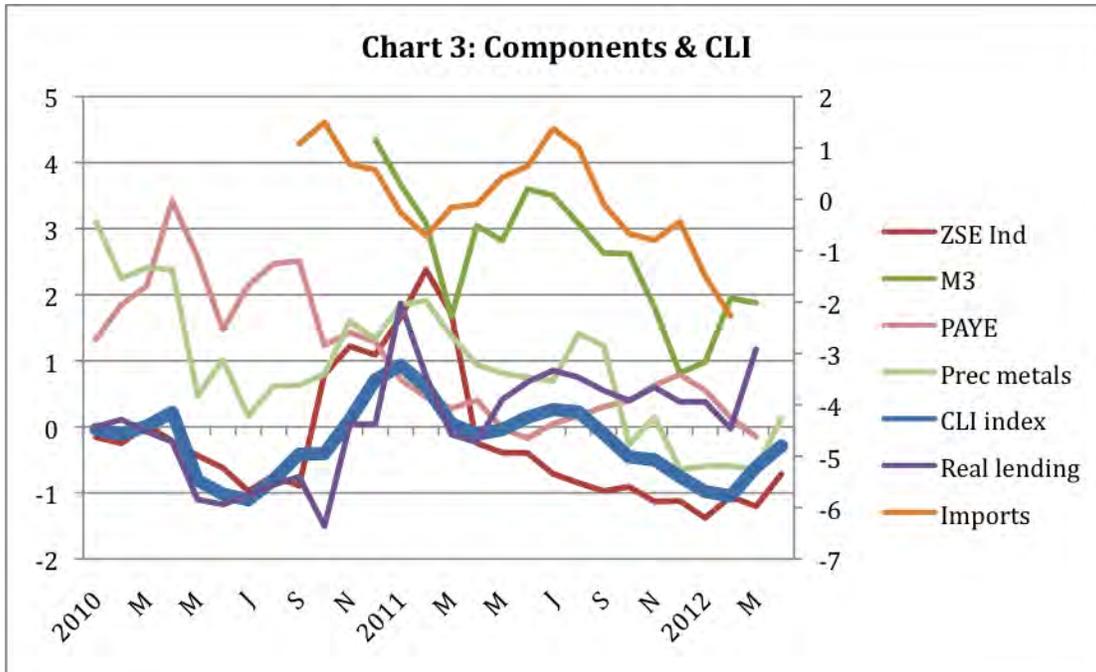
14. From the correlation coefficients it is evident that three series are not closely correlated with the others – PAYE receipts, the ZSE industrial index and the real bank lending rate. However, economic theory suggests that these should be important indicators or drivers of economic activity. Furthermore, it would not be wise to place too much reliance on correlation coefficients alone, especially as the period under review was one of stabilization and adjustment. Combining statistical results and economic judgment we therefore include all of the economic variables except for the VMI, which has a short data series that does not continue into 2012 (unlike all of the others), in Chart 2, and add the series for lending rates. We include the composite precious metals price rather than gold and/or platinum independently, and the ZSE industrial index rather than the mining index, as the former is much broader and the latter is to a large extent driven by metals prices, which are included directly.



15. The final grouping of data series for inclusion in the CLI series is therefore:

- a. ZSE industrial index (growth rates)

- b. Real M3 (growth rate)
  - c. Real PAYE receipts (growth rate)
  - d. Imports of intermediate goods (growth rate)
  - e. Composite precious metals prices (growth rate)
  - f. Real bank lending rate
16. The CLI series is then calculated as a simple average of the 6 chosen series. Chart 3 shows the 6 component series and along with the CLI.



17. The next step is to identify turning points in the cycles of the different series, and if necessary shift the series forward or backwards to achieve cycle consistency. Although turning points can be tentatively identified, there is no obvious pattern that will enable cycle-consistency to be achieved. This can be attempted when a longer and more consistent time series, and perhaps more component series, are available.
18. The CLI and the component series should also be compared with the real GDP data series, as it is this that the CLI series should lead. However, this requires a reasonable period of quarterly GDP data, and such a comparison – which will also enable a clearer focus on leading (rather than coincident or lagging) indicators will take some time, in the absence of such a GDP data series.
19. In the meantime, the database should be updated on a monthly basis, and the calculations and the CLI series also updated monthly. Effort should also be made to obtain data on other desirable series for possible inclusion.