

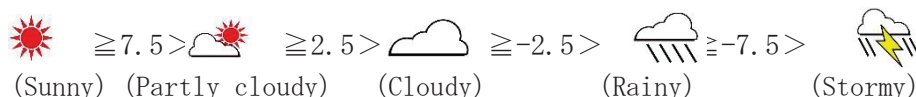
### About the JCER World Business Climate Index

#### □ Purpose and features

The objective is to promptly convey the latest business climate using a single index, while enabling comparison of the world's leading countries and regions with their various economic scales and development stages.

This index has three features. Firstly this index can assess business climate of each country by common value because the growth rates which include production, imports and retail sales, are normalized for expressing in a comparable form, and after that, these growth rate are integrated.

Secondly, we display the World Business Climate Index as a weather map to grasp a picture of business conditions at a glance. If this index is equal to the average growth rate over the 14 years from January 1996 to December 2012 (excluding the period from September 2008 until August 2010), this index becomes zero. And then, we define the figures which are surrounding zero as Cloudy and divide into five levels.



Thirdly, we make an Export Environment Index using weights based on Japan's exports to each country and region in addition to World Business Climate Index using weights based on average nominal GDP for 2010–12 denominated in dollars.

The indexes which are similar to this index are CLIs (Composite Leading Indicators) produced by Organization for Economic Cooperation and Development (OECD) and the World Economic Climate (WEC) index published by The German ifo Institute for Economic Research. Compared with CLIs, the main features of the index are that it is expressed in a comparable form because it use the common basic data of each country, presents business indicators for the world overall on a monthly basis and is coincident indicator. Although WEC based on questionnaire surveys, is also expressed in a comparable form and produce a business index for the world overall, it lacks immediacy in that it is only published quarterly.

Table. Comparison with other indexes

	Type of component series	Satisfies immediacy	Prepares world indicators	Type of indicator
JCER	Economic indicators	○(monthly)	○	coincident indicator
OECD	Economic indicators	○(monthly)		leading indicator
ifo	Survey Questionnaire	quarterly	○	Leading/coincident indicator

#### □ Subject countries

The index covers not just the advanced countries but also emerging economies. Country and region indexes are calculated separately for 15 countries or regions: Japan, United States, European Union, Hong Kong, Korea, Singapore, Taiwan, Indonesia, Malaysia, Philippines, Thailand, Brazil, China, India, and Russia. Europe is covered with a single index for the EU (28 countries) but does not have separate country indexes. The combined gross domestic product of all these countries and regions amounts to about 80% of the world total.

In addition to the "world" index (which combines the data for all these countries and regions), four regional indexes are calculated (for Asia, the Asian NIEs [newly industrialized economies], ASEAN [Association of Southeast Asian Nations], and the BRICs [Brazil, Russia, India, and China]). The NIEs

are Hong Kong, Korea, Singapore, and Taiwan, and ASEAN is defined as Indonesia, Malaysia, Philippines, and Thailand. The index for Asia covers the NIEs, ASEAN, and China but excludes Japan.

**□ Calculation method**

**Business Climate Index:** An index assessing economic indicator growth rates (year-on-year). With a base (zero) of the average growth rate in the past, it translates each unit of standard deviation into 10 index points. The base indexes are imports, production, and retail sales. The calculations are based on the average growth rate and its standard deviation over the 14 years from January 1996 to December 2012 (excluding the period from September 2008 until August 2010).

**Export Environment Index:** This index use weights based on Japan's exports to each country and region after calculating the index for each country and region. Naturally, this index does not include Japanese business climate.

**Stock Price Index (reference index):** Expresses stock price trends in Japan, the United States, the EU, the NIEs, ASEAN, and the BRICs. It calculates and combines representative stock price indexes of the countries and regions, setting January 2010 at 100.

**□ Timing of release**     Around the 15th of each month.

**□ Medium of publication**     The JCER website <http://www.jcer.or.jp/eng/>

and Nikkei Net <http://e.nikkei.com/e/ac/regtop.aspx>

## Index Calculation Method

### 1. JCER World Business Climate Index (JWBCI)

#### Calculation from monthly indexes

The index uses monthly data in order to provide timely information on global business trends. While gross domestic product (GDP) provides a comprehensive measure of economies, data on it are only released quarterly.

The index uses monthly import and production indexes, which are commonly available from the subject countries (table 1). As a supplementary index, real retail sales are used as far as possible.

Production indexes are considered to reflect business trends sensitively and are used by Japan and United States in its coincident indicators. Import provides a valuable measure of domestic demand. Even though the volume of import is basically used (for some countries the value index divided by the import price index is employed as a substitute), we use dollar-denominated value data if there is no the volume of import in some countries. And, to exclude the influence of the “Shale revolution” on the overall index (it is undermining the correlation between upturn of the economy and increase in imports), fuel imports are removed from the imports of the United States. The index used here is the real index based on sales volume. For some countries the value index divided by the consumer price index is employed as a substitute. These indexes are used as far as possible, although many emerging economies do not release data for them.

Table 1. Composite Indicators of the Business Index

	Imports		Production	Real retail sales
	Volume (real)	Dollar-denominated value		
Japan	○		○	○
US	○ (ex. Fuel)		○	○
EU	○		○	○
Hong Kong	○			○
Korea	○		○	○
Singapore	○		○	○
Taiwan	○		○	
Indonesia		○	○	
Malaysia		○	○	
Philippines		○	○	
Thailand	○		○	○
Brazil	○		○	
China		○	○	○
India		○	○	
Russia		○	○	○

Note: The EU data are for all 28 members.

#### Composed by converting year-on-year change into z scores

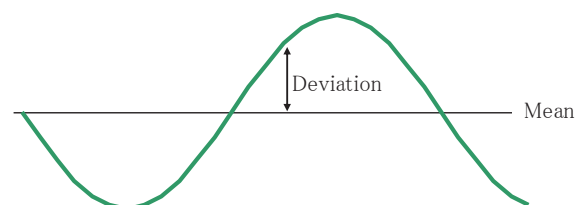
The change in each index from a year earlier is used for calculations. On account of disparities in values depending on the index or country, however, absolute rates of change do not permit judgments on the tone of business. For this reason, increase rates are further converted into z scores.

A z score for index value  $X_t$  is derived as follows using the mean for a time range and its standard deviation:

$$z \text{ score} = \text{deviation} / \text{standard deviation} = (X_t - \text{mean}) / \text{standard deviation}$$

In this calculation, values are standardized by first finding how far an index number differs from the mean (the degree of deviation) and then dividing the result by the standard deviation. Because the unit is one standard deviation ( $1 \sigma$ ), almost all index numbers (about 95%) will fall within two standard deviations above or below the mean. By means of this conversion into z scores, it becomes possible to make standardized judgments about all indexes, whether they have high or low rates of change or large

Charts1. Illustration of the Mean and the Deviation



or small variations from one month to the next.

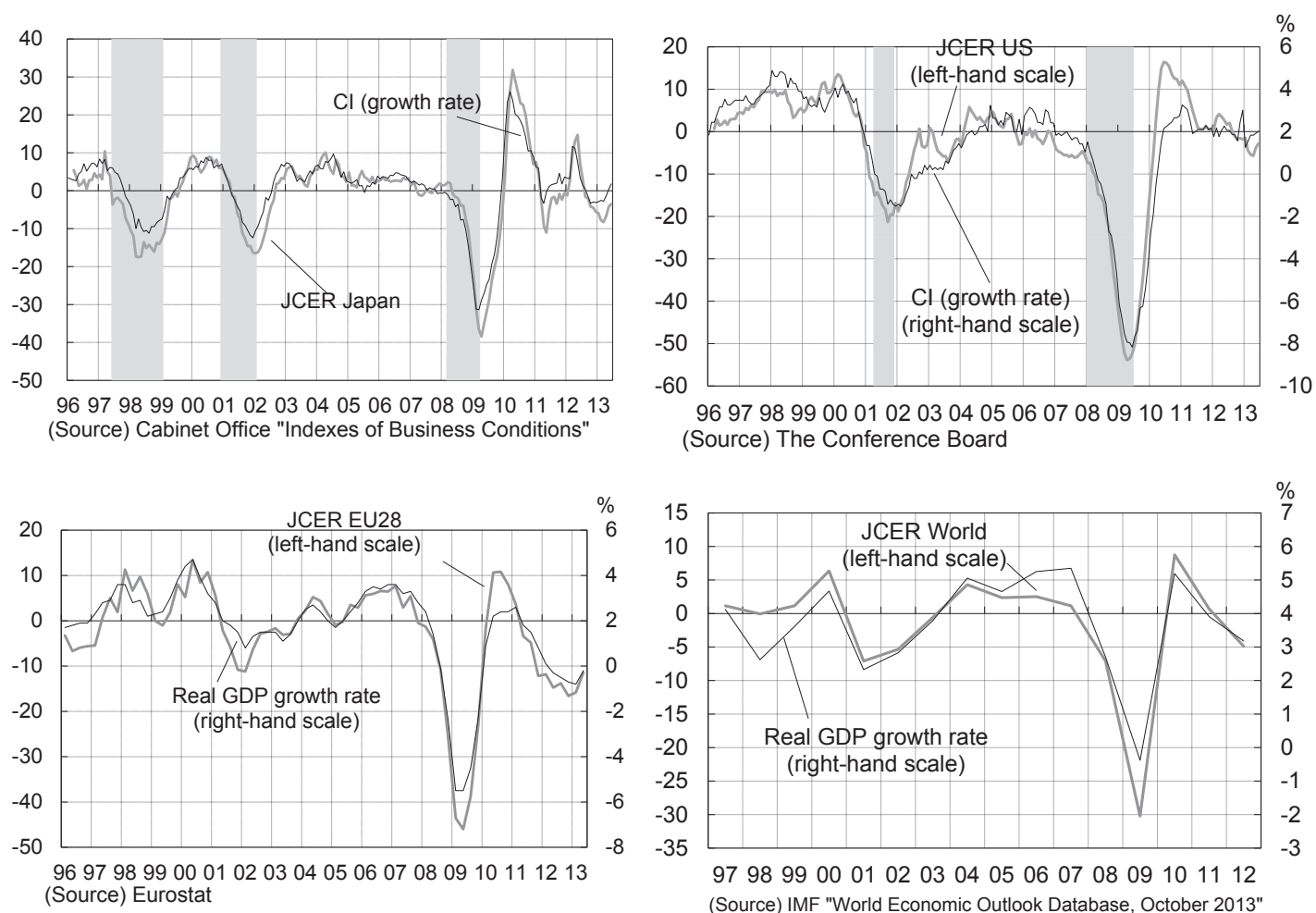
After index values have been converted into z scores, the z scores for all of the data series in each country or region are averaged. This computation method produces a business index for all countries and regions. To make the z scores easier to understand, they are multiplied by 10, giving each standard deviation a value of 10. With the average of the index values over the past set at zero, z scores above zero represent good business conditions, while those below zero represent poor business conditions.

### Assessment of the index

To test the performance of the Business Climate Index, the results it produced for major economies (the world, Japan, the US, and the EU) were compared with the results of composite indicators or equivalent indexes (see charts 1). Increase rates of coincident composite indicators were used for Japan and the US, and Real GDP growth rates were used for the world and the EU. As can be seen, the movements in the indexes are basically similar. The results produced by the World Business Index are not out of line with general business trends.

It needs to be cautioned, however, that movements in the index cannot be mechanically read to deduce turning points (peaks and bottoms). The business cycles in many countries do not have clearly delineated peaks and troughs, making it difficult to correlate the index with the phase of the business cycle. For reference, downswings are differentiated from upswings in the charts for the business cycles of Japan and the US.

Charts 2. Comparison of the JCER World Business Climate Index a, Composite Indicators and Real GDP growth rate



### Setting of the time range

One issue is what time range to employ for the mean and standard deviation, which are used to calculate z scores. For this index the time range was made the 14 years from January 1996 to December 2012 (excluding the period from September 2008 until August 2010), a period over which past statistics for all the data series are available. The weather condition during that period is rated as follows; Sunny 12.6%, Partly cloudy 26.1%, Cloudy 30.7%, Rainy 17.3%, and Stormy 13.2%.

### Weighted averages for dollar-denominated GDP

After calculating the index for each country and region, values for the world as a whole were computed using weights based on average nominal GDP for 2010–12 denominated in dollars (table 2). To express the business tone as seen from Japan, an Export Environment Index is also published using weights based on Japan's exports to each country and region.

Table 2a. Weights Used for the World Business Climate Index

	Nominal GDP (2010–12 average, \$ billion)	Weights (%)				
		World	Asia	NIEs	ASEAN	BRICs
Hong Kong	246.9	0.4	2.3	12.1		
Korea	1,086.3	2.0	10.0	53.1		
Singapore	257.9	0.5	2.4	12.6		
Taiwan	455.5	0.8	4.2	22.3		
Indonesia	811.4	1.5	7.5		48.9	
Malaysia	280.4	0.5	2.6		16.9	
Philippines	224.6	0.4	2.1		13.5	
Thailand	343.5	0.6	3.2		20.7	
Brazil	2,290.2	4.2				17.5
China	7,157.8	13.0	65.9			54.7
India	1,808.5	3.3				13.8
Russia	1,817.9	3.3				13.9
Japan	5,784.0	10.5				
EU	16,909.0	30.7				
United States	15,578.9	28.3				
Total	55,053.0	100.0	100.0	100.0	100.0	100.0

Source: IMF, World Economic Outlook October 2013

Table 2b. Weights Used for the Export Environment Index

	Japanese exports (2010-12 average, ¥ trillion)	Weights (%)
Hong Kong	3.47	6.4
Korea	5.21	9.6
Singapore	2.08	3.8
Taiwan	4.11	7.5
Indonesia	1.48	2.7
Malaysia	1.48	2.7
Philippines	0.94	1.7
Thailand	3.16	5.8
Brazil	0.50	0.9
China	12.50	23.0
India	0.84	1.5
Russia	0.88	1.6
EU	7.25	13.3
United States	10.53	19.3
Total	54.42	100.0

Source: Ministry of Finance, Trade Statistics of Japan

## Preliminary results

Immediacy is of importance to this index, and results for all countries and regions need to be released together. For this reason, when statistics for some of the base series come in late, values are extrapolated based on the rate of change for the preceding month. This means that in the case of these series, values are calculated on the assumption that there has been no substantial change from the preceding month, and the only changes incorporated in the index are those of other published statistics.

At present the base series that sometimes come in late include Philippines' imports, retail sales of both Singapore and Thailand, and EU's imports and production. As EU's import and production are estimated based on the corresponding data of constituent countries, their impact on the world index is not that significant. In addition, three-month moving averages are used to determine trends in the index, with the result that the influence of the missing values becomes even smaller.

## 2. Stock Price Index

Representative stock price indexes of each country are converted to an index with January 2010 set at 100, and weighted averages are derived using the market price total for 2010-12 average. The stock prices incorporated are as follows:

- Japan Nikkei-225 Stock Average
- US Standard and Poor's 500 Index
- EU Dow Jones EURO STOXX 50 Index
- NIEs
  - Hong Kong Hang Seng Index
  - Korea KOSPI Index
  - Singapore Straits Times Index
  - Taiwan TSE Index
- ASEAN
  - Indonesia Jakarta Composite Index
  - Malaysia KLSE Composite Index
  - Philippines PSEi Index
  - Thailand SET Index
- BRICs
  - Brazil Bovespa Index
  - China SSE Composite Index
  - India BSE Sensex Index
  - Russia Russian Trading System Index

Table 3 Weights Used for the Stock Price Index

	Market Capitalization (2010-12 average, \$ million)	Weights (%)			
		World	NIEs	ASEAN	BRICs
Japan	3,712,496	8.8			
United States	15,764,168	37.2			
EU	9,571,716	22.6			
Hong Kong	3,180,168	7.5	56.7		
Korea	1,068,791	2.5	19.1		
Singapore	547,292	1.3	9.8		
Taiwan	810,175	1.9	14.5		
Indonesia	388,642	0.9		30.0	
Malaysia	422,050	1.0		32.5	
Philippines	178,447	0.4		13.8	
Thailand	308,040	0.7		23.7	
Brazil	1,278,439	3.0			19.9
China	2,981,918	7.0			46.5
India	1,297,831	3.1			20.2
Russia	853,457	2.0			13.3
Total	42,363,628	100	100	100	100

Source: Bloomberg

While it would be possible to prepare a stock price index based on real-time change in the market price total, it was decided instead to create an index using the simple method of fixing the weights at a standard time.

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