

S&P Dow Jones Indices

A Division of **S&P Global**

S&P Currency Indices *Methodology*

October 2018

Table of Contents

Introduction	2
Index Objective, Highlights, and Index Family	2
Supporting Documents	2
Index Construction	3
Approaches	3
Index Calculations	3
Total Return Indices	4
Index Maintenance	5
Rebalancing	5
Currency and Currency Hedged Indices	5
Base Dates and History Availability	5
Index Governance	6
Index Committee	6
Index Policy	7
Holiday Schedule	7
Rebalancing	7
Unexpected Exchange Closures	7
Recalculation Policy	7
Real-Time Calculation	7
Contact Information	7
Index Dissemination	8
Tickers	8
Index Data	8
Web site	8
Appendix	9
Methodology Changes	9
Disclaimer	10

Introduction

Index Objective, Highlights, and Index Family

The S&P Currency Indices measure the performance of a given named currency versus the U.S. dollar. Each index represents the performance of a rolling investment in three-month, non-deliverable, forward currency contracts. The indices are rebalanced every three months on the valuation date of the previous three-month contract. Each index has an excess return version, reflecting changes in forwards prices, and a total return version which adds a risk-free rate to the excess return index.

S&P Chinese Renminbi Index. The index is designed to replicate the performance of the Chinese Renminbi versus the U.S. dollar.

S&P Indian Rupee Index. The index is designed to replicate the performance of the Indian rupee versus the U.S. dollar.

Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	Equity Indices Policies & Practices
S&P Dow Jones Indices' Index Mathematics Methodology	Index Mathematics Methodology

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

Index Construction

Approaches

The methodology assumes that three-month currency forward contracts are entered into after the close of trading on each rebalancing date, are held until maturity and are, then, rolled over. Spot and forward exchange rates used for all currencies are in relation to the U.S. Dollar.

Index Calculations

Each index is rebalanced on the valuation date of the previous forward contract. On any date, t , the index is calculated by valuing the three-month forward contract entered into at the prior rebalancing date using a linear interpolation between the current three-month forward rate and the current spot rate.

$$\text{Index Value}_t = \text{Index Value}_{rb} * (1 + \text{Return}_{i,t}) \quad (1)$$

where:

Index Value_{rb} = Index value as of the last rebalancing.

$\text{Return}_{i,t}$ = Return of currency i from the prior rebalancing date to t , calculated as follows:

$$\text{Return}_{i,t} = (3M \text{ Forward Rate}_{i,rb} / \text{Interpolated } 3M \text{ Forward Rate}_{i,t} - 1) / DF_t \quad (2)$$

where:

DF_t = Discount Factor = $(1 + \text{Days left} / 360 * \text{LIBOR}_t)$.

LIBOR_t = Three-month USD LIBOR rate as of date t .

$3M \text{ Forward Rate}_{i,rb}$ = The three-month forward rate of currency i as of the last rebalancing.

$\text{Interpolated } 3M \text{ Forward Rate}_{i,t}$ = The value, as of the close of date t , of a three-month forward contract of currency i entered into at the close of the prior rebalancing, calculated as follows:

$$\text{Interpolated } 3M \text{ Forward Rate}_{i,t} = \text{Spot Rate}_{i,t} + (3M \text{ Forward Rate}_{i,t} - \text{Spot Rate}_{i,t}) * (\text{Days left}) / (\text{Days in period}) \quad (3)$$

where:

$\text{Spot Rate}_{i,t}$ = Spot rate of currency i on date t .

$3M \text{ Forward Rate}_{i,t}$ = Three-month forward rate of currency i on date t .

Days left = Calendar days between the settlement date of the three-month forward contract as of the prior rebalancing and the settlement date of the spot contract on date t .

Days in period = Calendar days between the settlement date of the three-month forward contract on date t and the settlement date of the spot contract on date t .

The source data for forward and spot rates used in (2) and (3) is WM/Reuters. The indices are calculated intraday between 9:30 AM and 4:00 PM ET based on data from Reuters. For intraday calculations bid prices are used for forward rates and ask prices are used for spot rates. Bid prices are used for forward and spot rates for end of day calculations of the S&P Indian Rupee Index.

S&P Chinese Renminbi Index. A closing value for the index is calculated each day using forward rate data from Reuters, taken at 11:00 AM Beijing time and mid-market WM/Reuters fixing for the spot rate. WM/Reuters mid-market fixings rates are taken daily at 04:00 PM London Time. For any day, t , the closing value of the index is calculated using forward rate data as of 11:00 AM Beijing time on date $t+1$. On rebalancing dates, non-deliverable forwards will settle at the spot rate set by the People's Bank of China as displayed on Reuters page SAEC, or Reuters code CNYFIX=SAEC, at 9:30 AM Beijing time. The index will roll into the new three-month, non-deliverable forward at the closing value, 11:00AM Beijing time, using data from Reuters.

S&P Indian Rupee Index. A closing value for the index is calculated each day using data from Reuters, taken at 4:00 PM Singapore time. For any day, t , the closing value of the index is calculated using data as of 4:00 PM Singapore time on date $t+1$. On rebalancing dates, non-deliverable forwards will settle at the spot rate set by the Reserve Bank of India as displayed on Reuters page RBIB, or Reuters code INRFIX=RBIA, at 12:30 PM Mumbai time. The index will roll into the new three-month, non-deliverable forward at the closing value, 4:00PM Singapore time, using data from Reuters.

Total Return Indices

A total return version of each index is calculated, which includes interest accrual on the notional value of the index based on the overnight U.S. Fed Funds rate, as follows:

$$TRIV_t = TRIV_{rb} * Return_{i,t} + TRIV_{rb} * \prod_{i=rb+1}^t (1 + FF_{t-1} * D_{t-1,t} / 360)$$

where:

$TRIV_t$ = Total return index value as of the current date, t .

$TRIV_{rb}$ = Total return index value as of the last rebalancing date, rb .

$D_{t-1,t}$ = Count of calendar days from the previous trading date, $t-1$, to the current date, t .

FF_{t-1} = Federal Funds Overnight Bank Rate as of the last trading date, $t-1$, as reported on Reuters, under RIC USONBFR=, under the open field.

For more information on the index calculation methodology, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Index Maintenance

Rebalancing

Index rebalancings occur on the valuation date of the currently held three-month, non-deliverable forward contract. The S&P Chinese Renminbi Index and S&P Indian Rupee Index begin on January 3, 2006 and January 3, 2003, respectively, and assume a three-month forward contract is entered into on that day. The following rebalancing date is the date on which the three-month forward entered into on January 3rd takes valuation and so forth. A complete rebalancing schedule for the upcoming year is available on request.

Currency and Currency Hedged Indices

Additional currency and currency hedged versions of the indices, as well as maturity, sector and rating-based sub-indices, may be available. For a list of available sub-indices and tickers, please refer to S&P Dow Jones Indices' Fixed Income Index Directory available at www.spdji.com.

For more information on currency and currency hedged indices, please refer to S&P Dow Jones Indices' Fixed Income Index Mathematics Methodology.

Base Dates and History Availability

Index history availability, base dates and base values are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P Chinese Renminbi Index	03/12/2008	01/03/2006	01/03/2006	100
S&P Indian Rupee Index	03/12/2008	01/03/2003	01/03/2003	100

Index Governance

Index Committee

S&P Dow Jones Indices' EMEA Index Committee maintains the indices. The Index Committee meets regularly. At each meeting, the Index Committee reviews any significant market events. In addition, the Index Committee may revise index policy covering rules for timing of rebalancing or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Index Policy

Holiday Schedule

The indices are calculated daily, throughout the calendar year. The only days an index is not calculated are on days when WM/Reuters exchange rates services are not published.

A complete holiday schedule for the year is available at www.spdji.com.

Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

Unexpected Exchange Closures

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Recalculation Policy

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Real-Time Calculation

Real-time, intra-day, index calculations are executed for certain indices, whenever any of their primary exchanges are open. Real-time indices are not restated.

For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Contact Information

For any questions regarding an index, please contact: index_services@spglobal.com.

Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at www.spdji.com, major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media.

Tickers

The table below lists headline indices covered by this document. All currency, currency hedged, risk control, and return type versions of the below indices that may exist are also covered by this document. Please contact index_services@spglobal.com for a complete list of indices covered by this document.

Index	Bloomberg	Reuters
S&P Chinese Renminbi Index	SPCBCNYP	.SPCBCNYP
S&P Chinese Renminbi Total Return Index	SPCBCNY	.SPCBCNY
S&P Indian Rupee Index	SPCBINRP	.SPCBINRP
S&P Indian Rupee Total Return Index	SPCBINR	.SPCBINR

Index Data

Daily index levels and data are available via subscription.

For product information, please contact S&P Dow Jones Indices, www.spdji.com/contact-us.

Web site

For further information, please refer to S&P Dow Jones Indices' Web site at www.spdji.com.

Appendix

Methodology Changes

Methodology changes since January 1, 2015 are as follows:

Change	Effective Date (After Close)	Previous	Methodology Updated
Index Closing Value Calculation for the S&P Chinese Renminbi Index	10/12/2018	A closing value for the index is calculated each day using data from Reuters, taken at 11:00 AM Beijing time. For any day, t , the closing value of the index is calculated using data as of 11:00 AM Beijing time on date $t+1$. On rebalancing dates, non-deliverable forwards will settle at the spot rate set by the People's Bank of China as displayed on Reuters page SAEC, or Reuters code CNYFIX=SAEC, at 9:30 AM Beijing time. The index will roll into the new three-month, non-deliverable forward at the closing value, 11:00AM Beijing time, using data from Reuters.	A closing value for the index is calculated each day using forward rate data from Reuters, taken at 11:00 AM Beijing time and mid-market WM/Reuters fixing for the spot rate. WM/Reuters mid-market fixings rates are taken daily at 04:00 PM London Time. For any day, t , the closing value of the index is calculated using forward rate data as of 11:00 AM Beijing time on date $t+1$. On rebalancing dates, non-deliverable forwards will settle at the spot rate set by the People's Bank of China as displayed on Reuters page SAEC, or Reuters code CNYFIX=SAEC, at 9:30 AM Beijing time. The index will roll into the new three-month, non-deliverable forward at the closing value, 11:00AM Beijing time, using data from Reuters.
Source Data for Forward and Spot Rates	10/12/2018	The source data for forward and spot rates used is Tullett Prebon, via Reuters page PNDF, for end of day calculations, and page PYNDF, for intraday calculations. The indices are calculated intraday between 9:30 AM and 4:00 PM ET based on data from Reuters page PYNDF. Bid prices are used for forward and spot rates for end of day calculations. For intraday calculations bid prices are used for forward rates and ask prices are used for spot rates.	The source data for forward and spot rates used is WM/Reuters. The indices are calculated intraday between 9:30 AM and 4:00 PM ET based on data from Reuters. Bid prices are used for forward and spot rates for end of day calculations. For intraday calculations bid prices are used for forward rates and ask prices are used for spot rates.
Holiday Schedule	10/12/2018	The indices are calculated daily, throughout the calendar year. The only days an index is not calculated are on days when Tullett Prebon exchange rates services are not published.	The indices are calculated daily, throughout the calendar year. The only days an index is not calculated are on days when WM/Reuters exchange rates services are not published.
Federal Funds Rate used in the Total Return Calculation	09/30/2016	Federal Funds Open Rate as reported by Reuters under RIC USONFF=GCMN.	Overnight Bank Funding Rate as reported by Reuters under RIC USONBFR=.

Disclaimer

Copyright © 2018 S&P Dow Jones Indices LLC, a division of S&P Global. All rights reserved. STANDARD & POOR'S, S&P, SPDR, S&P 500, S&P EUROPE 350, S&P 100, S&P 1000, S&P COMPOSITE 1500, S&P MIDCAP 400, S&P SMALLCAP 600, GIVI, GLOBAL TITANS, S&P RISK CONTROL INDICES, S&P GLOBAL THEMATIC INDICES, S&P TARGET DATE INDICES, S&P TARGET RISK INDICES, DIVIDEND ARISTOCRATS, STARS, GICS, HOUSINGVIEWS, INDEX ALERT, INDEXOLOGY, MARKET ATTRIBUTES, PRACTICE ESSENTIALS, S&P HEALTHCARE MONITOR, SPICE, and SPIVA are registered trademarks of Standard & Poor's Financial Services LLC, a division of S&P Global ("S&P"). DOW JONES, DJ, DJIA and DOW JONES INDUSTRIAL AVERAGE are registered trademarks of Dow Jones Trademark Holdings LLC ("Dow Jones"). These trademarks together with others have been licensed to S&P Dow Jones Indices LLC. Redistribution, reproduction and/or photocopying in whole or in part are prohibited without written permission. This document does not constitute an offer of services in jurisdictions where S&P Dow Jones Indices LLC, Dow Jones, S&P or their respective affiliates (collectively "S&P Dow Jones Indices") do not have the necessary licenses. All information provided by S&P Dow Jones Indices is impersonal and not tailored to the needs of any person, entity or group of persons. S&P Dow Jones Indices receives compensation in connection with licensing its indices to third parties. Past performance of an index is not a guarantee of future results.

It is not possible to invest directly in an index. Exposure to an asset class represented by an index is available through investable instruments based on that index. S&P Dow Jones Indices does not sponsor, endorse, sell, promote or manage any investment fund or other investment vehicle that is offered by third parties and that seeks to provide an investment return based on the performance of any index. S&P Dow Jones Indices makes no assurance that investment products based on the index will accurately track index performance or provide positive investment returns. S&P Dow Jones Indices LLC is not an investment advisor, and S&P Dow Jones Indices makes no representation regarding the advisability of investing in any such investment fund or other investment vehicle. A decision to invest in any such investment fund or other investment vehicle should not be made in reliance on any of the statements set forth in this document. Prospective investors are advised to make an investment in any such fund or other vehicle only after carefully considering the risks associated with investing in such funds, as detailed in an offering memorandum or similar document that is prepared by or on behalf of the issuer of the investment fund or other investment product or vehicle. S&P Dow Jones Indices LLC is not a tax advisor. A tax advisor should be consulted to evaluate the impact of any tax-exempt securities on portfolios and the tax consequences of making any particular investment decision. Inclusion of a security within an index is not a recommendation by S&P Dow Jones Indices to buy, sell, or hold such security, nor is it considered to be investment advice.

These materials have been prepared solely for informational purposes based upon information generally available to the public and from sources believed to be reliable. No content contained in these materials (including index data, ratings, credit-related analyses and data, research, valuations, model, software or other application or output therefrom) or any part thereof ("Content") may be modified, reverse-engineered, reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of S&P Dow Jones Indices. The Content shall not be used for any unlawful or unauthorized purposes. S&P Dow Jones Indices and its third-party data providers and licensors (collectively "S&P Dow Jones Indices Parties") do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Dow Jones Indices Parties are not responsible for any errors or omissions, regardless of the cause, for the results obtained from the use of the Content. THE CONTENT IS PROVIDED ON AN "AS IS" BASIS. S&P DOW JONES INDICES PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY

SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Dow Jones Indices Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs) in connection with any use of the Content even if advised of the possibility of such damages.

S&P Global keeps certain activities of its various divisions and business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain divisions and business units of S&P Global may have information that is not available to other business units. S&P Global has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

In addition, S&P Dow Jones Indices provides a wide range of services to, or relating to, many organizations, including issuers of securities, investment advisers, broker-dealers, investment banks, other financial institutions and financial intermediaries, and accordingly may receive fees or other economic benefits from those organizations, including organizations whose securities or services they may recommend, rate, include in model portfolios, evaluate or otherwise address.

The Global Industry Classification Standard (GICS®) was developed by and is the exclusive property and a trademark of S&P and MSCI. Neither MSCI, S&P nor any other party involved in making or compiling any GICS classifications makes any express or implied warranties or representations with respect to such standard or classification (or the results to be obtained by the use thereof), and all such parties hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of such standard or classification. Without limiting any of the foregoing, in no event shall MSCI, S&P, any of their affiliates or any third party involved in making or compiling any GICS classifications have any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.