

Nikkei 225 Currency Hedged Indexes Index Guidebook

Nikkei Inc.

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(December 8, 2014 version)

1: Concept

The Nikkei 225 Currency Hedged Indexes measure the return of the Nikkei Stock Average (Nikkei 225) by hedging its currency risk 100% for investors outside Japan, i.e. non-Yen investors. These indexes represent the mixed positions of the Nikkei 225 investment in other currencies than JPY, and the relevant currency hedged transactions. Nikkei 225 Currency Hedged Indexes are based on the Nikkei 225 and Nikkei 225 Total Return Index. The currencies are USD and Euro.

Suppose that the Nikkei 225 increased 10% while the exchange rate of Yen against a home currency of an investor depreciates 10%. The return from such investment is almost zero for such non-Yen investor offset by the loss from the yen long position. If the currency risk was eliminated, the investor could receive 10% return minus the currency hedge cost.

The Nikkei 225 Currency Hedged Indexes are designed to be used to measure the performance of such currency risk hedged investments.

2: Index names

(1) General term

Nikkei 225 Currency Hedged Indexes

(2) Individual indexes

Nikkei 225 USD Hedged Index

Nikkei 225 EUR Hedged Index

Nikkei 225 Total Return USD Hedged Index

Nikkei 225 Total Return EUR Hedged Index

3: Index Calculation

(1) Basic points

- The Index value is calculated by using the close of Nikkei 225 or Nikkei 225 Total Return Index, and the Spot rate and 1-month Forward rate of the targeted currency (rates of Japanese Yen (JPY) to the targeted currency).
- The Indexes use the WM/Reuters Spot rate and 1-month Forward rate (middle price of bid and ask) of the targeted currency at 4pm, London Time. In case that the rates

are not available on a day of index calculation, e.g. holiday of the London market, the rates used for the latest valid calculation of the index will be used on the day.

- The Index value on a day is calculated by multiplying the index value on the end of the previous month by (1) the return of the Nikkei 225 from the end of the previous month, (2) the return of the spot currency rate from the end of the previous month, and (3) the currency hedge return from the end of previous month, respectively. The hedge ratio of the targeted currency is 100%.
- Unit of the index value is “point” and the figure is rounded to two decimal places.
- For the Nikkei 225 based indexes, index value of the base date (September 30, 2004) was 10,823.57. For the Nikkei 225 Total Return Index based indexes, the value of the base date was 13,519.22.
- These indexes are calculated and published on the end-of-day basis by 2 pm, Tokyo Time on the next business date.

(2) Formula

The Nikkei 225 Currency Hedged Indexes are calculated in accordance with the following formula.

$$Index\ Value_t = Index\ Value_0 \times \left\{ \frac{Nikkei\ 225_t}{Nikkei\ 225_0} \times \frac{S_0}{S_t} + \left(\frac{S_0}{F_0} - \frac{S_0}{LIF_t} \right) \right\}$$

$$LIF_t = S_t + \left(1 - \frac{t}{M} \right) \times (F_t - S_t)$$

where

- S : Spot rate of the targeted currency
- F : 1-month Forward rate of the targeted currency
- t : Date of index calculation (calendar day basis, in case $t=0$ as the last business day of previous month, i.e. S_0 or F_0)
- M : Number of calendar days in the month including the day of the index calculation (in case of February on leap year, $M=29$)

- *1) LIF : the theoretical value of the Forward rate for the end of month calculated by a linear interpolation of Spot rate and 1- month Forward rate on the day of index calculation.
- *2) In case of the calculation for the Nikkei 225 Total Return USD Hedged Index and the Nikkei 225 Total Return EUR Hedged Index, please replace the “Nikkei 225” on the formula described above with the “Nikkei 225 Total Return Index”.

4: Calculation Example (in case of Nikkei 225 USD Hedged Index)

*Following calculation is for illustration purposes only. Spot and forward rates are hypothetical as well as the index value.

(Example.1) Calculation on Dec 30, 2013 (Last business day of month): Last business day of previous month was Nov 29, 2013.

- Nikkei 225 USD Hedged Index_{Nov 29} = 16,779.71
- Nikkei 225_{Nov 29} = 15,661.87
- Nikkei 225_{Dec 30} = 16,291.31
- USD Spot Rate_{Nov 29} = 102.365
- USD Spot Rate_{Dec 30} = 105.035
- USD Forward Rate_{Nov 29} = 102.3343
- USD Forward Rate_{Dec 30} = 105.0185

$$\begin{aligned} & \text{Nikkei 225 USD Hedged Index}_{\text{Dec 30}} \\ &= 16,779.71 \times ((16,291.31/15,661.87) \times (102.365/105.035) + \\ & \quad (102.365/102.3343 - 102.365/(105.035 + (1-30/31) \times (105.0185 - 105.035)))) \\ &= 17,441.8838... \approx \underline{17,441.88} \end{aligned}$$

(Example.2) Calculation on Jan 6, 2014 (Beginning of month): Last business day of the previous month was Dec 30, 2013.

- Nikkei 225 USD Hedged Index_{Dec 30} = 17,441.88
- Nikkei 225_{Dec 30} = 16,291.31
- Nikkei 225_{Jan 6} = 15,908.88
- USD Spot Rate_{Dec 30} = 105.035
- USD Spot Rate_{Jan 6} = 104.525
- USD Forward Rate_{Dec 30} = 105.0185
- USD Forward Rate_{Jan 6} = 104.5100

$$\begin{aligned} & \text{Nikkei 225 USD Hedged Index}_{\text{Jan 6}} \\ &= 17,441.88 \times ((15,908.88/16,291.31) \times (105.035/104.525) + \\ & \quad (105.035/105.0185 - 105.035/(104.525 + (1-6/31) \times (104.5100 - 104.525)))) \\ &= 17,031.1549... \approx \underline{17,031.15} \end{aligned}$$

5: Treatment of the index value

(1) Retroactively Calculation in the past

The Nikkei 225 Currency Hedged Indexes are to be calculated retroactively back to the base date of September 30, 2004 on the end-of-day basis.

(2) Modification of the index value

In the case the Nikkei Stock Average (Nikkei 225) is modified retroactively, Nikkei 225 Currency Hedged Indexes may also be modified retroactively.

6: Others

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