

# Dating Rules for Turning Points of Growth Cycles in Korea

by

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*A business cycle is recognized as a growth cycle in a continuously growing economy such as Korea. This paper suggests reasonable dating rules for the reference date of a business cycle using various measures of a growth cycle. These measures are a cyclical component of the coincident composite index (CI), a coincident cumulative diffusion index, and a historical diffusion index with coincident component indicators. Dating rules include identifying turning points based on these measures of the growth cycle, and various approaches which confirm and review whether these turning points are appropriate for reference dates. And the dating rules are backed up by an administrative process to determine and disseminate these turning points as the reference dates of growth cycles in Korea. The process provides a strategy that gives authority to the released reference dates and minimises errors in the dating.*

*However, these dating rules have strict procedures to determine the reference date because the measures of a growth cycle are revised annually and their turning points could be affected by their revisions. Usually, a new reference date requires approximately three years before it is released officially. Due to the delayed dating strategy, the present and future business conditions need to be reviewed by detecting and forecasting models of the coming turning points with leading indexes and coincident indexes.*

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*Keywords: growth cycle, reference date, composite index of business cycle indicators, diffusion index, turning point*

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## 1. The importance of dating

### 1.1. Business cycle and reference date

The business cycle is defined as an economic phenomenon in which the aggregate activities of an economy increase and decrease around the long-term growth trend recurrently. This type of business cycle, which is defined as a growth cycle in most developed and developing countries, is different from the classical cycle defined in the USA. For this reason, dating rules of growth cycles are different from those of the classical cycle.

According to the ABCD approach, the turning point of a growth cycle is the time when the growth of an economy equals the long-run growth trend, because a growth cycle should be measured by removing the long-term trend factor from the economic growth. In other words, a growth cycle includes only cyclical components by removing the long-term trend factor from the economic aggregate time series with a continuously right-upward trend cycle<sup>1</sup>. Therefore, turning points of a growth cycle include peaks and troughs on the cyclical component as in the classical cycle. The difference is whether the long-term trend factor is removed from the original time series or not. Hence, the trend factor is removed in view of a growth cycle, while it is included in the classical cycle. Comparing turning points of a growth cycle with those defined in the classical cycle, expansion duration of a growth cycle is shorter than that of the classical cycle, while contraction duration of a growth cycle is longer than that of a classical cycle. On the other hand, the typical asymmetry would be valid in that the expansion duration is longer than the contraction duration in both types of business cycle<sup>2</sup> methods.

### 1.2. Uses of the reference date

The reference date of an economy<sup>3</sup> is used to assess the economic policies and co-movement of economic indicators. Academic studies for the business cycle are based on this reference date. Three cases can be explained as in the following examples.

First, a reference date is used as an appraisal standard of timeliness and usage of various economic regulation measures. When the typical economic condition turns from expansion to contraction, soft-landing economic policies need to be carried out to alleviate an abrupt slowdown. At that time, a trough of a growth cycle, i.e. a starting point, had been disseminated. According to this turning point of a trough, economic units like the government, private enterprises, and households can identify symptoms of changes in the economic conditions and create awareness of the fact that the business cycle has turned immediately from an expansion to a contraction phase. Under these circumstances, the effects of an economic policy are maximized, while the social losses are minimized by suppressing the effects of strong economic slump.<sup>4</sup>

Second, the reference date is utilized as the standard for classifying the individual economic indicators into leading, coincident or lagging categories. As mentioned earlier, the business cycle is defined as a growth cycle in Korea. Therefore, individual economic

indicators are seasonally adjusted, and trend factors are removed from the seasonally adjusted series. Then, the cyclical component of an indicator can be computed. Next, specific turning points are estimated from each cyclical indicator. Now, we can identify whether specific turning points are located before or after reference dates, and classify the indicator into leading or lagging category. The classification needs to satisfy the condition that specific turning points of the indicator and reference dates are correlated with stable leading or lagging time.<sup>5</sup>

Third, the reference date is used for testing the business cycle behaviour and studying the characteristics of economic movements. According to reference dates, the scope of the study is selected to investigate the cause and effect relationship of the corresponding cycle era. Also, the dates are included in the economic models for the diagnosis of the present and future business conditions. For example, after modelling the past economic expansion and contraction phases, the present economic situation can be reviewed and the future business conditions can be forecasted by using the model. In this study, researchers need to be knowledgeable about the duration and amplitude of previous business cycles and the relationship between the growth rate or unemployment rate and the business cycle. The confirmation of these facts is possible when reference dates of the business cycle are detected and disseminated officially.

### **1.3. Background**

In this paper, we intend to suggest reasonable dating rules for reference dates using the measures of a growth cycle in a continuously growing economy, where the business cycle is defined as a growth cycle. In order to estimate a growth cycle, de-trending techniques are applied and composite indexes of business cycle indicators are compiled by using the total change rate of the main economic component indicators as in the NBER method. Turning points of a growth cycle are identified and detected by cyclical components of the composite indexes, which correspond to the measure of a growth cycle. However, in order to minimize dating errors of the official reference dates, an administrative process is introduced, and in that process, identified turning points are officially determined as reference dates. These processes will be suggested briefly in this study.

In the USA and Japan, reference dates are also released according to similar procedures. In the USA, the business cycle is considered as the classical cycle and there is an independent dating committee in the NBER, which is comprised of seven members. The committee reviews the turning points of the recent business cycles and determines them as reference dates through discussions about corresponding economic conditions. Then, these reference dates are released officially. In Japan, indexes of business conditions are compiled as the measure of the business cycle. Peaks and troughs of the business cycle are determined based upon the appearance of these indexes. The cabinet office<sup>6</sup>, which is in charge of measuring the business cycle in Japan, decides and disseminates reference dates through discussions with experts in the corresponding fields.

### **1.4. Contents of the study**

This study is comprised of four sections. In Section 2, the method of identifying turning points of a growth cycle will be introduced and approaches of reviewing them as reference dates will be explained. In Section 3, the administrative process will be introduced, wherein identified turning points are ultimately determined as reference dates. In Section 4, a case study will be explained. Reference dates of the most recent

growth cycle were determined and released in August 2008. Finally, a summary of this study and a future study will be presented in Section 5.

## **2. The method of identifying turning points of growth cycles**

### **2.1. Components for the business cycle**

The definition provided by Burns and Mitchell (1946) is very well-known, and clearly explains the characteristics of the business cycle.

Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in the business enterprises: a cycle consists of expansion 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 changes 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 (Burns, A. F. and W. C. Mitchell, *Measuring Business Cycles*, 3p).

In the context of the definition, there are three components in the business cycle. Turning points of the business cycle and economic phases can be identified by using these components.<sup>7</sup> First, the business cycle movement needs to be pronounced. Namely, the ups and downs of an economy need to be divided clearly. In a continuously growing economy, if only upswings are observed, it is not easy to define the business cycle. Therefore, in terms of a growth cycle, the business cycle is redefined as “aggregate economic activities which repeatedly move up and down on long-term growth trends.” Second, the business cycle has a tendency to diffuse. That is, a number of economic activities move simultaneously and repeat the trends of boom, slowdown, recession, and recovery. These movements are diffused throughout various economic sectors including production, employment, sales, income, investment, international trade, and finance. Therefore, when most economic activities are booming, the economy is probably near the peak of the business cycle. Third, an economic phase has a tendency to be maintained for a certain period of time. Burns and Mitchell (1946) suggest that the duration of a cycle is from more than one year to less than 12 years. Based on a number of empirical studies about economic indicators, the NBER also suggest the minimum duration as follows: the duration must be 15 months or more in a single cycle, and 5 months or more in a single phase, i.e. expansion or contraction phase.

### **2.2. The method of identifying turning points**

#### **2.2.1. Cyclical component of the coincident composite index**

The Korea National Statistical Office (KNSO) produces composite indexes of business cycle indicators by using the compiling method developed by the NBER. The composite index (CI) is used for measuring the duration and depth of the business cycle.

The coincident composite index is compiled from eight component indicators, which represent the sectors of employment, production, sales, and trade. These indicators are sensitive to the business cycle. Each component series is adjusted by removing the non-business factors such as seasonal and irregular factors. To prevent a more volatile component series from dominating the index, the symmetric percentage change for each component is standardized by its standard deviation. The summation of the standardized change rates for all components becomes the total change rate. Then, the total change rate is adjusted by the GDP trend adjustment technique in order to equalize the growth trend of

the coincident composite index with that of the GDP. The final coincident composite index is updated monthly according to this adjusted total change rate.

Because the business cycle is defined earlier as a growth cycle, the cyclical component is computed by removing the long-term trend<sup>8</sup> from the coincident composite index in order to measure a growth cycle. The highest point on the cyclical component series is interpreted as a peak and the lowest point is considered as a trough in terms of the depth of the business cycle, because the cyclical component is regarded as the measure of a growth cycle. The turning point of a peak or a trough needs to satisfy the minimum duration rule. Technically, turning points on the cyclical component series are identified by the Bry and Boschan (1971) Method, in which the minimum duration rule is guaranteed.

### 2.2.2. *Coincident cumulated diffusion index*

The diffusion index (DI) needs to be compiled for the second component of the business cycle, so called a “diffusion”, because a disadvantage of the composite index is that it does not include a diffusion of economic activities. The diffusion index is defined as a proportion of the components that contribute positively to a growth cycle. Therefore, the diffusion index can be calculated easily by using the percentage change rates of all selected component series for the coincident composite index before the standardization procedure. However, in practice, it is more complicated to calculate the diffusion index in an economy where the business cycle is defined as a growth cycle. In other words, the percentage change rate can not be applied for compiling the diffusion index, because the percentage change rate has a long-term trend and the degree of its contribution to a growth cycle, i.e. positive or negative contribution, cannot be evaluated with only its change rates. Hence, the diffusion index is computed by the definition that “if the percentage change rate of the component series is more (less) than the long-term trend of the change rate<sup>9</sup>, the component series is regarded as having a positive (negative) contribution to a growth cycle”.

Typically, a turning point tends to be shown near the 50 point level of the diffusion index. Hence, the cumulated diffusion index (CDI) can be calculated by cumulating<sup>10</sup> the pure degree of the diffusion in economic activities as greater than or less than 50. This coincident cumulated diffusion index is another measure of a growth cycle in terms of diffusion. The coincident CDI corresponds to the cyclical component of the coincident composite index, because they are both based on the same component series. But the coincident CDI tends to have a right-upward movement behaviour, which is different from the cyclical component series, because the asymmetric characteristics that “the expansion duration is longer than the contraction duration” are reflected in the CDI. Technically, turning points in the coincident CDI series are also identified by the Bry and Boschan (1971) Method. They are considered as a peak or a trough in terms of the diffusion of the business cycle.

### 2.2.3. *Historical diffusion index (HDI)*

A new cycle index can also be compiled by aggregating states of expansion or contraction in the component indicator series. Namely, the concept of the probability of the aggregate economic activities being in the expansion phase is introduced as a measure of a growth cycle. The compiling procedure is very simple, because all the component series for the coincident composite index are used.

First, a cyclical component of each series is computed by removing the growth trend estimated through the PAT or Hodrick-Prescott Filter Technique from the seasonally and

irregularly adjusted series. Then, turning points on each cyclical component are identified by the Bry and Boschan (1971) Method, which are termed as specific turning points of the individual cycle series. Second, each series is identified with 100 in periods of the expansion phase and 0 in those of the contraction phase, when the phase is determined based on the specific turning points. Therefore, the values of each series are classified as being part of a phase of expansion or contraction of the business condition in individual economic activities. Third, the historical diffusion index (HDI) is obtained by averaging values of all the component series, which means aggregating states of business condition in an economy. The HDI is interpreted according to the standard of 50 as in a typical diffusion index. In other words, turning points of the HDI are regarded as dates when the index moves through the 50 point mark. For example, a peak (trough) occurs in the period when the HDI passes the 50 point mark from top to bottom (from bottom to top).

### **2.3. Approach of confirming identified turning points**

#### **2.3.1. Distribution chart analysis of specific turning points**

Specific turning points of each component series are identified in the process of compiling the HDI. Hence, a distribution chart of these turning points can be made. The turning points of the growth cycle identified by the three measures outlined above (CI, CDI and HDI) can be confirmed by this chart, by reviewing whether they are located within a range of the specific turning points.

#### **2.3.2. Growth rate of GDP and the detailed data**

GDP is compiled to measure value added for a certain period of time. This GDP indicator represents the aggregate economic performance of an economy. Hence, turning points identified earlier can be confirmed by comparing them with turning points of the GDP growth rate. Because the GDP is produced quarterly and the change rate is based on the same quarter of the previous year, turning points of the GDP growth rate usually tend to lead one quarter or become included in the same quarter in comparison with the turning points identified in the three steps measuring of a growth cycle.

On the other hand, identified turning points can be confirmed by monitoring whether economic phases of expansion and contraction based on them are valid in the context of the detailed data on economic growth. In other words, the boom or slump of private consumption, investment in equipment or buildings and facilities, and exports leads the economic expansion or contraction. Hence, expansions or contractions based on identified turning points are confirmed by reviewing growth rates of the detailed items of the GDP. For example, growth rates of the most detailed items tend to go upward during an economic expansion period, and go downward, even to the point of moving into negative figures, during an economic contraction period.

#### **2.3.3. Review of economic situations**

Economic policy authorities tend to recognize turning points of economic phases carefully by monitoring every available economic indicator, because it is impossible to prepare and implement economic regulation actions or measures to avoid a recession without the recognition of economic phases. Therefore, records of economic policies or events become important data in reviewing whether the period before or after previously identified turning points corresponds to economic expansion or contraction. For example, economic measures for stimulating consumption or investment are announced by

economic authorities, and the call rate as a reference interest rate is often lowered by the monetary authority in a period of recession. Hence, in practice, the economic event diary<sup>11</sup> is made and used for reviewing whether identified turning points are referenced to the dates of a growth cycle.

### **3. Administrative procedure for dating**

#### **3.1. Preparation of dating report**

In order to detect a predicted reference date, identified turning points of the cyclical component of the coincident CI, the coincident CDI and HDI are confirmed through various approaches as mentioned earlier. Then, a report about predicted reference dates is produced, which is based on identified and confirmed results concerning turning points of growth cycles in Korea. This report is used in a meeting with a group of experts, which is the process for an administrative procedure for dating.

The average duration of a single cycle in growth cycles of Korea is about 50 months and the average duration of a single expansion phase is approximately 30 months. Therefore, the dating of a new reference date needs to be reviewed about three years from the announcement of the most recent reference date.

#### **3.2. Discussion with a group of experts**

The meeting with a group of experts in the business cycle field is a very important process for dating in Korea. Participants of the meeting discuss the statistical accuracy of the predicted reference date and the validity in the context of economic situations at that time. The discussion is important because the group of experts is mainly comprised of professors in the business cycle field, research fellows in that field, and government officers currently analyzing economic indicators. After the meeting with the experts, the report about the predicted reference dates is revised according to their comments.

#### **3.3. Deliberation at the Economic Statistics Committee<sup>12</sup>**

The revised report is presented to the Economic Statistics Committee under the National Statistics Committee. The Economic Statistics Committee deliberates on the predicted reference dates in the revised report. The committee can ask technical experts to participate in the meeting and give professional opinions about the predicted reference dates. In the case of dating, the committee asks the official in charge to explain the revised report and proposed agenda concerning the reference dates predicted before the deliberation. Then, the members of the committee discuss and review the proposed reference dates. Following the deliberation, the participants vote to either agree or disagree with the proposed reference dates.

#### **3.4. Determination and dissemination of reference dates**

The final report on reference dates is produced on the basis of the proposed and then agreed reference dates from the Economic Statistics Committee. Following the approval by the commissioner of the KNSO, the determination of reference dates is completed. Then, the determined reference dates are released to the public through a press release and briefing on the monthly composite indexes of business cycle indicators. In addition, the determined reference dates are described in the monthly publication, "Composite Indexes of Business".

## 4. Recent dating experience

### 4.1. Recent reference dates

Composite Indexes of Business Indicators have been compiled since March 1981, and monthly data are available from 1970. Since then, the composite indexes have been revised 7 times by changing their component series and minor compiling options in order to prevent composite indexes from making a false representation of a growth cycle, while the release of reference dates has been conducted 11 times during 9 growth cycles from 1970 to the present.

In 2007, turning points of the 8th and the 9th cycles were reviewed by various detecting and estimating models on the turning points of a growth cycle. In March 2008, revised data of various component series<sup>13</sup> were reflected<sup>14</sup> in the composite indexes, and the base year of these indexes was changed which means that the average index is now equal to 100 in year 2005. Therefore, three measures of a growth cycle, i.e. cyclical component of the coincident CI, coincident CDI, and HDI are revised with changed data of the coincident composite index and its component series. Also, turning points of the 8th and 9th cycles were re-identified with this data concerning growth cycles. Identified turning points are shown in Figure 2 and Figure 3 of the Appendix.

These identified turning points had been confirmed by various previous approaches prior to June 2008. Then, a draft report about predicted reference dates was created. Also, in July 2008, this report was revised by reflecting comments proposed in the meeting with a group of experts. The revised report was presented to the Economic Statistics Committee in August 2008, and the committee agreed to determine the proposed reference dates. Then, the final report on reference dates was produced and approved by the commissioner of the KNSO. The determined reference dates were officially released through a press briefing on August 29, 2008.

### 4.2. Keynotes during the 8th and the 9th cycles

The period from July 2001 to April 2005 was estimated as the 8th cycle of the Korea business cycle. Namely, the trough and peak of the 8th cycle were finalized as July 2001 and December 2002.<sup>15</sup> Also, the trough of the 9th cycle was determined preliminarily as April 2005. The 8th cycle had durations of 17 months of expansion and 28 months of contraction. Therefore, the cycle had unusual characteristics in that the expansion period was shorter than the contraction. This seemed to be caused by cyclical movements of the domestic sector including consumption and investment, and the cycle of exports with delayed lags. There were a few keynotes during the 8th and 9th cycles.

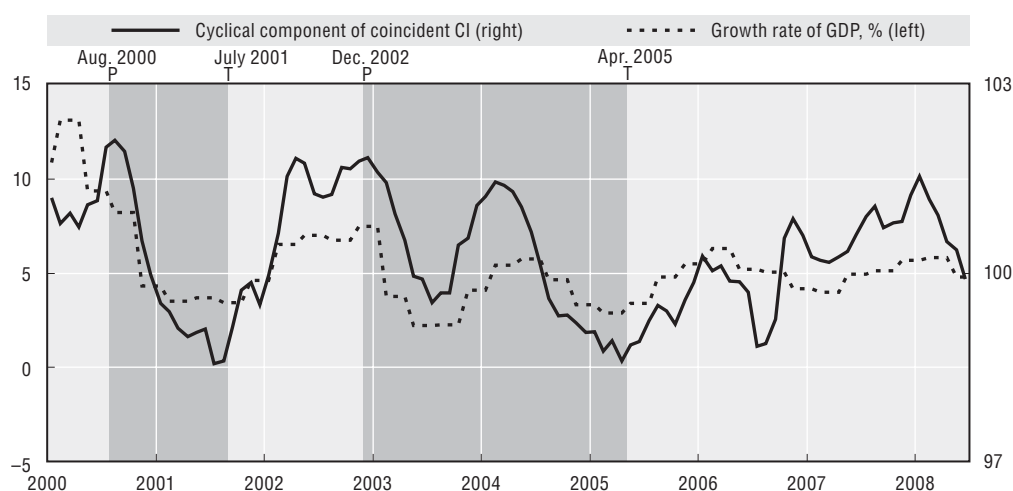
First, the overseas demand for Korean commodities decreased, and the exports and equipment investment were in recession because of the impact of the worldwide IT business depression since 2000. For this reason, various fiscal and monetary policies were implemented. For example, the call rate was continually lowered in four steps (from 5.25% to 4.0%) during the eight months from February to September of 2001. Comprehensive countermeasures for stimulating domestic demand were released in October 2001, including reinvigoration of home construction and the service industry, removal of some restrictions on the business of enterprises and promotion of investment in the information and communication field. Due to the effects of these policies, the business conditions started to recover from July 2001.

Second, GDP growth reached 6-7% in 2002 due to a boom in consumption and investment. Also, exports increased vigorously in the second half of the year, and business



conditions reached a peak in December 2002. After then, consumption and investment decreased sharply or slowed down because of an insolvency of household loans and the credit crisis, in which business conditions started to decrease. A recovery of domestic demand was delayed until early 2005 due to the slow progress of household living conditions and the instability of job markets. Even though exports were favourable in 2004 due to synchronism with world business, they did not stimulate the depressed domestic demand.<sup>16</sup> Hence, there was a long-term depression of domestic demand. The duration of the contraction in the 8th cycle was 28 months, which was longer than the 19 months of an average duration for contractions in Korea.

Figure 1. **Growth cycle in Korea since 2000**



Third, the trough of April 2005 was determined preliminarily as the starting point of the 9th cycle. Around April of 2005, the IT business escaped from a depression, and the bubble of household consumption settled down. Also both exports and consumption started to increase gradually. However, the business recovery progressed slowly due to the low diffusion effects of growth in main industries, such as the semiconductor industry, and to a slump in investment. Therefore, the growth rate of GDP was around 5% during that period.

### 4.3. Assessment of dating rules in Korea

Dating rules in Korea are evaluated as necessary procedures. First, the business cycle in Korea is defined not as the classical cycle in the USA, but as a growth cycle like the OECD. If it were defined as the classical cycle, the economy would have had only two recessions; one in 1980 where the economy had unstable politics and was affected by the second oil shock, the other in 1998 when it suffered from the foreign exchange crisis. However, Korea's economy had slumps in consumption and investment between these two periods. Hence, the classical cycle would not be considered a reasonable representation of the Korean economy. Second, turning points of a growth cycle are identified with three representative indicators<sup>17</sup> which are measured in terms of a growth cycle. Then, the identified turning points are reviewed and confirmed through various approaches. The predicted reference dates are estimated and reported on the basis of these identified turning points. Third, the administrative process is introduced in order to determine reference dates. Professional opinions are collected by having a meeting with a group of experts. Then, the report on the proposed reference dates is presented to the Economic

Statistics Committee under the National Statistics Committee. After deliberation, the final report on agreed reference dates from the committee is submitted to and approved by the commissioner. This process gives authority to the released reference dates and provides a system to minimise the error of determining reference dates through biased opinions on economic conditions.

## 5. Conclusion

This study introduces rules for dating a growth cycle in Korea including the method of identifying turning points by measures of a growth cycle, various approaches in reviewing these turning points, and the administrative process in determining the final reference dates. These dating rules for a growth cycle can be benchmarked in a continuously growing economy such as Korea, where the business cycle should be defined as a growth cycle.

In summary, there are three important and necessary procedures in the dating rules of Korea. First, composite indexes of business cycle indicators are compiled by using the method developed in the NBER. Also, measures of a growth cycle are based on these composite indexes and their turning points are identified by the Bry and Boschan (1971) technique. Therefore, identified turning points of a growth cycle are reliable. Second, these turning points are reviewed through various approaches in terms of their qualification as reference dates of a growth cycle. This procedure guarantees that measures of a growth cycle can function as a good business cycle indicator. Third, the administrative procedure is the process that determines and disseminates these turning points as reference dates of growth cycles in Korea. The process is expected to give an authoritative basis to the released reference dates and minimize errors in the dating.

However, dating rules requires strict procedures because these measures of a growth cycle are revised annually and their turning points could be affected by their revisions. Usually, a new reference date requires approximately three years before it is released officially. Hence, detecting and forecasting models of the coming turning points are necessary in order to review the present and the future business conditions with leading indexes and coincident indexes. For example, the two or three months' consecutive method and analysis of lead time may be used with a leading composite index. Also the sequential signals method and Neftchi probability may be utilized with a coincident index and a leading index. Therefore, future studies will focus on development of econometric models for detecting and forecasting turning points of a growth cycle.

## Notes

1. The cyclical component is interpreted as a deviation from the long-term growth trend.
2. Since the 1980s in the USA, where the business cycle is defined as the classical cycle, durations of expansions have been quite long while durations of contractions have been very short relatively.
3. A nation is usually considered as an economic system unit.
4. Not to mention that if the corresponding economic policy were delayed and carried out in a recovery period, the policy could make the volatility of the business fluctuation bigger and so increase the instability of economy markets.
5. The NBER classified economic indicators into strong or weak leading categories when they were identified as stable leading indicators over a long period.
6. The Economic and Social Research Institute (ESRI) is compiling and releasing these indexes.
7. It is called 3P (Pronounced, Pervasive, Persistent) or 3D (Depth, Diffusion, Duration).
8. The triplet Phase Average Trend (PAT) technique is applied for measuring the long-term trend in KNSO.

9. The mean of the percentage change rate is considered as the long-term trend of each component series.
10. The present CDI = CDI of previous month + (DI of the present month – 50).
11. The diary includes economic policies, social and political events, and various actions or measures implemented before and after turning points. Also, it is used for monitoring the economic situation in a meeting with a group of experts as well as reviewing the predicted reference date internally.
12. The committee is established for deliberating upon the work plan of economic statistics, and is comprised of 11 members, who are knowledgeable in economics and statistics or have a large amount of experience in analyzing or compiling economic statistics. The Commissioner of the KNSO appoints as chairperson one person among the 11 members with significant experience in economic statistics and experience in leading the meeting. The meeting of the Economic Statistics Committee is valid when more than half of the 11 members participate, and the decision of the meeting is effective provided that a majority of the participants agree to a proposed agenda.
13. The indexes revised by changing weights of detailed items and the base year are the Industrial Production Index, the Wholesale and Retail Sales Index, and the Service Industry Activity Index. At the beginning of the year, the preliminary data released earlier are usually revised to become the final data in cases of updates to one of the other component series.
14. To reflect the revised data of component series, parameters applied in compiling composite indexes are changed, i.e. seasonal factors, standardization factors, and trend factors. Then preliminary data of composite indexes are re-adjusted.
15. At the 7th revision of composite indexes, preliminary dates for the trough and the peak of the 8th cycle were determined.
16. There was a short boom for seven months in this contraction. But it was not identified as a normal cycle. Because of the depression of consumption and investment, experts were of the opinion that the short period could not be recognized as an expansion. Also, the Economic Statistics Committee agreed with the opinions of experts.
17. The three indicators are the cyclical component of the coincident CI, the coincident CDI, and HDI.

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APPENDIX

Figure 2. **Cyclical component of coincident CI and coincident CDI in Korea**

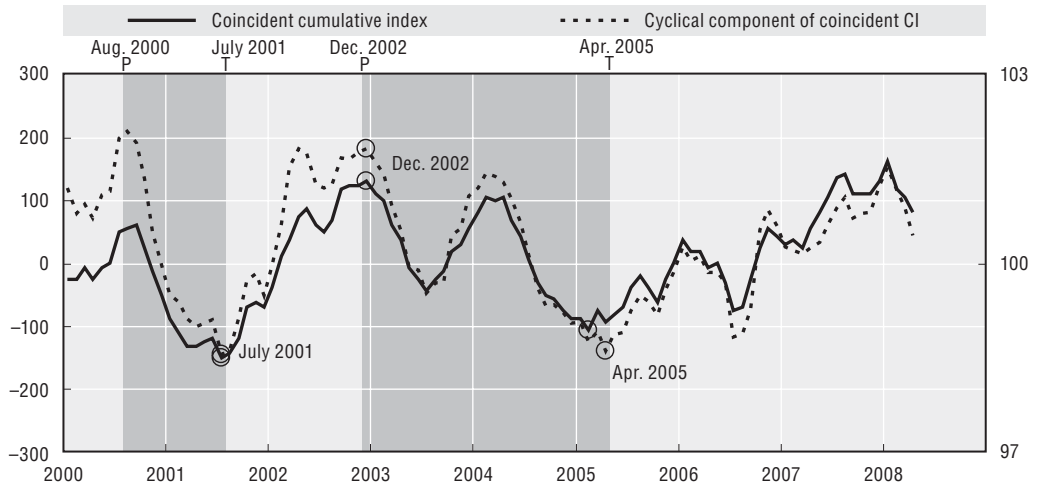
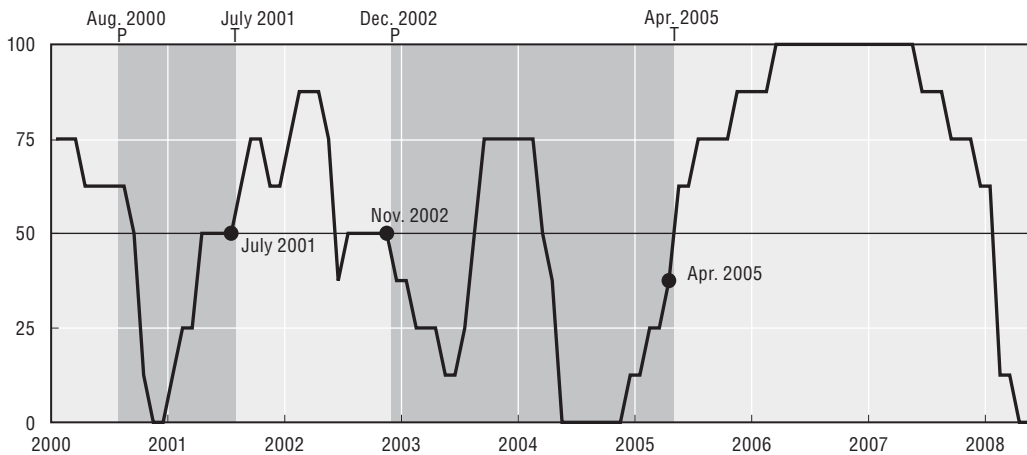
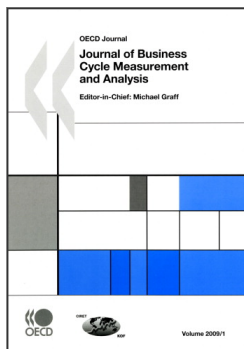


Figure 3. **HDI (Historical Diffusion Index) in Korea**





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