

# Nikkei 225 VI Futures Index Index Guidebook

Nikkei Inc.

- This document is the index guidebook of the Nikkei 225 VI Futures Index calculated and published by Nikkei Inc. (Nikkei) since December 3, 2012. This document is drawn by Nikkei and it would be changed or modified corresponding to the revision of the index calculation rule etc.
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(March 24, 2014 version)

## 1: Concept

The Nikkei 225 VI Futures Index is designed to reflect the daily price fluctuation of a position that combines the near term and the next term Nikkei Stock Average Volatility Index Future (Nikkei 225 VI Future) prices at specified weights. The weights are adjusted daily to keep the maturity of the combined future contracts constant as the term exact one month.

## 2: Index Calculation

### (1)Basic Points

- Index value on a day is calculated by multiplying the index value on the previous day by the change rate on the day based on the prices of the Nikkei 225 VI Futures.
- Use the closing prices and settlement prices of the Nikkei 225 VI Futures on the Osaka Exchange (OSE), which are published by the OSE.
- The index value is expressed as the figures rounded to two decimal places. Unit of the index value is “points”.
- Cover the near-term (first-term) future and the next-term (second-term) future. The two future contracts used to calculate the index are rolled respectively to their next delivery months on next business day after the last trading date of the near-term future contract (normally final settlement date of the Nikkei 225 VI Futures, i.e. SQ Date).
- The index value on February 27, 2012 was 100,000 points.
- The index is calculated and published as the value on the end-of-day basis since December 3, 2012.

### (2)Formula

The Nikkei 225 VI Futures Index is calculated in accordance with the following formula.

#### ①On each trading day excluding SQ Date

$$Index Value_t = Index Value_{t-1} \times \frac{F_{1,t} \times W_{1,t-1} + F_{2,t} \times W_{2,t-1}}{F_{1,t-1} \times W_{1,t-1} + F_{2,t-1} \times W_{2,t-1}}$$

#### ②SQ Date (\*1)

$$Index Value_t = Index Value_{t-1} \times \frac{F_{1,t}}{F_{2,t-1}}$$

When

$W_{i,t}$  : “Weight” for  $i$ -th term future contract at a time point of  $t$

$F_{i,t}$  : Future price of  $i$ -th term future contract at a time point of  $t$

\*1: Please note that when a time point of  $t$  is the SQ Date, the near-term future at a time point  $t$  (=SQ Date) is the

same as next-term future at a time point of  $t-1$ (= the last trading date of the near-term future).

### (3)Future price

Priority in the usage of prices is as follows :

- ① Closing price (Last trading price)
- ② Settlement price

### (4)Definition of the “Weight” for each delivery month

Each “Weight” for the near-term future and the next-term future is determined on the following steps :

- ① Obtain the “Target Term days”, the total number of business days in the current rolled period from the SQ Date for the previous-term future to the last trading date of the near-term future(both dates inclusive, e.g. “18” in the following example). (\*2)
- ② Divide the number of days, one day shorter than the days to maturity (business-day basis, including both current day and the last trading date) of the near-term future by “Target Term days” and round down the result to two decimal places, then obtain the “Weight” for the near-term future.(e.g.  $17/18=0.94$  on Sep 12, 2012 for the Oct 2012 contract)
- ③ Subtract the “Weight” for the near-term future from 1, then obtain the “Weight” for next-term future.(e.g.  $1-0.94=0.06$  on Sep 12, 2012 for the Nov 2012 contract)

\*2: The “Target Term days” stays constant from the previous rolled date to the day before the following rolled date.

\*3: The “Weight” for the near-term future on the last trading day becomes “0”.

A sample calculation of “Weight” between September 12, 2012 (SQ Date, previous rolled date) and October 10, 2012 (SQ Date, the following rolled date) is shown below.

Table 1 : A sample calculation of “Weight”

Date	Days to maturity (Oct 2012)	Days to maturity (Nov 2012)	Weight (Oct 2012)	Weight (Nov 2012)	Weight (Dec 2012)
Sep/12/2012	18	43	0.94 (17/18)	0.06	-
Sep/13/2012	17	42	0.88 (16/18)	0.12	-
Sep/14/2012	16	41	0.83 (15/18)	0.17	-
Sep/18/2012	15	40	0.77 (14/18)	0.23	-
Sep/19/2012	14	39	0.72 (13/18)	0.28	-
Sep/20/2012	13	38	0.66 (12/18)	0.34	-
Sep/21/2012	12	37	0.61 (11/18)	0.39	-
Sep/24/2012	11	36	0.55 (10/18)	0.45	-
Sep/25/2012	10	35	0.50 (9/18)	0.50	-
Sep/26/2012	9	34	0.44 (8/18)	0.56	-
Sep/27/2012	8	33	0.38 (7/18)	0.62	-
Sep/28/2012	7	32	0.33 (6/18)	0.67	-
Oct/1/2012	6	31	0.27 (5/18)	0.73	-
Oct/2/2012	5	30	0.22 (4/18)	0.78	-
Oct/3/2012	4	29	0.16 (3/18)	0.84	-
Oct/4/2012	3	28	0.11 (2/18)	0.89	-
Oct/5/2012	2	27	0.05 (1/18)	0.95	-
Oct/9/2012	1	26	0.00 (0/18)	1.00	-
Oct/10/2012	-	25	-	0.96 (24/25)	0.04

### 3: Calculation Example of index value (in case of September 28 and October 10, 2012)

#### (1) Calculation on September 28, 2012 (On each trading day excluding SQ date)

\*In the following example, “Current day” is September 27, 2012, “Previous day” is September 26, 2012, “near-term future” is Oct 2012 contract and “next-term future” is Nov 2012 contract.

- Nikkei 225 VI Futures Index (Previous day) = 58104.26
- ”Weight” for near-term future (Previous day) = 0.38
- Future price of near-term future (Previous day) = 19.40
- Future price of near-term future (Current day) = 19.25
- ”Weight” for next-term future (Previous day) = 0.62
- Future price of next-term future (Previous day) = 20.25
- Future price of next-term future (Current day) = 19.90

$$\begin{aligned} & \text{Nikkei 225 VI Futures Index (Current day)} \\ &= 58104.26 \times \{(0.38 \times 19.25 + 0.62 \times 19.90) \div (0.38 \times 19.40 + 0.62 \times 20.25)\} \\ &= 58104.26 \times 0.986249 \dots = 57305.315490 \dots \approx \underline{57305.32} \end{aligned}$$

#### (2) Calculation on October 10, 2012 (On SQ Date)

\*In the following example, “Current day” is October 10, 2012 and “Previous day” is October 9, 2012.

- Nikkei 225 VI Futures Index (Previous day) = 53215.11
- Future price of Nov 2012 contract(\*4) (Previous day) = 18.50
- Future price of Nov 2012 contract(\*4) (Current day) = 18.65

$$\begin{aligned} & \text{Nikkei 225 VI Futures Index (Current day)} \\ &= 53215.11 \times (18.65 \div 18.50) = 53215.11 \times 1.008108 \dots = 53646.583864 \dots \approx \underline{53646.58} \end{aligned}$$

(\*4) Although Nov 2011 contract was the near-term (first-term) future on current day, same contract was the next-term (second-term) future on previous day.

### 4: Treatment of the index value

#### (1) Publication of the index value

As a general rule, the index is published as the value on the end-of-day basis by 4:30pm on every business day on Nikkei Indexes (<http://indexes.nikkei.co.jp/en/>).

#### (2) Retroactively Calculation in the past

The Nikkei 225 VI Futures Index was calculated retroactively on the end-of-day basis, to February 27, 2012, base date of the index (=100,000 points). The “Weight” between the next date after the base date (=February 28, 2012) and the day before first rolled date (=March 13, 2012) was calculated by using the “Target Term days” on condition that February 8, 2012 was the rolled date.

### (3) Modification of the index value

If any event which affects the index value occurs (e.g. correction of the futures prices published by the OSE), as a general rule, retroactive calculation for the modification will not be conducted.

## **5: Others**

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## Appendix : Change history of Index Guidebook

November 13, 2012 version	Initial Version
March 24, 2014 version	In “2:Index Calculation (1)Basic Points - modified the exchange name to “Osaka Exchange” due to the trade name change.