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EQUITY 101 | Global

Mechanics of Currency Hedged Indices

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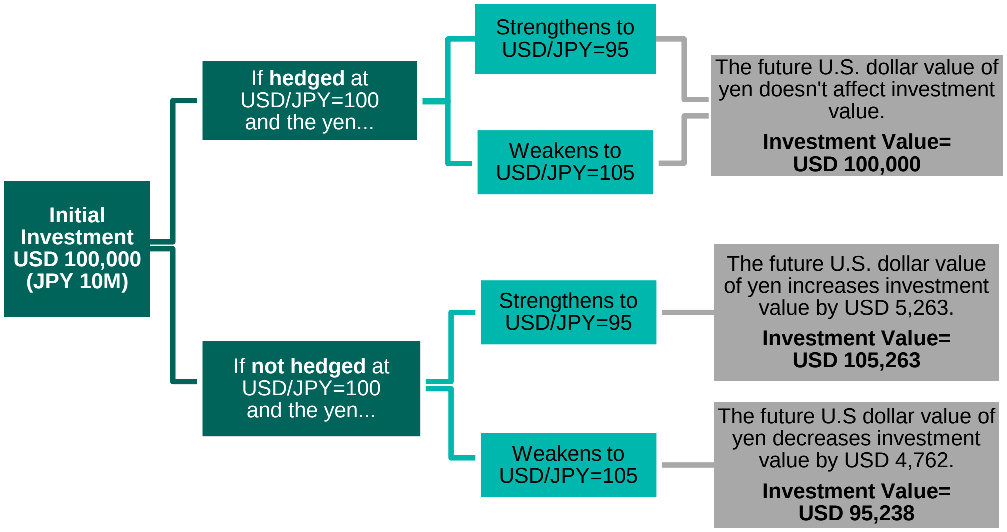
OVERVIEW

Suppose a U.S. investor is bullish on Japanese equities but does not wish to bear the risk of Japanese yen depreciation versus the U.S. dollar. She wants to invest USD 100,000 in Japanese stocks but avoid currency risk. To make her investment, assuming an exchange rate of USD/JPY=100, every USD 1 invested will be converted to JPY 100 in order to purchase the shares. At the end of her holding period, she will sell the shares and receive monetary proceeds denominated in Japanese yen. She will then convert this amount back to U.S. dollars, or in other words, she will sell Japanese yen for U.S. dollars. Since she believes that the future exchange rate may be less favorable in terms of U.S. dollars, she chooses to hedge the currency risk.

Exhibit 1 shows the trade-off she faces. There are two scenarios, hedged or unhedged, for a given hypothetical movement in the U.S. dollar value of the Japanese yen, assuming no change in the value of underlying investments such as stocks or bonds. Hedging aims to ensure that the investor will receive USD 100,000 at the end of her holding period, regardless of exchange rate fluctuations. However, it could result in forfeiting gains if the Japanese yen were to appreciate versus the U.S. dollar. On the other hand, an unhedged position would result in a gain if the Japanese yen appreciates or a loss if it depreciates relative to the U.S. dollar.

Hedging could result in forfeiting any gains that would be made if the Japanese yen were to appreciate versus the U.S. dollar.

Exhibit 1: Hedging Scenarios and Currency Movements



Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes. Exchange rates are hypothetical values used to simplify example. No other investment returns or costs have been factored in the outcome. This example also assumes currency returns are fully offset by hedge returns, but perfect hedges do not exist.

CURRENCY HEDGING IN AN INDEX

Global investors can lock in forward exchange rates to manage potential currency risk by taking positions in currency forward contracts, or by hiring an investment manager to do so. Profits (or losses) from forward contracts are offset by losses (or profits) in the spot value of the currency, thereby negating exposure to the currency. Currency hedged indices are designed to represent this technique within the index calculation. They seek to measure a combination of the performance of an underlying index and that of currency forward contracts used to hedge relevant exchange-rate risk.

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Exhibit 2: Currency and Index Changes

Period	JPY/USD Spot	S&P/TOPIX 150	S&P/TOPIX 150 (USD)	S&P/TOPIX 150 USD Hedged Index
July 31, 2015	123.895	1,389.51	1,440.76	1,915.89
Aug. 31, 2015	121.185	1,279.02	1,358.06	1,760.88
Change in Period (%)	2.24	-7.95	-5.74	-8.09

Source: S&P Dow Jones Indices LLC. Data as of Aug. 31, 2015. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see performance disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 2, we see that during August 2015, the change of the S&P/TOPIX 150 USD Hedged Index (-8.09%) came close to the local currency (Japanese yen) index, the S&P/TOPIX 150 (-7.95%). Returns of currency hedged indices tend to come closer to those of local indices the lower the interest rate differential is between the two relevant countries. Interest rate differentials are reflected in currency forward rates and are the most significant cost to currency hedging. For Japan and the U.S., interest rates are close to one another, and this is reflected in how tightly the August 2015 return of the S&P/TOPIX 150 USD Hedged Index came to that of the local currency S&P/TOPIX 150.

CURRENCY HEDGED INDEX MECHANICS

S&P Dow Jones Indices' standard currency hedged indices are calculated by hedging beginning-of-period balances using rolling one-month forward contracts. The amount hedged is adjusted on a monthly basis.[1] The second-to-last business day of each month is the index reference day. Continuing with the example above, the level of the S&P/TOPIX 150 USD Hedged Index was 1,900.52 as of the reference day in July 2015, and we equate the index level to a hypothetical portfolio value of USD 1,900.52. The equivalent amount of Japanese yen, based on that day's ending spot exchange rate of USD/JPY=124.335, would be JPY 236,301. This is the monetary value, expressed in Japanese yen, to be hedged for the upcoming month. On the rebalancing day, which is the last business day of the month, the index hypothetically enters into a currency forward contract to sell JPY 236,301 at the end of the next month. The one-month forward exchange rate at the close of business on the rebalancing day is USD/JPY=123.859, so we will

[1] For more information on hedged computations, please refer to the "Currency Hedged Indices" section of the Index Mathematics Methodology.

sell JPY 236,301 to buy USD 1,907.82 at the end of the next month. This "transaction" locks in the amount of U.S. dollars the investor will buy at month's end. Note that it does not guarantee that the investor will have sufficient Japanese yen to complete the transaction at the end of August 2015—that is a function of the performance of the underlying index.

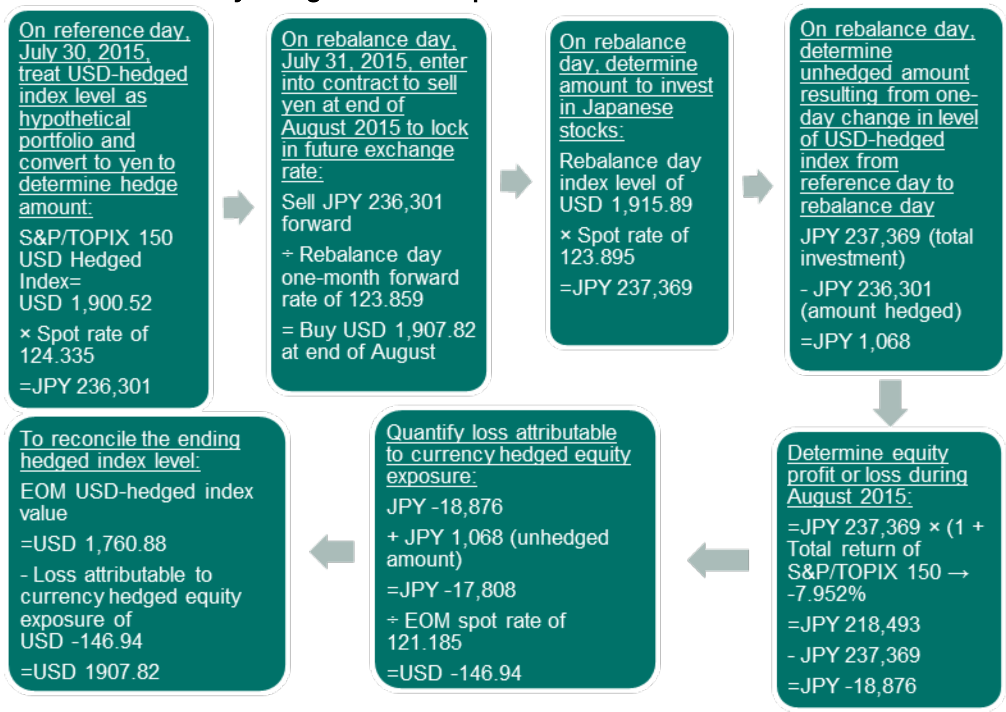
Unhedged equity risk is the main source of risk within a currency hedged index

Equity risk remains unhedged and is the main source of risk within a currency hedged index. Another smaller risk stems from timing. As of the index reference day (July 30, 2015), it is determined that JPY 236,301 will be sold forward the following day (the index rebalance day, July 31, 2015) to receive USD 1,907.82 at the end of August 2015. Those hypothetical trades are filled at the prevailing foreign exchange rate and index level at the close of business on July 31, 2015. From July 30, 2015, to July 31, 2015, the Japanese yen value of the hedged index has changed, and this relatively small difference represents a residual, unhedged currency exposure. If a U.S. investor were to replicate the currency hedged index, on the index rebalance day they would exchange U.S. dollars for Japanese yen at the spot rate. The July 31, 2015, value of the USD hedged index would be USD 1,915.89. The spot exchange rate is USD/JPY=123.895, so they will invest JPY 237,369 in stocks of the S&P/TOPIX 150. As determined on the prior day, they will also enter into a forward contract to sell JPY 236,301 at the end of August 2015. The difference between the amount invested in stocks and the amount hedged with a forward contract is JPY 1,068 and it would be considered unhedged exposure.

As noted previously, however, the equity risk of the entire investment would also be unhedged. Unfortunately for our investor, by the end of August 2015, her investment in Japanese stocks is worth only JPY 218,493, marking a loss of JPY 18,876. At the end of August 2015, she still has an obligation to exchange Japanese yen for U.S. dollars, and we already know that she will buy USD 1,907.82 with the proceeds of her investment. However, she has JPY 18,876 less than when she started. To quantify the loss that is attributable to currency hedged equity exposure, we subtract JPY 1,068 (which was the unhedged Japanese yen value from beginning of August 2015) from the total loss of JPY 18,876. This shows that JPY 17,808 of the total loss resulted from currency hedged equity exposure.

To reconcile the loss due to currency hedged equity exposure with the level of the currency hedged index, we express JPY 17,808 in terms of U.S. dollars and divide by the month-end spot rate of USD/JPY=121.185. This shows the loss in U.S. dollar terms to be USD 146.94, and in index terms it represents an externality that must be accounted for to reconcile the ending hedged index value. If we add USD 146.94 to the ending USD hedged index level of USD 1,760.88 we get USD 1,907.82, the amount we calculated that would be received in U.S. dollars from the currency forward contract. In the real world, this amount would be additional U.S. dollars needed at month's end to fulfill the terms of the currency forward contract that was entered into at the start of the month.

Exhibit 3: Currency Hedged Index Replication and Reconciliation



Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes. There is some rounding used in the example because actual index calculations use more decimal places.

The relatively small amount of residual currency risk is typically much less significant than underlying equity risk, because it represents the currency and equity performance over one day instead of an entire month.

SUMMARY

Currency risk can be largely eliminated once a currency forward contract is in place, but underlying equity risk remains and becomes the main driver of variable performance. As a result, the performance of a currency hedged index may be positive or negative. To reiterate, equity risk is not hedged out like currency risk is. In addition to this source of unhedged risk, there is a smaller one. Because the Japanese yen value of the hedged index on the reference date is different than on the rebalance date (when the currency forward contract is entered into), there is a relatively small amount of residual currency risk remaining in the index. This unhedged risk is typically much less significant than the underlying equity risk, because it represents the currency and equity performance over one day instead of an entire month. During August 2015, the local currency S&P/TOPIX 150 dropped roughly 8%. The poor equity performance was not hedged in the currency hedged version of the index, and it declined about 8%.

Our example illustrates a case in which U.S. investors would have been better off with an unhedged position. Because the value of the Japanese yen appreciated relative to the U.S. dollar, the equity losses would have been partially mitigated by currency appreciation. This is shown by the return of the S&P/TOPIX 150 (USD), which only dropped 5.74%. Hedging is therefore a double-edged sword—it largely removes currency uncertainty, but that involves sacrificing potential currency gains as well as losses.

PERFORMANCE DISCLOSURES

The S&P/TOPIX 150 USD Hedged Index was launched on June 21, 1999. All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency on their products. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indicates introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

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