INDICATOR APPROACH TO BUSINESS CYCLE FORECASTING IN INDONESIA

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IN INDONESIA

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Statement of Originality

The work described in this Final Year Project, entitled “Indicator Approach to Business Cycle Forecasting in Indonesia” is to the best of the author’s knowledge that of the author except where due reference is made.

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ABSTRACT

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By

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This study aims to investigate the business cycles in Indonesia by attempting to construct two composite leading indicators (CLI), namely, BCI1 and BCI2 (for the common reference series of business cycle, Industrial Production Index (IPI) and real Gross Domestic Product (GDP) respectively) using monthly data to predict the business cycles in Indonesia. The constructed BCI1 which uses IPI as reference series successfully predicted all downturns in the industrial sector reasonably from 2004M1 to 2014M11. On the other hand, the constructed BCI2 which uses real GDP as reference series also correctly predicted all downturns of the Indonesian economy from 2000M3 to 2014M11. Both BCI1 and BCI2 can be utilized in different ways for the economy of Indonesia. Hence, policymakers, businesses, investors should consider using the BCI1 and BCI2 as early indicators to predict the direction of the industrial sector and the economy of Indonesia.
ABSTRAK

PENDEKATAN PENUNJUK UNTUK MERAMAL KITARAN PERNIAGAAN DI INDONESIA

Oleh
Lim Ken Jing

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1.0 Introduction

Periods of expansion and contraction of an economy are known as the business cycle. The business cycle can be categorized into four phases, expansion, peak, contraction, and trough (Boundless, 2014). Real output increases during the expansion phase, the peak or boom phase will then ensue with fast economic growth that is likely to be inflationary and unsustainable. In the next phase, the contraction or recession phase takes place whereby growth rate shows down, signalling the trough or depression phase of which there is negative growth and the fall of real output. After the trough phase, the cycle will then repeat itself. Figure 1.1 below illustrates this four phases.

Figure 1.1: The Four Phases of a Business Cycle

Expansion    Boom    Recession    Depression

Source: Boundless, 2014.
The reason for the occurrence of business cycles is unclear. Romer (2008) mentioned that business cycle occurs when disturbances pushes the economy to exceed or go below its full employment. One example of disturbances includes surges in private and public spending which result in inflationary booms. The movement of interest rates which is controlled through the monetary policy is also another possible cause of business cycles (Romer, 2008). These disturbances affect the spending and investment decisions of firms and consumers.

A volatile business cycle is deemed bad for the economy. Hence, the business cycle is an important field to be studied. Some of the problems resulting from the fluctuations in business cycle are vast wastage of resources and high unemployment rate during recessions and the rise in government spending, resulting in high debt. There are two conflicting views about recessions among economists. Some economists are of opinion that recession is good because it filters out inefficient firms, leaving only the efficient firms. On the other hand, other economists argue that it forces some efficient firms out which leads to loss of productivity.

Considering that the downturn of the economy results in numerous complications, the government tend to make use of the monetary and fiscal policy to minimize the volatility of the business cycle and the negative outcomes arising from it. However, the usage of monetary and fiscal policy cannot effectively to regulate the business cycle due to three problems (Sprinkle 1986). The three problems are observation lag, execution lag, and impact lag. Hence, a proper tool or indicator to forecast the business cycle is needed in order to minimize the problems arising from the usage of monetary and fiscal policy.
In order to overcome these problems, the information underlying the movement of a set of leading indicators have to be interpreted in order to help gain a rough idea on where the economic condition of a country is headed to. This tool is known as the composite leading indicator (CLI). The CLI provides information to predict the turning points for the business cycle and hence gives policy makers, investors, businessmen and other stakeholders to have an insight of the future of the business cycle. This gives opportunities for the stakeholders to control potential crises that might lead to recessions.

1.1 Background of the study

1.1.1 The Business Cycle

The pioneers of the study of the business cycle, Arthur Burns and Wesley Mitchell wrote the book about business cycles entitled “Measuring Business Cycles” in 1946. Burns and Mitchell (1946) broke down the business cycle into the sequence of expansion, recession, contraction, and revival. They described the sequence of changes of business cycle as “recurrent but not periodic” (Burns and Mitchell, 1946, p.3). This means that the business cycle repeats itself but the length or period of the business cycle is not fixed. It could vary from a few months to several years. Burns and Mitchell’s defined business cycle as:

“...a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities,
followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of change is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own.” (p. 3)

From the definition, it can be implied that the fluctuations in the aggregate economic activity along with the co-movement between many economic activities that lasts for more than a year is a feature of business cycle.

1.1.2 The Developments in the Study of Business Cycle

The study of business cycle began following the disaster of the Great Depression around the 1930s. In the beginning, the research of the business cycle was mainly conducted in the US by the National Bureau of Economic Research (NBER) by Burns and Mitchell. This research is the starting point for the study of business cycle using the indicator approach. Since this study, other researches regarding the business cycle indicators for NBER were carried out by Geoffrey H. Moore, along with Charlotte Boschan, Gerhard Bry, Julius Shishkin, Victor Zarnowitz, and others affiliated with the NBER (The Conference Board, 2000). NBER has developed numerous leading indicators over the years and constructed a Composite Index of Leading Indicators (CILI). The construction of the CILI is based on the foundation that a single indicator cannot predict the turning points of the business cycle more effectively than an aggregation of indicators because the overall activity cannot be explained by one indicator.
In 1961, the U.S. Government started publishing a monthly report known as the Business Cycle Developments which utilized the time-series charts of NBER indicators extensively. This report is carried out in cooperation with the NBER and the President’s Council of Economic Advisors and was renamed Business Conditions Digest in 1968. These indicators were moved to the Bureau of Economic Analysis (BEA) in 1972.

Around the 1970s, the oil price shocks that caused wide fluctuations in output and price led to the resurgence of interest in the business cycles and growth cycles. This is the time when a greater variability in real income growth rates were experienced by the major market economies, putting an end to the long sustained growth and uninterrupted growth after World War 2. The leading indicator approach was then extensively applied through to development of growth theories along with the business cycle approach (Mohanty, Singh & Jain, 2003). This leading indicator approach provides early signals for the turning point of the economy or early signals of recession or recovery which is useful for policy making. This property of the leading indicator resulted in the prominent interest from policymakers, investors and the business community.

In 1990, the Business Conditions Digest is then integrated as a section into a publication of the BEA which is known as the Survey of Current Business (SCB). In 1995, The Conference Board (TCB) took over the research program and production of the business cycle indicators from the BEA. To date, TCB is still in charge of the leading indicators in U.S. In addition to United States, the BCI for Mexico, France, the United Kingdom, South Korea, Japan, Germany, Australia, and Spain are also
released by TCB. Besides TCB, other institutions that also contribute to the study of leading indicators are the Centre for International Business Cycle Research (CIBCR), Economic Cycle Research Institute (ECRI) and the Organisation Co-operation and Development (OECD).

This leading indicators approach was criticised for lacking a sound economic foundation (Koopmans, 1947). However, the developments in study of the leading indicators have led to the defence of this approach (De Leeuw, 1991, Yap, 2001 & OECD, 2012). They listed a few economic reasons on why the leading indicator, some of the justifications include prime movers, market expectation and production time. As of today, current researches on the leading indicators focus on the development of noble methods that is in accordance to the developments in economic theory and time series analysis, the formulation of better methods to forecast the performance of the indicators and the determination of turning points of the business cycle and many more.

1.1.3 Approaches to the Measurement of Business Cycle

There are 3 different approaches to the measurement of business cycle fluctuations: the classical business cycle, the growth cycle, and the growth rate cycle (also known as acceleration cycle).

The study of business cycles began with the concept of classical business cycles. In this concept, the business cycles are measured through the absolute changes of economic indicators. This means that expansion phases are phases experiencing positive growth rates whereas recession phases are phases experiencing negative
growth rates. The construction of the composite indices based on The Conference Board methodology uses this approach to its business cycle study. Although this approach is most simple and accurate it is noted that a long term slowdown of economic growth can cause more harm to the economy than recession itself which can be proven by many countries (Klucik & Haluska, 2008). In addition, in the 1960s, major economies only experience slowdown on the economic growth during real decline in economy activities. The economy of these countries continued to grow in absolute terms but with lower pace. Hence, the practicality of the classical business cycle in analysing business cycle was questioned.

The need for a business cycle that is more in aligned with reality led to the development of the growth cycle approach (Mintz, 1969). This growth cycle approach is the deviation from the actual growth rate of the economy that is observed as up and down movements from its long run trend growth rate. For this approach, the contractionary phases are phases that are experiencing a decline in growth rates whereas expansionary phases are phases that are experiencing an increase in growth rates. The OECD methodology utilizes this approach in the construction of composite indices.

For the other approach, the growth rate cycle, the contraction phase is the change from acceleration to deceleration in the rate of growth whereas the expansion phase is change from deceleration to acceleration in the rate of growth. In other words, the cyclical ups and downs in an economic activity’s growth rate are reflected in the growth rate cycle (Mohanty, Singh & Jain, 2003). This approach is utilized by the Economic Cycle Research Institute (ECRI) in their study of the business cycle.
These different approaches emerged due to the changing nature and pace of the expansion and contraction phases of the business cycles in different economies (Mohanty, Singh & Jain, 2003). Nonetheless, all the different measurements of the business cycle have the one common feature. The common feature of these measurements is that they all reflect the comovement of various indicators with the economic activity of an economy.

1.1.4 Reference Series for Business Cycle

In order to study the business cycle, a reference series or target variable is required to be used as a representation of the aggregate economic activity. In other words, the reference variable or the target variable is the variable to be forecasted in the study of CLI. The most frequently used reference series is real gross domestic product (GDP) or the industrial production index (IPI). Both these variables have its pros and cons. The real GDP is the recommended reference series to be used because it is the broadest measure of economic growth and hence is most suitable to represent the business cycle. However, the GDP is only available on a quarterly basis which limits the frequency or observation. The IPI on the other hand, is available on a monthly basis. IPI allows a greater precision when it comes to the calculation of correlations compared to GDP (Tsalinski & Kyle, 2000). However, IPI differs from the GDP through the coverage of the variable. This means that IPI does not cover as many areas or sectors compared to GDP. Sectors such as the service sectors and agricultural sectors are not included in IPI.
1.1.5 Reasons for Composite Indices Application

There are three reasons on why composite indices are used. The reasons given are as follows:

i. When it comes to the business cycle, there is no single proven and acceptable reason for it. The downturns and contractions, upturns and expansions are results of a number of probable and not mutually exclusive hypotheses. Based on this reasoning, depending on the dominance of causal elements and the way their working manifests, the individual indicators performs differently at any given time. Hence, it is suggested that a “reasonably diversified group of leading series with demonstrated predictive potential” (Zarnovitz, 1992, p. 316) is used to raise the probability of obtaining true signals and lower the chances of getting false signals (Zarnovitz, 1992).

ii. Individual indicators are often hampered with large measurement errors particularly most recent observations based on preliminary data. By evaluating the signals of a number of related series and not viewing any one series in isolation, the risk of being misled can be reduced. It is however noted that the related series picked must be differentiated sufficiently and not be different measurements of the same variable. This is done to avoid over weighting of some elements in the index which happens through multiple counting.

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1 The explanation for this section is adapted from Zarnovitz (1992).
iii. By combining series, "pure noise" can be reduced and the predictive capability can be enhanced. This is because indicators also react to frequent disturbances besides sustained cyclical fluctuations. This means short unpredictable movements are more likely to persist in month-to-month changes in the series after seasonal elements is removed compared to longer cyclical ones. Hence, combining a series into an index will eliminate some of the noises and as a result, composite indexes can smoother than any of its components.

1.1.6 Approaches in the Construction of Composite Indices

Following the study of Burns and Mitchell, many studies were done involving the business cycle. The numerous attempts to measure and forecast business cycles can be classified into two approaches. These approaches are the traditional indicator approach and the modern time series econometrics approach. The traditional indicator approach involves constructing business cycle indices after categorising economic indicators into leading, coincident and lagging series. This approach is also known as the non-parametric approach. The leading index functions as a tool to forecast turning points whereas another two indices, the coincident and lagging indices are used to recognise and confirm the turning points of a business cycle.

On the other hand, the modern time series econometrics approach involves using time series econometrics to measure and forecast the business cycle. This approach is also known as the parametric approach. This approach plays the role of estimating the business cycles model or calculating the likelihoods that turning points will happen in a business cycle phase. Among the models used for the modern time

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2 The discussion in this section is adapted from Katsuura (1999).

1.2 Background of Indonesia

1.2.1 Economy of Indonesia

Apart from 1997-1998 Asian Financial Crisis contraction, the economy of Indonesia has grown drastically over recent decades. Due to the growth pace, Indonesia is increasingly playing an important role in the global economy. On purchasing power parity (PPP), its economy is ranked 4th in East Asia (after China, Japan and South Korea) and 15th in the world (Elias & Noone, 2011). The economy of Indonesia has changed significantly over the years. In the past, due to Indonesia's stage of economic development and government policies in the 1950s and 1960s that encourages agricultural self-sufficiency, agriculture comprised a huge part of their economy. Then, the steady process of industrialisation and urbanisation began in the late 1960s. In the 1980s, as oil prices fall, the Indonesian Government then focused on the diversification from oil exports to manufactured exports (Goeltom, as cited by Elias & Noone, 2011). This resulted in the acceleration of the industrialization and urbanisation of Indonesia. In addition, the economy of Indonesia became more global when trade barriers were reduced and the mid-1980s. Since the Asian Financial Crisis, the strong growth of the economy of Indonesia was accompanied with low output volatility which can be observed during the 2008-2009 global financial crisis, where the economic growth of Indonesia did not suffer much and only experienced a
moderate slowdown in their economic growth. This is in contrary to most other economies whose economies had a decline in output.

Due to industrialization and urbanisation over the past half a century, there was an increase of 19 percentage point in the manufacturing share of GDP of Indonesia whereas there was a decrease of 35 percentage points in the agricultural share of GDP of Indonesia from 1967 to 2009 (Elias & Noone, 2011). They also pointed out that there was an increase from 17 percent to 53 percent increase in the population living in urban areas. Even though there was the decline in the agricultural share of GDP in Indonesia, the agricultural share still plays an important role in the Indonesian economy, taking up 16 percent of the output in 2009. Besides that, in 2008, more than 40% of employment in Indonesia is from the agricultural industry (Elias & Noone, 2011). Besides manufacturing and agricultural sector, the mining and utility shares also plays a large role, taking up around 12 percent of the GDP of Indonesia since the late 1980s (Elias & Noone, 2011).

As of date, the three major sectors in Indonesia are the agricultural sector, industry sector and the services sector (Indonesia-Investments, 2014). The change in percentage share of the agricultural industry in GDP towards the manufacturing industry means that Indonesia changed from the highly agricultural dependent country to a more balanced economy (Indonesia-Investments, 2014). The percentage share of the agricultural, industry and services sector in the GDP of Indonesia are as illustrated in Table 1.1.