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GLOBAL INDEX GROUP

AUGUST 31, 2006

Index Guide

GLOBAL

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# Citigroup Global Fixed-Income Index Catalog — 2006 Edition

- World Government Bond Index
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- US Broad Investment-Grade Bond Index
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# Citigroup Global Fixed-Income Index Catalog — 2006 Edition

# Contents

# The Global Fixed-Income Index Group

**Figure 1. Citigroup Global Fixed-Income Index Group — Regional Contacts**


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# Characteristics of a Good Benchmark

The Citigroup indexes are designed to provide relatively stable and easily replicable benchmarks. We achieve this goal by adhering to the following guidelines:

**Relevance.** An index should be relevant to investors. At a minimum, it should track those markets and market segments of most interest to investors.

**Comprehensiveness.** An index should include all opportunities that are realistically available to market participants under normal market conditions while measuring the performance of new investments and existing holdings.

**Replicability.** The total returns reported for an index should be replicable by market participants. It must be fair to investment managers who are measured against it and to sponsors who pay fees or award management assignments based on performance relative to it. Furthermore, over time, an index must represent a realistic baseline strategy that a passive investor could have followed. Accordingly, information about index composition and historical returns should be readily available.

**Stability.** An index should not change composition often, and all changes should be easily understood and highly predictable. It should not be subject to opinions about which bonds or equities to include on any particular day. However, index composition must change occasionally to ensure that it accurately reflects the structure of the market. A key virtue of an index is to provide a passive benchmark; investors should not be forced to execute a significant number of transactions just to keep pace.

**Barriers to entry.** The markets or market segments included in an index should not contain significant barriers to entry. This guideline is especially applicable to an international index in which an included country may discourage foreign ownership of its bonds or participation in its equity market.

**Expenses.** In the normal course of investing, expenses related to withholding tax, safekeeping, and transactions are incurred. For a market or market segment to be included, these ancillary expenses should be well understood by market participants and should not be excessive. For example, if expenses are unpredictable or inconsistently applied, an index cannot hope to fairly measure market performance.

**Simple and objective selection criteria.** A clear set of rules should govern inclusion of bonds or markets in an index, and investors should be able to forecast and agree on changes in composition.

This list of desirable characteristics may not be exhaustive, and different investors may place different emphasis on each. In constructing indexes, some desirable characteristics may have to be sacrificed to ensure that others are met. However, it is critical that an index follows objective rules that are well defined so that all interested parties can understand how to apply the information to their particular situation.

# Historical Summary of Index Introductions

**Figure 2. Historical Summary of Index Introductions**

| Year Introduced | Index | Base Date |
|---|---|---|
| 1978 | US Treasury-Bill and Certificate-of-Deposit Indexes | December 31, 1977 |
| 1981 | World Bond Index[a] | December 31, 1977 |
| 1981 | World Money Market Index[b] | December 31, 1977 |
| 1985 | US Broad Investment-Grade (USBIG) Bond Index | December 31, 1979 |
| 1985 | US Treasury Benchmark (On-the-Run) Indexes | December 31, 1979 |
| 1986 | World Government Bond Index (WGBI) | December 31, 1984 |
| 1986 | US Large Pension Fund (LPF) Baseline Bond Index | December 31, 1979 |
| 1986 | Long-Term High-Yield Index | December 31, 1979 |
| 1987 | Targeted Index Matrix Series (TIMS)[c] | December 31, 1983 |
| 1988 | Currency-Hedged World Government Bond Index | December 31, 1984 |
| 1988 | High-Yield 7+ Year Index (Formerly the High-Yield Composite Index) | December 31, 1984 |
| 1988 | Core ⊕ 3 and Core ⊕ 5 Indexes | December 31, 1979 |
| 1988 | US Treasury Yield Curve Average Indexes | December 31, 1986 |
| 1990 | US High-Yield Market Index | December 31, 1988 |
| 1991 | Extended High-Yield Market Index[d] | December 31, 1990 |
| 1991 | Brady Bond Index[e] | March 31, 1990 |
| 1992 | Group-of-Seven (G-7) Government Bond Index | December 31, 1984 |
| 1992 | Group-of-Five (G-5) Government Bond Index | December 31, 1984 |
| 1992 | Global Government Composite Bond Index[f] | September 30, 1992 |
| 1994 | Eurodollar Bond Index | June 30, 1993 |
| 1994 | US (New) Large Pension Fund Baseline Bond Index[g] | December 31, 1979 |
| 1994 | Emerging Markets Mutual Fund (EMMF) Debt Index[h] | December 31, 1993 |
| 1995 | Euro-Deutschemark, Eurosterling, and Euroyen Bond Indexes[i] | December 31, 1994 |
| 1996 | ECU Bond Index[i] | December 31, 1995 |
| 1996 | Government and Eurobond Composite Index (GECI)[j] | December 31, 1995 |
| 1997 | US Inflation-Linked Securities Index (ILSI) | February 28, 1997 |
| 1997 | Jumbo Pfandbrief Index | June 30, 1997 |
| 1998 | US Treasury STRIPS Index | December 31, 1991 |
| 1998 | EMU Government Bond Index (EGBI) | December 31, 1998 |
| 1998 | Euro Broad Investment-Grade (EuroBIG) Bond Index | December 31 1998 |
| 1999 | Float-Adjusted Mortgage Index | June 30, 1999 |
| 2000 | World Broad Investment-Grade (WorldBIG) Bond Index | December 31, 1998 |
| 2000 | Australian Broad Investment-Grade (AusBIG) Bond Index | June 30, 1999 |
| 2000 | US Agency Zero 10+ Index | July 31, 2000 |
| 2002 | Global Emerging Market Sovereign Bond Index (ESBI) | December 31, 1995 |
| 2002 | US High-Yield Market Capped Index | December 31, 2001 |
| 2003 | Polish Government Bond Index | December 31, 1999 |
| 2003 | Singapore Government Bond Index | December 31, 1999 |
| 2005 | Asian Government Bond Indexes | December 31, 2004 |
| 2005 | Japanese Inflation-Linked Securities Index | June 30, 2004 |
| 2006 | Dow Jones Citigroup® Sukuk Index | September 30, 2005 |

[a] Discontinued as of December 31, 1995. [b] Redefined as of January 1999, with history dating to January 1998. [c] Discontinued as of March 31, 2005. [d] Discontinued as of December 31, 1998. [e] Market coverage of Brady bonds was migrated to the ESBI Index. Brady bond performance and characteristics will be available via the Brady bond sector of the ESBI family of indexes. [f] Discontinued August 31, 2006. [g] Refined as of May 1994, with history dating back to 1980. Replaced the old LPF Index in July 1995. [h] Discontinued as of June 30, 2003. An alternative to the EMMF Index is our ESBI-Capped Index, which limits exposure to any one country by placing a ceiling on the par value contribution of each country. [i] The Euro-Deutschemark Bond and ECU Bond indexes were discontinued as of December 31, 1998. Most members of these indexes are now included in the EuroBIG Index. [j] Discontinued as of December 31, 2001.
Source: Citigroup Index LLC.

## Where to Find the Citigroup Fixed-Income Indexes

Our indexes are widely followed and broadly published. We employ many methods of distribution to allow for easy access to our indexes. In this section, we highlight the distribution channels that incorporate our index products. Although the main vehicles that we use to distribute index information are the Citigroup Fixed-Income Index website (www.yieldbook.com) and The Yield Book®, one can get extensive information from several independent sources. The level of data carried by these services varies from monthly sector level returns to details on the individual security holdings of each index.

**Figure 3. Where to Find the Citigroup Fixed-Income Indexes**

| | |
|---|---|
| **Citigroup** | |
| Citigroup Fixed-Income Index Website (http://www.yieldbook.com/) | Citigroup DIRECT Website (http://fidirect.citigroup.com) |
| The Yield Book® | Citigroup Smith Barney (http://www.smithbarney.com/fii) |
| Total Rate-of-Return Indexes (Citigroup monthly publication) | |
| International Market Indexes (Citigroup monthly publication) | |
| **Financial News Organizations** | |
| Bloomberg SBI<GO>; SBBI<GO> (Downloadable) | Global Money Management (Biweekly) |
| Reuters pages SOLR-Z | Global Finance (Monthly) |
| The Economist (Weekly) | Greek Financial Press |
| Financial Times (Daily) | International Financing Review (IFR) (Weekly) |
| Borsen Zeitung (Daily) | Latin Finance (Monthly) |
| Il Sole-24 Ore (Daily) | |
| **Data and Analytic Vendors** | |
| ABIC | Micropal |
| Albridge Solution | Mitsubishi Asset Brains |
| Bank Hapoalim | Mitsui Asset Trust |
| Bank of New York | Mizuho Research Institute |
| BARRA | Mobiüs Group |
| Blackrock | Morningstar, Inc. |
| Brainpower | Nikko Financial Intelligence |
| Capital Mgmt Sciences (CMS) | Nomura Funds Research & Technology |
| Confluence Technologies | Nomura Research Institute |
| Daiwa Institute of Research | Northern Trust Custody |
| DPG | Quantec Investment Technologies |
| eVestment Alliance | QUICK Corporation |
| FactSet Data Systems | Ratings & Investments |
| Financial Express | RBC Dexia Investor Trust Services |
| Fininfo/Europerformance | Reuters Ltd. |
| GreenHill Partners | Richards & Tierney |
| Haver Analytics | RIMES Technologies |
| Ibbotson Associates | RiskMetrics |
| Informa Financial Solutions | Strategic Financial Solutions (Pertrac) |
| Interactive Data Corporation | Sungard Frontier Analytics |
| Investor Force | Sungard Shaw Data Services |
| Japan Pension Navigator | Thomson Financial Companies |
| Japan Trustee Services Bank | Trust & Custody Services Bank |
| Jiji Press Ltd. | Watson Wyatt K.K. |
| JP Morgan Chase Custodian | Wilshire Associates |
| Master Trust Bank of Japan, Ltd. | Wilson Associates |
| Mellon Analytical Solutions | Zephyr Associates, Inc. |
| Mellon Bank | |

Source: Citigroup Index LLC.

# General Methodology — Fixed-Income Indexes

All Citigroup indexes follow the general methodology outlined in this section. When necessary, we elaborate on the explanations or provide more detailed information in a separate section on each index.

## Maturity and Issue Size

The Citigroup fixed-income indexes measure the total-rate-of-return performance for bond markets with a remaining maturity of at least one year. In addition, each market has a minimum size criterion designed to include only those bonds that are "reasonably available" for institutional investors under normal market circumstances. The specific size criterion will be discussed in the individual index sections.

Money market indexes measure the performance of instruments with maturities of 12 months or less.

## Pricing

Reliable pricing of each security in our indexes is essential to ensure reliable index values and returns. For monthly returns, traders' bid-side prices (mid-prices for the JGB market) are collected on the last business day of every month, generally at the close of the local market. All securities in our US domestic indexes and Canadian Government Bond Index are priced as of 3:00 p.m. Eastern Standard Time (EST) to reflect the futures close. In the event of an early cash or futures market close, we still use the futures close to time our pricing. For daily return calculations only, trader pricing may be supplemented with matrix pricing. When necessary, outside pricing sources are used for some securities to ensure completeness.

**Figure 4. Local Market Times Used for Pricing**

| | | | |
|---|---|---|---|
| Australia | 4:30 p.m. (Sydney) | EMU Bloc | 4:15 p.m. (London) |
| New Zealand | 4:30 p.m. (Wellington) | Scandinavia | 4:15 p.m. (London) |
| Japan | 3:00 p.m. (Tokyo) | United Kingdom | 4:15 p.m. (London) |
| Singapore | 4:30 p.m. (Singapore) | Jumbo Pfandbrief | 3:30 p.m. (London) |
| Canada | 3:00 p.m. (New York) | Switzerland | 5:00 p.m. (Zurich) |
| United States | 3:00 p.m. (New York) | Poland | 4:30 p.m. (Warsaw) |

Source: Citigroup Index LLC.

## Index Data Delivery

The following are the expected delivery times for the indexes.

- Daily WGBI, AGBI, and AusBIG Index returns reports (PDF files): 6:00 p.m. EST, same day.
- Daily profiles and returns for all other markets: 11:45 p.m. EST, same day.
- Month-end daily profile and returns: 9:00 p.m. EST, first business day using US calendar.
- Monthly profile and returns: 9:00 p.m. EST, first business day using US calendar.

Please note that under extenuating circumstances, index production may be delayed. Production delays are posted on our index website (www.yieldbook.com). By subscribing to Production News, website users will automatically receive notification regarding delays in data delivery.

### Index Profile

With the growing importance of global indexes to fund managers throughout the world, it is important for us to communicate the new index preliminary profile on a timetable that will provide sufficient time for fund managers to respond to changes in their benchmarks within their own time zone.

The profile fixing enables us to disseminate index information ahead of the month-end date so that investors have time to prepare rebalancing transactions.

We publish a schedule of fixing dates on our Citigroup Fixed-Income Index Website and in our monthly publications. These dates are determined by the rule that there must be four (4) business days after the fixing date and before the calendar end of the month in all of the following business regions: the United States, Japan, the United Kingdom, EMU (specifically Germany), and Australia.

For an issue to be eligible for inclusion in an index, all information on the issue must be publicly available on or before the fixing date, and the first settlement date of the issue must be on or before the end of the month. We impose this constraint to ensure the indexes are as representative as possible of the investment opportunities that exist in the markets for the period that they cover.

At the same time, bonds that no longer meet the maturity (that is, an average life of less than one year from the last calendar day of the month), amount outstanding, or rating criteria are removed. Any buyback or reverse auction occurring on or before fixing causes the bond to be removed from the index.

After the release of the preliminary profile and prior to the end of the month, we will continue to track market activities and will remove any issues that are called, tendered, or defaulted. We also may revise the preliminary profile for corrections.

The index constituents remain the same for the calendar month, and all interim returns are calculated based on its composition. Reconstitution on a monthly basis, together with the large number of bonds in the indexes, provides a reasonable compromise between stability and comprehensiveness.

### Settlement

For daily calculations, we assume that indexes settle on a same-day basis except on the last business day of the month, when settlement is the last calendar day. Monthly holding periods, therefore, are exactly one calendar month. For example, the January return period would run from the close on December 31 to the close on January 31, regardless of the last business day. However, the last business day in each local market is used for pricing.

### Return Computation

Total returns are computed on the assumption that each security is purchased at the beginning of the period and sold at the end of the period. (Bid-side valuations are used except for the JGB market where mid-prices are used.) An issue's total rate of

return is the percentage change in its total value over the measurement period (see Figure 5).

The components of total return are price change, principal payments, coupon payments, accrued interest, and reinvestment income on intramonth cash flows. In the case of multicurrency or nonbase indexes, the total return also includes currency movement. The total returns are market-capitalization weighted using the security's beginning-of-period market value.

**Figure 5. Total Rate-of-Return Calculation Methodology**

| | | |
|---|---|---|
| Beginning-of-Period Value | = | (Beginning Price + Beginning Accrued) x Beginning Par Amount Outstanding |
| End-of-Period Value | = | [(Ending Price + Ending Accrued) x (Beginning Par Amt. Outstanding - Principal Payments)] + Coupon Payments + Principal Payments + Reinvestment Income |
| Total Rate of Return (%) | = | [(End-of-Period Value/Beginning-of-Period Value)-1] x 100 |

A note on precision: Returns are computed to at least six decimal places but reported to a maximum of four. In addition, owing to rounding errors inherent in computer floating-point arithmetic, the last digit in any reported value may sometimes be off by one from its true value.
Source: Citigroup Index LLC.

## Return Computation — Base Currency Returns, Unhedged

We calculate returns in a base currency in the following way:

**Figure 6. Total Rate-of-Return Calculation Methodology (Unhedged)**

| | | |
|---|---|---|
| Total Rate of Return (%) | = | (1+ (Local Currency Return/100)) x ((End-of-Month Spot Rate/Beginning-of-Month Spot Rate)-1) x 100 |

Source: Citigroup Index LLC.

This equation holds true only if the spot rates are quoted as base currency per unit of foreign currency.

## Return Computation — Base Currency Returns, Currency-Hedged

We compute the monthly currency-hedged return by using a rolling one-month forward exchange contract as a hedging instrument. The face value of the contract is equal to the estimated end-of-month full market value. To calculate this value, we assume that the bond's yield is unchanged from the beginning of the month. We then account for any known cash flows, such as coupon or principal payments, and add in interest expected to accrue for the period. This strategy leaves the intramonth changes in bond prices from yield movements unhedged. Any principal movement resulting from yield change is then settled at end-of-month spot exchange rates. We give an example of the calculation formula from the point of view of a US investor in Figure 7.

**Figure 7. Currency-Hedged Monthly Return Calculation Methodology**

| | |
|---|---|
| Beginning-of-Period Value | [(Beginning Price + Beginning Accrued) x (Beginning Par Outstanding)] x [Beginning-of-Period Spot Exchange Rate (US Dollar/Local Currency)] |
| End-of-Period Value | [(End-of-Period Local Currency Value, Assuming Unchanged Yield + Known Intramonth Cash Flows and Interest Expected to Accrue) x Beginning-of-Period One-Month Forward Exchange Rate (US Dollar/Local Currency)] + [Change in Market Value of Principal Amount Due to Yield Change x (End-of-Period Spot Exchange Rate (US Dollar/Local Currency)] |
| Total Rate of Return (%) | [(End-of-Period Value/Beginning-of-Period Value)–1]*100 |

Source: Citigroup Index LLC.

### Maturity Sector

In addition to the broad categories that we publish, we provide subsector breakdowns for many of our indexes. One such subdivision is based on the remaining maturity of the underlying securities. We define our maturity sector buckets by including all underlying issues with a remaining average life at least equal to the lower bound, but less than the upper bound of the particular category. For example, the one- to three-year sector of the USBIG Index would include all securities in the USBIG Index with remaining average life of at least one year, but less than three years. We then hold the set of bonds constant for the calculation month, even though the average life declines. The only exception to this rule is the mortgage sector, which we include in its entirety in the one- to ten-year sector.

### Country-of-Issuer Classification

We use the nationality of an issuer as another method of subdividing the index. In general, the country of issuer is based on the domicile of the parent company. With global consolidation becoming an everyday part of business, the country-of-issuer classification can become somewhat obscure. For this classification, we have adopted the following approach:

An overseas operating subsidiary assumes the nationality of its parent if it is guaranteed by its parent; otherwise, it retains its own nationality. For example, Toyota Motor Credit Corporation, an operating subsidiary of Toyota Motor Company (registered in Japan), assumes its own nationality of the United States.

A special purpose, offshore, debt-issuing subsidiary assumes the nationality of its parent, whether or not guaranteed by the parent. For example, BP Capital BV (a financing vehicle registered in the Netherlands) assumes the nationality of its ultimate parent, British Petroleum Company plc (registered in the United Kingdom).

If any ambiguity exists, we consult our corporate industry analysts and evaluate implied credit risk to determine the classification.

### Index Quality

An index quality is assigned to each index bond as of profile fixing. The quality is first mapped to the S&P rating. If a bond is not rated by S&P, we define the index quality as the S&P equivalent of the Moody's rating. For split-rated bonds in an investment-grade index, we assign the investment-grade rating to the index quality. These ratings remain unchanged for the entire performance month.

### Exchange Rates

The Citigroup family of global bond indexes uses the WM/Reuters closing spot and forward rates. The WM Company takes several snapshots at regular intervals centered on the fixing time of 4:00 p.m. London time and selects the median rate for each currency. All rates are mid-market quotations and appear on Reuters (see WMRSPOT01).

### Data Correction Policy

While every effort is made to minimize the restatement of data, it is sometimes necessary based on the magnitude of the error. These circumstances can be caused by, but not limited to, calculation error as a result of pricing error, missing data or

change in indicative data. When this occurs, we review the impact of the error to determine whether restatement is necessary. Some guidelines in making this determination are the magnitude of the error, the overall impact on the data, the sector impacted, and whether the error affects daily and/or monthly data.

If we find it necessary to restate, a notification will be sent out and the data will be redistributed. An announcement will also be posted on our index website (www.yieldbook.com). By subscribing to Production News, website users will automatically receive notification regarding any corrections.

# World Broad Investment-Grade (WorldBIG) Bond Index

In constructing the World Broad Investment-Grade (WorldBIG) Bond Index, we use the World Government Bond Index (WGBI) as the core, and include sectors from our broad family of indexes that are targeted to global investors and that are of most interest to them. In addition, we believe that it is important to consider the higher liquidity needs and higher transaction costs facing a global investor. Therefore, we impose larger minimum issue sizes to help satisfy this need. We believe that this results in an index that is truly focused on the large issuers that are of most interest to the traditional institutional investor base.

Figure 8 describes the major indexes that make up the WorldBIG Index.

**Figure 8. World Broad Investment Grade (WorldBIG) Bond Index — Composition Comparison With Stand-Alone Indexes**

| Index | Composition as Stand-Alone Index | Composition in WorldBIG |
|---|---|---|
| WGBI | Entire index | Entire index |
| USBIG | Minimum issue size for credit/asset backed: US$250 million. | Minimum issue size for credit/asset-backed: US$500 million. No zero-coupon bonds. |
| EuroBIG | Entire index | Entire index |
| Euroyen | Entire index | Entire index |
| Eurodollar | Minimum issue size: Corporate/financial/asset-backed: US$250 million. | Minimum issue size: Corporate/financial/asset-backed: US$500 million. No zero-coupon bonds. |
| Eurosterling | Minimum issue size: £200million. | Minimum issue size: £300 million. |

Source: Citigroup Index LLC.

Figure 9 provides a more detailed description of the design criteria and calculation assumptions of the WorldBIG Index.

**Figure 9. World Broad Investment-Grade (WorldBIG) Bond Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed Rate, No Zero-Coupon Bonds Except for Domestic Sovereign Bonds (WGBI) |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| **Minimum Size Outstanding by Currency** | |
| US Dollar | Domestic Sovereign: US$1 billion public amount outstanding<br>US agency/supranational: US$1 billion<br>Credit/asset-backed: US$500 million<br>Mortgage Coupon: US$5 billion (Origination year minimum: US$1 billion)<br>Global: US$500 million<br>Eurodollar: US agency and supranationals at US$1 billion, Other: US$500 million |
| Japanese Yen | Domestic Sovereign: ¥500 billion, 20- and 30-year bonds: ¥450 billion<br>Euroyen: ¥50 billion |
| Euro | EMU Sovereigns: €1 billion or the equivalent for nonredenominated bonds<br>Other: €500 million or the equivalent for nonredenominated bonds |
| UK Sterling | Domestic Sovereign: £410 million<br>Eurosterling: £300 million |
| Australian Dollar | Domestic Sovereign: A$250 million net of LCIR amounts |
| Canadian Dollar | Domestic Sovereign: C$1 billion |
| Danish Krone | Domestic Sovereign: DKr10 billion |
| Norwegian Krone | Domestic Sovereign: NOK20 billion |
| Polish Zloty | Domestic Sovereign: PLN1 billion |
| Swedish Krona | Domestic Sovereign: SEK10 billion |
| Swiss Franc | Domestic Sovereign: Sfr1 billion |
| Minimum Quality | BBB-/Baa3 by either S&P or Moody's with the following exceptions: Unrated Jumbo Pfandbrief, which are shadow-rated AAA; unrated bonds issued by or guaranteed by a sovereign or a supranational issuer, which are assigned the rating of the issuer or guarantor. |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Calculation Frequency | Daily |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of month, when settlement is last calendar day |
| Reinvestment of Cash Flow | At daily average of local currency one-month Eurodeposit rate, except Australia. Australia: Australia dollar bank bill swap reference rate (BBSW). Calculated from actual scheduled payment date of cash flow through end of reporting period. |
| Pricing | Individual Citigroup trader pricing as of local market close for each bond at month-end, except for Swiss Treasuries for which a major market maker provides prices. Some US agency/credit securities are matrixed for daily calculation only |
| Price Adjustments | Mortgages: Carry-adjusted to reflect the difference between index settlement dates and standard PSA settlement dates |
| Volatility | US Nonmortgages: 10% single volatility. US Mortgages: Market-implied volatility (two-factor skew model) |
| Base Date | December 31, 1998 |

Source: Citigroup Index LLC.

## Market Inclusion

Because the WorldBIG Index has the WGBI as its core, markets will be subject to the same entry criteria already established for the WGBI, as outlined in Figure 11. In addition, we include credit market coverage for the four largest currency sectors, namely US dollar, euro, Japanese yen, and UK sterling. We may add other credit sectors as we expand our market coverage, but we will use our market expertise to determine their eligibility, because some domestic credit markets are truly targeted to domestic investors and, therefore, are not an appropriate fit for this global benchmark.

## Sector Classifications

Most portfolio strategies involve a separate risk/reward analysis of each asset class. In aggregating the sectors from the various indexes to form the WorldBIG Index, it is important to ensure consistency in terms of the definitions of the various asset class sectors across countries and currencies. This clearly delineates risks for the global investor and assists risk/reward analysis in assessing portfolio strategies. We have divided the overall index into three main asset classes, as outlined in Figure 10: (1) government/ government-sponsored; (2) collateralized; and (3) corporate. In addition, we embraced the terminology of covered bonds for all Pfandbrief and Pfandbrief-like securities predominant in the euro region. This classification scheme differs from that used in most existing stand-alone indexes.

**Figure 10. World Broad Investment Grade (WorldBIG) Bond Index — Sector Classification**

| Sovereign/Sovereign-Guaranteed | Collateralized | Corporate — Utility |
|---|---|---|
| Domestic Sovereign (WGBI) | Mortgage-Backed Securities | Electric |
| Foreign Sovereign | Covered | Gas |
| Sovereign-Guaranteed | ➤ Jumbo Pfandbrief | Telecommunication |
| | ➤ Other Covered | Other Utility |
| | Asset-Backed Securities | |
| **Government-Sponsored/Regional Government** | **Corporate — Industrial** | **Corporate — Finance** |
| Agency | Consumer | Banks |
| Supranational | Energy | Independent Finance |
| Other Sovereign-Sponsored | Manufacturing | Insurance |
| Regional Government | Service | Other Finance |
| Regional Government-Guaranteed | Transportation | |
| Regional Government-Sponsored | Other Industrial | |

Source: Citigroup Index LLC.

# World Government Bond Index (WGBI)

At present, the World Government Bond Index (WGBI) includes the 22 government bond markets of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Market capitalization and investability criteria determine market eligibility. A market's eligible issues (see Figures 11 and 12) must total at least US$20 billion, €15 billion, and ¥2.5 trillion for the market to be considered eligible for inclusion. With the advent of EMU, the euro area is treated as a single market and individual EMU government debt markets are not subject to market-size criteria. We impose a minimum credit quality of BBB-/Baa3 by either S&P or Moody's for all issuers to ensure that the WGBI remains an investment-grade benchmark.

In addition, we consider barriers to entry a reason for exclusion. A market being considered for inclusion should actively encourage foreign investor participation and show a commitment to its own policies. Once the market satisfies the market-size, credit, and barriers to entry criteria for three consecutive months, it is added to the WGBI beginning with next month's profile.

We have established guidelines by which markets exit the index. When the market capitalization of eligible issues falls below half of all entry-level market-size criteria for three consecutive months, the market will be removed from the next month's profile and moved to the Additional Market Indexes. In addition, any market that no longer satisfies other inclusion criteria — credit or barriers to entry — will also move to the Additional Market Indexes.

We also track a series of markets called the Additional Market Indexes. These indexes include bond markets that do not at present qualify for inclusion in the WGBI based on the criteria outlined above. Although the Additional Market Indexes still carry the "waiting room" concept, this does not imply that the country is ready for inclusion into the WGBI, but instead that the market is tracked. To join WGBI, the market must satisfy size, credit, and barriers to entry requirements. A country may stay in Additional Markets because it discourages foreign ownership, for example, even if it meets the size and credit criteria. Once a market has met all three requirements, an announcement will be made and the three-month waiting period will begin.

The composition of the WGBI has changed considerably since its introduction. Figure 13 reviews the chronological events affecting the construction or calculation of this index.

**Figure 11. World Government Bond and Related Indexes — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Varies by market as follows<br>Australia: A$250 million (Net of LCIR amounts)<br>Canada: C$1 billion<br>Denmark: DKr10 billion<br>EMU Markets: €1 billion<br>Japan: ¥500 billion, 20- and 30-year bonds: ¥450 billion<br>New Zealand: NZ$100 million<br>Norway: NOK20 billion<br>Poland: PLN1 billion<br>Singapore: S$1.5 billion<br>Sweden: SEK10 billion<br>Switzerland: Sfr1 billion<br>United Kingdom: £410 million<br>United States: US$1 billion public amount outstanding |
| Composition | Sovereign debt denominated in the domestic currency |
| Minimum Quality | BBB-/Baa3 by either S&P or Moody's |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Reinvestment of Cash Flow | At daily average of local currency one-month Eurodeposit rate, except Australia.<br>Australia: Australia dollar bank bill swap reference rate (BBSW). Calculated from actual scheduled payment date of cash flow through end of reporting period. |
| Pricing | Citigroup is the source for all except Switzerland, where a major market maker provides prices. All pricing generally taken as of the local market close (see Figure 4 in the General Methodology section) |
| Calculation Frequency | Daily |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except for last business day of the month, when settlement is last calendar day |
| Base Date | December 31, 1984 |

Source: Citigroup Index LLC.

**Figure 12. Composition of the World Government Bond Index (WGBI) and Related Indexes by Sector**

| WGBI Market | Securities Included | Securities Excluded |
|---|---|---|
| Australia | Fixed-rate noncallable bonds | Inflation index-linked and tax rebate bonds |
| Austria | Fixed-rate noncallable (Bundesanleihen) and fixed-rate bonds originally issued in any euro-converting currency | Bundesobligationen |
| Belgium | Fixed-rate noncallable bonds | Philippe bonds (retail-directed) |
| Canada | Fixed-rate noncallable bonds | Savings bonds, real-return bonds |
| Denmark | Fixed-rate noncallable bond and Treasury Notes | Mortgage credit issues |
| Finland | Bullet bonds and fixed-rate bonds originally issued in any euro-converting currency | Housing Fund and Yield bonds |
| France | Fixed-rate noncallable — Obligations Assimilables du Trésor (OATs) and Bons du Trésor à Intérêt Annuel Normalisé (BTANs) | Variable-rate securities |
| Germany | Fixed-rate noncallable bonds (Bundesrepublic, Schatzanweisungen, Bundesobligationen, Unity bonds, Treuhandanstalt, and Treuhandobligationen) | Schuldscheine, Unverzinsliche, Schatzanweisungen, Bundespost, Bundesbahn, European Recovery Program Bonds |
| Greece | Fixed-rate noncallable bonds issued in any euro-converted currency | Variable-rate bonds |
| Ireland | Fixed-rate noncallable bonds | Variable-rate bonds |
| Italy | Fixed-rate noncallable (Buoni del Tesoro Poliennale (BTPs)) and fixed-rates bonds originally issued in any euro-converting currency | Floating-rate bonds (Certificati di Credito del Tesoro (CCTs)) |
| Japan | Fixed-rate bonds | Discount bonds, floating-rate bonds, private placements, inflation-indexed bonds, and JGBs for individuals |
| Netherlands | Fixed-rate noncallable bonds | Private placements (onderhandse leningen) |
| Norway | Benchmark bonds | Loans and lottery loans issued before 1991 |
| Poland | Fixed-rate noncallable bonds (including zero-coupon bonds) | Treasury convertible bonds, floating-rate bonds |
| Portugal | Fixed-rate noncallable bonds (Obrigaçoes do Tesouro (OTs)) and fixed-rate bonds originally issued in any euro-converting currency | Floating-rate debt (FIPs and OCAs) |
| Singapore | Fixed-rate (including zero-coupon bonds) | Index-linked bonds; callable/puttable bonds |
| Spain | Fixed-rate noncallable bonds (Bonos and Obligationes del Estado) and fixed-rate bonds originally issued in any euro-converting currency | Discount bonds (Letras and Pagares del Tesoro) |
| Sweden | Fixed-rate noncallable bonds (Riksobligationer) | Retail-directed Treasury bonds and inflation-index-linked bonds |
| Switzerland | Fixed-rate noncallable and callable bonds | Book liabilities and private placements |
| United Kingdom | Fixed-rate noncallable and callable bonds, partly paids, convertible (into other gilt issues) bonds, and perpetuals (undated) | Inflation-index-linked bonds; rump gilts |
| United States | Fixed-rate noncallable and callable bonds | Savings bonds, inflation-indexed securities, STRIPS |
| **Additional Markets** | | |
| New Zealand | Fixed-rate noncallable bonds | Index-linked bonds |
| Korea | Fixed-rate noncallable and callable bonds | Monetary Stabilization Bonds, STRIPS |
| Malaysia | Fixed-rate noncallable and callable bonds | Government Investment Issues (GII) |
| Taiwan | Fixed-rate noncallable and callable bonds | |

Source: Citigroup Index LLC.

**Figure 13. Chronological Summary of World Government Bond Index (WGBI) Events/Enhancements**

| Date Introduced | Enhancement/Event |
|---|---|
| May 1987 | Introduction of the After-Tax Indexes |
| March 1988 | Introduction of the Currency-Hedged Indexes |
| May 1988 | Inclusion of BTANs in the French sector |
| November 1988 | Inclusion of Bundesobligationen in the German sector |
| April 1989 | Inclusion of Denmark in the World Government Bond Index as a new country sector<br>Introduction of the Currency-Hedged After-Tax Indexes |
| July 1991 | Minimum size eligibility increased to US$100 million |
| October 1992 | Inclusion of Belgium, Italy, Spain, and Sweden in the WGBI as new country sectors<br>Exclusion of Switzerland from the World Government Bond Index<br>Introduction of multiple composite indexes<br>Introduction of Additional Market Indexes — Austria, Ireland, and New Zealand<br>Minimum size eligibility changed to a local currency standard |
| April 1993 | Inclusion of Austria in the World Government Bond Index as a new country sector |
| December 1993 | Currency spot exchange rates switched to the WM/Reuters standard |
| January 1995 | Minimum entry increased as follows:<br>➤ United States: US$1 billion<br>➤ Spain: ESP100 billion<br>➤ France: Ffr10 billion<br>Settlement date changed to same day for daily calculations and last calendar day for monthly<br>Issuance cutoff for profile changed to the twenty-fifth day of the calendar month<br>Introduction of Finland, Norway, and Portugal to the Additional Market Indexes |
| April 1996 | Inclusion of Switzerland in the World Government Bond Index |
| July 1996 | Inclusion of Finland in the World Government Bond Index |
| April 1997 | Inclusion of Ireland in the World Government Bond Index<br>Monthly pricing of US and Canada changed to 3:00 p.m. EST time (futures close) from 5:00 p.m. |
| July 1998 | Inclusion of Portugal in the World Government Bond Index |
| January 1999 | WGBI market entry/exit size criteria changed to €15/€7.5 billion from DM30/DM15 billion<br>Country inclusion rule changed to currency-based rule. All domestic fixed-rate bonds larger than the issue size threshold issued by EMU sovereigns will qualify for inclusion<br>Exclusion of German agency debt (moved to the EuroBIG Index) |
| June 1999 | Australian Index amounts net of LCIR holdings |
| January 2000 | Minimum entry size for gilts changed to £400 million. Rump gilts no longer eligible for inclusion |
| April 2000 | Inclusion of Greece as an Additional Market Index<br>Country inclusion rule changed to shorten time to include or exclude a market based on size<br>Addition of a minimum credit rule of BBB-/Baa3 from either S&P or Moody's for market inclusion |
| July 2000 | Inclusion of Greece in the World Government Bond Index<br>Minimum entry increased as follows:<br>➤ Canada: C$1 billion<br>➤ Denmark: Dkr10 billion<br>➤ Japan: ¥500 billion<br>➤ Norway: NOK20 billion<br>➤ Sweden: SEK10 billion<br>➤ Switzerland: Sfr1 billion |
| January 2001 | Greece entered EMU |
| April 2001 | Laddered inclusion rule for Japan Government Bond Index introduced that lowers minimum amount outstanding of 20-year JGB to ¥450 billion from ¥500 billion |
| August 2001 | Minimum entry size for gilts changed to £410 million |
| October 2002 | Inclusion of Poland as an Additional Market Index |
| May 2003 | Inclusion of Poland in the World Government Bond Index<br>Inclusion of Singapore as an Additional Market Index |
| September 2003 | Inclusion of Norway in the World Government Bond Index |
| January 2005 | Inclusion of Singapore in the World Government Bond Index |
| September 2006 | Inclusion of Korea, Malaysia, and Taiwan as Additional Market Indexes |

Source: Citigroup Index LLC.

## Related Benchmarks

### Citigroup Nonbase Currency Government Bond Indexes

The indexes of nonbase currency sectors exclude respective base currency bond markets from the calculation and, in turn, are stated in terms of the base currency. For example, the non-US Dollar WGBI includes all WGBI countries except the United States and is stated in US dollar terms. As with all of our indexes, we can state returns in any base currency.

### Citigroup European World Government Bond Index

The European WGBI consists of those 17 sectors of the WGBI that are geographically located in Europe, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

### Citigroup EMU Government Bond Index (EGBI)

The EGBI consists of those sectors of the WGBI that are EMU-participating countries, namely Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain. If Luxembourg were to issue debt of sufficient size, that debt would also be included in this index.

### Citigroup Group-of-Five (G5) Index

The G5 Index includes France, Germany, Japan, the United Kingdom, and the United States. This index is designed to provide broad international exposure using a small number of markets. It covers approximately 72% of the market value of the WGBI using just five markets versus the WGBI's 22 markets.

### Citigroup Group-of-Seven (G7) Index

The G7 Index includes Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. This index covers approximately 83% of the market value of the WGBI.

### Citigroup After-Tax Bond Indexes

After-tax returns are computed from the point of view of a US pension account and attempt to approximate the effect on total rate of return of withholding tax on coupon income.

**Figure 14. Withholding Tax Assumptions for the After-Tax Indexes**

| Market | Tax Rate | Calculation Assumption |
|---|---|---|
| Japan | 10.00 | Nonrefundable |
| Switzerland | 35.00 | 5% nonrefundable, 30% refundable three months following the January 1 or July 1 after the coupon payment date |

Effective July 1, 1997, all Italian bonds accrue and pay interest on a gross basis. Effective April 6, 1998, all UK gilt securities accrue and pay interest on a gross basis. Although for the index we assume Australian government bonds pay interest on a gross basis, under certain circumstances, some US pension funds may be subject to withholding tax on these investments.
Source: Citigroup Index LLC.

## Additional Market Indexes

The Additional Market Indexes include bond markets that do not at present qualify for inclusion in the WGBI, based on the criteria outlined earlier. Although the Additional Markets Indexes still carry the "waiting room" concept for inclusion in the WGBI, this does not imply that the country is ready for inclusion into the WGBI. Instead, it means that the market is tracked. To join the WGBI, the market must satisfy size, credit, and barriers to entry requirements. For example, a country may stay in Additional Markets because it discourages foreign ownership, even if it meets the size and credit criteria. Once a market has met all three entry requirements (outlined earlier), an announcement will be made and the three-month waiting period for inclusion in the WGBI will begin. The Additional Market Indexes currently include New Zealand, Korea, Malaysia, and Taiwan.

# Asian Government Bond Indexes (AGBI)

Through the Asian Government Bond Indexes (AGBI), we expand our Asian coverage of sovereign debt markets to include Korea, Malaysia, and Taiwan. In addition to the Citigroup World Government Bond Index (WGBI), which tracks the performance of 22 government bond markets, the Asian Government Bond Indexes provide investors with a benchmark for performance measurement of additional local markets and methodology consistent with the WGBI, enabling performance comparison of these indexes with other sovereign debt markets.

Figure 15 details the design criteria and calculation assumptions for the Asian Government Bond Indexes.

**Figure 15. Asian Government Bond Indexes — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed Rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Korea: W1 trillion<br>Malaysia: RM4 billion<br>Singapore: S$1.5 billion<br>Taiwan: NT$40 billion |
| Minimum Quality | BBB-/Baa3 by either S&P or Moody's |
| Calculation Frequency | Daily |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of month, when settlement is last calendar day |
| Reinvestment of Cash Flow | At daily average of one-month Eurodeposit rate, calculated from actual scheduled payment date of cash flow through end of reporting period |
| Pricing | Individual Citigroup trader pricing as of local market close. |
| Base Date | Korea: December 31, 2004<br>Malaysia: December 31, 2004<br>Singapore: December 31, 1999<br>Taiwan: December 31, 2004 |

Source: Citigroup Index LLC.

# US Broad Investment-Grade (USBIG) Bond Index

The US Broad Investment Grade (USBIG) Bond Index is designed to track the performance of bonds issued in the US investment-grade bond market. The USBIG Index includes institutionally traded US Treasury, government-sponsored (US agency and supranational), mortgage, asset-backed, and investment-grade securities and provides a reliable and fair benchmark for an investment-grade portfolio manager.

Figure 16 details the design criteria and Figure 17 reviews the chronological summary of events/enhancements.

**Figure 16. US Broad Investment-Grade (USBIG) Bond Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed Rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | US Treasuries: US$1 billion public amount outstanding<br>US agencies and supranationals: US$1 billion<br>Credit and asset-backed: US$250 million<br>Mortgage: *Entry:* US$1 billion minimum amount outstanding per origination year generic when the coupon has a minimum amount outstanding of US$5 billion. *Exit:* An origination year generic will exit when its amount outstanding falls below US$1 billion. If the amount outstanding for the coupon falls below US$2.5 billion, all corresponding origination year generics will be removed from the index. |
| Minimum Denomination | Par Value: US$1,000 |
| Composition | Treasuries (excluding inflation-indexed securities and STRIPS); agencies (excluding callable zeros and bonds callable less than one year from issue date); mortgage pass-throughs; asset-backed; supranationals; credit (excluding bonds callable less than one year from issue date); Yankees, globals, and securities issued under Rule 144A with registration rights |
| Minimum Quality | BBB-/Baa3 by either S&P or Moody's |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Interest | Fully taxable (federal) |
| Yield Curve | Citigroup Treasury Model (off-the-run) Curve |
| Reinvestment of Cash Flow | Continuous at the daily average of the one-month Eurodeposit rate for the calculation period |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing as of 3:00 p.m. EST for each bond at month-end; most corporate and agency issues are matrixed for the daily calculation only |
| Price Adjustments | Mortgages: Carry-adjusted to reflect the difference between the index settlement dates and standard PSA settlement dates |
| Volatility | Nonmortgages: 10% single volatility<br>Mortgages: Market-implied volatility (two-factor skew model) |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month when settlement is last calendar day. |
| Base Date | December 31, 1979 |

Source: Citigroup Index LLC.

**Figure 17. Chronological Summary of US Broad Investment-Grade (USBIG) Bond Index Events/Enhancements**

| Date Introduced | Enhancement/Event |
|---|---|
| January 1983 | Inclusion of 30-year FNMAs |
| January 1984 | Effective (option-adjusted) values calculated at 16% volatility |
| January 1986 | Inclusion of 15-year mortgages |
| September 1987 | Expanded 30-year mortgage seasoning to include new and seasoned |
| January 1988 | Investment-grade ratings by S&P or Moody's<br>Increase minimum outstanding from US$25 million to US$50 million<br>Inclusion of Yankees other than Canadian and World Bank issues |
| January 1989 | Returns reflect transaction costs on new issues |
| August 1989 | Volatility assumption changed from 16% to 13% |
| January 1990 | Government-sponsored sector introduced, including agencies and supranationals |
| February 1990 | Inclusion of credit cards |
| July 1990 | Expanded mortgage seasoning to include moderately seasoned 30-year pass-throughs |
| July 1991 | Inclusion of FHLMC Gold pass-throughs |
| July 1992 | Expanded mortgage seasoning to include moderately seasoned 15-year pass-throughs<br>Minimum entry/exit size for mortgage securities increased to US$200 million |
| July 1993 | Inclusion of FHLMC and FNMA balloons |
| January 1994 | Expanded corporate industry sectors |
| January 1995 | Minimum entry/exit increased as follows:<br>➤ US Treasuries: US$1/US$1 billion public amount outstanding<br>➤ Corporates and Government-Sponsored: US$100/US$75 million<br>➤ Mortgages: US$1/US$1 billion<br>Settlement date became same day for daily calculations and last calendar day for monthly calc.<br>Issuance cutoff for profile changed to the twenty-fifth day of the calendar month<br>Price adjustment for mortgages implemented<br>Multifamily project loans eliminated from the Mortgage Index |
| September 1995 | Use the Citigroup Treasury Model (off-the-run) Curve to compute option-adjusted values<br>Incorporate a new mortgage prepayment model and compute option-adjusted values using a two-factor model with fixed historical volatilities<br>Reduce volatility assumptions on nonmortgages from 13% to 10% |
| July 1996 | Switched to origination year-based pricing for mortgages<br>Reclassified Mortgage Index to include a "superseasoned" category<br>Minimum size per seasoning category reduced from US$500 million to US$250 million |
| December 1996 | Added minimum denomination and fully taxable (federal) interest as inclusion criteria to include certain preferred security structures (for example, Trust Pass-Through Securities, or TRUPS) |
| April 1997 | All security pricing switched to 3:00 p.m. EST (US Treasury futures close) from 5:00 p.m. |
| November 1997 | Origination-year generics replace seasoning categories for Mortgage Index<br>Minimum size per origination-year generic set at US$100 million |
| January 1998 | Exit amount for Corporate and Government-Sponsored increased from US$75 million to US$100 million<br>Returns no longer reflect transaction costs for new issues |
| July 1998 | Incorporate a new mortgage prepayment model and compute option-adjusted values using a two-factor model with market-implied volatilities |
| July 1999 | Minimum entry size for a mortgage coupon increased to US$5 billion and origination year minimum increased to US$250 million<br>GNMA-IIs added to the Mortgage Index<br>Callable zeroes removed from the Agency Index |
| April 2001 | Minimum entry size increased from US$100 million to US$200 million for agency, supranational, corporate, and asset-backed bonds. Origination-year minimum for mortgages increased from US$250 million to US$500 million<br>Bonds with call dates less than one year from issue date no longer included<br>Rule 144A securities with registration rights added to the Credit sector. Sector classifications changed to Treasury/Government-Sponsored, Collateralized, and Credit |
| July 2001 | Issuance cut-off for profile changed to four (4) global business days before month-end |
| November 2001 | Reclassified the stranded asset sector from utility sector to collateralized asset-backed sector |
| May 2003 | Incorporated a new mortgage prepayment model and compute option-adjusted values using a two-factor model with market-implied volatilities. |
| July 2004 | Minimum entry size increased from US$200 million to US$1 billion for agency and supranational.<br>Minimum entry size increased from US$200 to US$250 for credit and asset-backed bonds. Mortgage: *Entry:* US$1 billion minimum amount outstanding per origination year generic when the coupon has a minimum amount outstanding of US$5 billion. *Exit:* An origination year generic will exit when its amount outstanding falls below US$1 billion. If the amount outstanding for the coupon falls below US$2.5 billion, all corresponding origination year generics will be removed from the index. US$500 million. |

Source: Citigroup Index LLC.

### Mortgage Index Profile

The Mortgage Index comprises 30- and 15-year GNMA, FNMA, and FHLMC securities, and FNMA and FHLMC balloon mortgages and is reconstituted each month to reflect new issuance and principal paydowns. All mortgage pools are aggregated by coupon within agency or product type. In addition, each coupon sector may be further divided into distinct origination-year generics provided that each of these origination-year generics meets a minimum amount outstanding criterion.

Each month, Citigroup receives a set of computerized "factor" tapes that individually list relevant information for all outstanding agency-guaranteed mortgage pools. This information is supplied by GNMA, FNMA, and FHLMC for all of their respective pools and represents the most current information available in the marketplace. Each mortgage pool has a factor that represents the fraction of the original pool still outstanding. The outstanding amounts are aggregated and their difference is used to calculate the paydown for a coupon sector. To calculate monthly paydowns, the latest factor for the pool is subtracted from the appropriate factor from the prior tape.

### Mortgage Index Pricing

Each day, mortgage TBAs receive a trader price, quoted for standard PSA settlement dates, which occur on a variety of dates throughout the month, depending on the type of security. Because the index uses cash settlement, it is necessary to adjust the prices for carry. With a positively sloped yield curve, the actual market price for end-of-month settlement would be higher than the PSA settlement price to account for the difference between the current yield on the mortgage security and the money market rate over the time between settlement dates (the cost of carry). The price adjustment also accounts for the effect of principal paydowns on the mortgage security's current yield. We assume the previous month's paydown and use the one-month LIBOR rate when calculating the carry-adjusted price.

Since July 1996, the pricing of mortgage securities has reflected the origination year of the loans. For any particular coupon, Citigroup traders provide the TBA price plus additional pricing points for specific origination years. We use the WALA (weighted average loan age) provided by GNMA, FHLMC, and FNMA to calculate the origination year. Prices for origination years with relatively lower amounts outstanding are interpolated. This pricing methodology ensures that the index return more fairly represents the results of a realistic baseline strategy that a passive investor could have followed.

### Mortgage Index Return Methodology

The principal payment component of the total-rate-of-return computation for the Mortgage Index includes both scheduled principal amortization and unscheduled principal prepayment. The Mortgage Index accounts for all mortgage payments (principal plus interest) at the end of each month to reflect the monthly cash flow characteristics inherent in the instruments.

For example, during the January measurement period, most mortgage securities generate cash flow (principal and interest). The index assumes that cash flow is reinvested at the monthly average of the daily one-month Eurodeposit rate. For the January returns, information on the January paydown, applicable to a December 31–

January 31 holding period, is available by the third week of January. The return computation for mortgage securities is given in Figure 18.

**Figure 18. Return Calculation for Mortgage Securities**

Total Return (%) = [((C+X) x (1+(Rm/200)N/180) + (EP+EA)(1-(X/100)))/(BP+BA)-1] x 100

BP Beginning price. EP Ending price. BA Beginning accrued interest. EA Ending accrued interest. X Principal payment as percent of beginning balance. C Coupon rate/12. Rm Reinvestment rate on intramonth payment (average of daily one-month Eurodeposit rate). N Number of days between date of receipt of coupon and principal payment and calendar month-end.
Source: Citigroup Index LLC.

### Credit Index Industry Classification

**Figure 19. US Broad Investment-Grade (USBIG) Credit Index — Industry Sector Classification**

| Industrial — Manufacturing | Industrial — Service | Utility |
|---|---|---|
| Aerospace/Defense | Cable/Media | Electric |
| Automotive Manufacturers | Gaming/Lodging/Leisure | Power |
| Building Products | Healthcare Supply | Gas — Local Distribution |
| Chemicals | Pharmaceuticals | Telecommunications |
| Conglomerate/Diversified Mfg. | Publishing | Utility — Other |
| Electronics | Restaurants | |
| Information/Data Technology | Food/Drugs | **Finance** |
| Machinery | Retail Stores — Other | Banking |
| Metals/Mining | Service — Other | Independent Finance |
| Paper/Forest Products | | Life Insurance |
| Textiles/Apparel/Shoes | **Industrial — Transportation** | Mortgage Banking |
| Vehicle Parts | Airlines | Property & Casualty |
| Manufacturing — Other | Railroads | REITs |
| | Transportation — Other | Securities |
| **Industrial — Energy** | | Finance — Other |
| Gas — Pipelines | **Industrial — Consumer** | |
| Oil & Gas | Beverage/Bottling | **Non-US Sovereign & Provincial** |
| Oilfield Machinery & Services | Consumer Products | Canadian Province & Sovereign |
| | Food Processors | Sovereign Yankee |
| **Industrial — Other** | Tobacco | |

Source: Citigroup Index LLC.

## Related Benchmarks

### Citigroup Credit Index

This index includes US and non-US corporate securities and non-US sovereign and provincial securities.

### Citigroup Corporate Index

This index includes US and non-US corporate securities (excludes non-US sovereign and provincial securities).

### Citigroup High-Grade Credit Index

This index includes those issues from the Credit Index that have at least ten years to maturity (long-term) and a minimum credit rating of AA-/Aa3.

### Citigroup Collateralized Index

This index includes mortgage pass-throughs and asset-backed securities.

### Citigroup Mortgage Index

This index measures the mortgage component of the USBIG Index, comprising 30- and 15-year GNMA, FNMA, and FHLMC pass-throughs and FNMA and FHLMC balloon mortgages.

### Citigroup Core ⊕ 5 Index

This index is the USBIG Index excluding both Treasury and government-sponsored securities with less than five years to maturity.

### Citigroup Core ⊕ 3 Index

This index is the USBIG Index excluding both Treasury and government-sponsored securities with less than three years to maturity.

### Citigroup US Treasury Benchmark (On-the-Run) Indexes

These indexes measure total returns for the current two-, three-, five-, ten-, and 30 year on-the-run Treasuries that have been in existence for the entire month. As a result of the reduced auction schedule for one-year Treasury bills, as of May 2000, we select an existing coupon bond with approximately one year to maturity to use as the one-year benchmark. In most cases, this is an old two-year security.

### Citigroup US Treasury Benchmark Yield Curve Average Indexes

These indexes measure total returns for the current two-, three-, five- and ten-year on-the-run Treasuries that have been in existence for the entire month and the two shorter and two longer issues in the Treasury Index nearest each respective benchmark maturity. The 30-year US Treasury Benchmark Yield Curve Average Index measures total returns for the 30-year on-the-run Treasury that has been in existence for the entire month and the four shorter issues in the Treasury Index. Callable bonds are excluded from these indexes.

### Citigroup US Treasury Bill Indexes

These indexes measure monthly return equivalents of yield averages that are not marked to market. For example, the Six-Month Treasury-Bill Index is an average of the last six six-month Treasury bill month-end rates. Similarly, the One-Month and Three-Month Treasury Bill Indexes consist of the last one one-month and three three-month Treasury bill month-end rates, respectively. Returns for these indexes are calculated on a monthly basis only.

#### Example of Calculation Methodology for the Three-Month US Treasury Bill Index

**Step 1.** Obtain discount yields for the three previous month-end dates. For example, the January return requires the rates at the end of December, November, and October.

**Step 2.** Convert the discount rates to bond-equivalent yields.

**Step 3.** Compute the simple average of the bond-equivalent yields.

**Step 4.** Decompound to a monthly frequency using the actual number of days in the month and a 365-day year.

## Citigroup Certificate-of-Deposit Indexes

These indexes measure the monthly return equivalents of yield averages that are not marked to market. The CD rate is a rotating sample (collected by the New York Federal Reserve Bank) of five banks and dealers surveyed daily about secondary-market dealer offer rates for jumbo certificates of deposit. Returns for these indexes are calculated on a monthly basis only.

#### Example of Calculation Methodology for Six-Month Certificate-of-Deposit Index

**Step 1.** Obtain CD-equivalent yields for six previous month-end dates. For example, the January return requires the rates at the end of December, November, October, September, August, and July.

**Step 2.** Convert the CD rates to bond-equivalent yields.

**Step 3.** Compute the simple average of the bond-equivalent yields.

**Step 4.** Decompound to a monthly frequency using the actual number of days in the month and a 365-day year.

## Citigroup US Benchmark STRIPS Indexes

These indexes measure the total returns of the current one, two-, three-, five-, seven-, ten-, 15-, 20-, 25- and 30-year STRIPS. These benchmarks change every three months based on their February, May, August, and November cycles. For example, benchmarks maturing in the February cycle will be used for January, February, and March returns. Owing to liquidity constraints, long-term benchmark STRIPS may not change every three months.

# US Large Pension Fund (LPF) Baseline Bond Index

The US Large Pension Fund (LPF) Baseline Bond Index provides an appropriate benchmark and/or tracking vehicle for pension funds seeking to establish long-term core portfolios that more closely match the longer duration of their nominal dollar liabilities. These portfolios might normally be benchmarked to the USBIG Index, but the LPF Index improves on that structure by using fixed sector weights and a minimum maturity of seven years for nonmortgage issues. These design characteristics satisfy the longer duration goal of pension fund portfolios while emphasizing the traditionally higher yielding longer-term securities.

The LPF Index employs the calculation assumptions previously outlined for the USBIG Index in Figure 16. Figure 20 details the design criteria for this index.

**Figure 20. US Large Pension Fund (LPF) Baseline Bond Index — Design Criteria**

| | |
|---|---|
| Stated Coupon | Fixed rate |
| Minimum Maturity | Nonmortgage: Seven years<br>Mortgage: One year |
| Weighting | Issues: Market capitalization updated once a month<br>Sectors: Fixed weight as follows:<br>➤ Treasury/Government-Sponsored: 40%<br>➤ Collateralized: 30%<br>➤ Credit: 30% |
| Minimum Size Outstanding | US Treasuries: US$1 billion public amount outstanding<br>US agencies and supranationals: US$1 billion<br>Credit and asset-backed: US$250 million<br>Mortgage: *Entry:* US$1 billion minimum amount outstanding per origination year generic when the coupon has a minimum amount outstanding of US$5 billion. *Exit:* An origination year generic will exit when its amount outstanding falls below US$1 billion. If the amount outstanding for the coupon falls below US$2.5 billion, all corresponding origination year generics will be removed from the index. |
| Minimum Denomination | Par Value: US$1,000 |
| Composition | Treasuries (excluding inflation-indexed securities); agencies (excluding callable zeros and bonds callable less than one year from issue date); mortgage pass-throughs; asset-backed; supranationals; credit (excluding bonds callable less than one year from issue date); Yankees, globals, and securities issued under Rule 144A with registration rights |
| Minimum Quality | BBB-/Baa3 by either S&P or Moody's |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Interest | Fully taxable (federal) |
| Base Date | December 31, 1979 |

Source: Citigroup Index LLC.

# US Treasury STRIPS Index

The US Treasury STRIPS Index represents a comprehensive selection of long-duration market sectors and thereby improves on the customization possibilities otherwise available. The STRIPS Index offers a wider range of duration choices and can also be combined with a range of USBIG Index sectors if a core spread product exposure is desired. It has been increasingly difficult to construct long-duration benchmarks using a core that combines the Credit and Collateralized Indexes, since the effective duration of the Mortgage Index is significantly shorter than that of the Credit Index. The greater choice of long-duration sectors allows investors to opt for any core holding and combine it with the appropriate STRIPS sector to reach their target durations.

Figure 21 summarizes the design criteria and calculation assumptions for this index.

**Figure 21. US Treasury STRIPS Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Weighting | Market capitalization updated once a month |
| Minimum Maturity | None, but derived from bonds with a remaining maturity of at least one year |
| Minimum Size Outstanding | None, but derived from bonds with at least US$1 billion amount outstanding |
| Cycles | We include only those STRIPS derived from bonds within the Feb–Aug 15 or May–Nov 15 cycles |
| Reinvestment of Cash Flow | Maturing interest STRIPS are reinvested at the daily average one-month Eurodeposit rate from the date of the cash flow through the end of the calculation period |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing daily as of 3:00 p.m. New York time |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | December 31, 1991 |

Source: Citigroup Index LLC.

## Bond Inclusion Criteria

We choose to include STRIPS derived only from bonds in our US Treasury Index. We also include the coupon STRIPS with less than one year remaining to maturity that have been derived from this set of Treasury bonds. (The Treasury Index tracks those issues with at least US$1 billion public amount outstanding and a remaining maturity of at least one year.) In addition, only those STRIPS from Treasury bonds maturing in the February, May, August, and November 15 cycles are included. The bond stripping of eligible monthly Treasury auctions, along with the stripping of Treasury Inflation Protected Securities, has not created a deep enough market to ensure availability to institutional investors; therefore, we have chosen to exclude these STRIPS from the index.

## Maturity and Issue Size

We impose neither an amount outstanding cutoff nor a minimum maturity screen on the STRIPS Index. Our goal is to maintain a relatively stable universe that accommodates the broadest measure of available securities. By including coupon STRIPS with less than one year remaining to maturity, the full STRIPS Index cash flows can be replicated closely by using bonds in the Treasury Index.

### Index Profile

The index is rebalanced each month. The first week of each month, the Bureau of Public Debt makes available the Treasury market debt outstanding held in stripped form as of the previous month-end. We use these figures along with the current Treasury Index profile to arrive at our amounts outstanding for the following month's STRIPS Index. For example, on June 4, the Bureau of Public Debt announced the amounts held in stripped form as of May 31. We applied these amounts to the July index profile fixing and they are then fixed for the calendar month, and all interim returns are calculated based on its composition.

# US Agency Zero 10+ Index

The US Agency Zero 10+ Index was constructed to allow better customization for investors seeking long-duration benchmarks. The Agency Zero 10+ Index provides investors with a higher-yielding benchmark alternative to Treasury STRIPS while enabling investors to maintain a high-quality benchmark. Combining the Agency Zero 10+ Index with a range of STRIPS Index sectors, we offer investors a wider variety of long-duration benchmark choices.

Figure 22 summarizes the design criteria and calculation assumptions for this index.

**Figure 22. US Agency Zero 10+ Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Zero |
| Minimum Maturity | Ten years |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Original-issue zero-coupon bonds and principal pieces of stripped coupon bonds: US$200 million<br>Interest pieces of stripped bonds and zero-coupon bonds issued as serial zeros: US$40 million |
| Composition | Noncallable securities only |
| Yield Curve | Citigroup Treasury Model (off-the-run) Curve |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing as of 3:00 p.m. EST for each bond daily |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | July 31, 2000 |

Source: Citigroup Index LLC.

## Bond Inclusion Criteria

The Agency Zero 10+ Index includes noncallable zero-coupon bonds issued by US agencies. Currently, this includes zero-coupon bonds issued by Fannie Mae and Freddie Mac, as well as interest and principal pieces created from stripping the Fannie Mae Benchmark and Freddie Mac Reference bonds. The zeros created by stripping Financing Corp (FICO) and Resolution Funding Corp (REFCORP) issues are also included. In addition, we include bonds issued as serial zeros, such as those issued through the Agency of International Development — Israel (AID).

## Index Profile

The index is rebalanced each month. The information detailing stripping activity on coupon bonds is obtained from the relevant agencies and used to calculate and update amount outstanding. Because the frequency and timing of available data may vary from agency to agency, we will apply publicly available data at profile fixing to create the subsequent index profile.

# Inflation-Linked Securities Indexes (ILSI)

The Inflation-Linked Securities Indexes (ILSI) measure the return of US Treasury inflation-protected securities (TIPS) and Japanese government inflation-indexed bonds with fixed-rate coupon payments that are adjusted for inflation as measured by the Consumer Price Index (CPI). The price of each issue in the ILSI is adjusted by using an index ratio. The index ratio is determined by dividing the current CPI-U (Consumer Price Index for all Urban Consumers) level by the CPI-U at the time of issue of the security. The CPI-U is available for the current profile pricing date and the subsequent horizon pricing date; the intramonth index ratio is calculated by using the straight-line interpolation of these values.

Figure 23 details the design criteria and calculation assumptions for the Inflation-Linked Securities Indexes.

**Figure 23. Inflation-Linked Securities Indexes (ILSI) — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Weighting | Market capitalization updated once a month |
| Composition | US Treasury Inflation-Protected Securities, Japanese Government Inflation-Indexed Bonds |
| Minimum Maturity | One year |
| Minimum Size Outstanding | US$1 billion<br>¥250 billion |
| Reinvestment of Cash Flow | Continuous at the daily average one-month Eurodeposit rate for the calculation period |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing daily as of local market close |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | US: February 28, 1997<br>Japan: June 30,2004 |

Source: Citigroup Index LLC.

# Euro Broad Investment-Grade (EuroBIG) Bond Index

The Euro Broad Investment-Grade (EuroBIG) Bond Index is designed to provide a benchmark for euro-based fixed-income portfolios. It covers all sectors of the investment-grade fixed-income market that are accessible to institutional investors and accurately measures their performance and risk characteristics.

Figure 24 summarizes the design criteria and calculation assumptions for this index.

**Figure 24. Euro Broad Investment-Grade (EuroBIG) Bond Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | EMU Sovereigns: €1 billion or the equivalent for nonredenominated bonds<br>Other: €500 million or the equivalent for nonredenominated bonds |
| Composition | Issues denominated in EUR, ECU, or NCU, and certain euro medium-term notes[a] |
| Minimum Quality | Investment-grade: BBB-/Baa3 by either S&P or Moody's with the following exceptions — Unrated Jumbo/Global Pfandbrief, which are shadow-rated AAA; unrated bonds issued by or guaranteed by a sovereign or supranational issuer, which are assigned the rating of the issuer or guarantor |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Seasoning | Unseasoned bonds are included |
| Reinvestment of Cash Flow | At daily average of the one-month Eurodeposit rate, calculated from the actual scheduled payment date of cash flow through the end of the reporting period |
| Calculation Frequency | Daily |
| Pricing | Citigroup is the source for all pricing |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except for last business day of month, when settlement is last calendar day |
| Base Date | December 31, 1998 |

[a] For a medium-term note to be included, it must meet all other criteria and be publicly announced. For self-led deals, we require the issue to be managed by a syndicate with a minimum of five members; for all other deals, we require a minimum of three syndicate members. For the purposes of determining the amount outstanding of such an issue, all fungible issues will be combined.
Source: Citigroup Index LLC.

## Sector Classification

The asset classification of the EuroBIG Index reflects the current structure of the market and is in line with the structure of the WorldBIG Index. Figure 25 details the sector classification of the EuroBIG Index.

**Figure 25. Euro Broad Investment-Grade (EuroBIG) Index — Sector Classification**

| Sovereign/Sovereign-Guaranteed | Collateralized | Corporate — Utility |
|---|---|---|
| Domestic Sovereign (EGBI) | Jumbo Pfandbrief | Electric |
| Foreign Sovereign | Other Covered | Gas |
| Sovereign-Guaranteed | Asset Backed | Telecommunication |
| | | Other Utility |
| **Government-Sponsored/Regional Government** | **Corporate — Industrial** | **Corporate — Finance** |
| Agency | Consumer | Banks |
| Supranational | Energy | Independent Finance |
| Other Sovereign-Sponsored | Manufacturing | Insurance |
| Regional Government | Service | Other Finance |
| Regional Government-Guaranteed | Transportation | |
| Regional Government-Sponsored | Other Industrial | |

Source: Citigroup Index LLC.

## Related Benchmarks

### Citigroup EMU Government Bond Index

The EMU sovereign sector of the EuroBIG Index is the EMU Government Bond Index (EGBI). This index also forms the euro sector of the World Government Bond Index (WGBI). Detailed design and issue selection criteria are provided in the WGBI section of this report.

### Citigroup Jumbo Pfandbrief Index

The Jumbo Pfandbrief Index is an integral part of the EuroBIG Index and represents the significant component of the German collateralized bond market. By definition, a Jumbo Pfandbrief is a Pfandbrief with at least €500 million outstanding, a fixed-rate coupon, and at least three market makers prepared to quote two-way prices during normal trading hours. Owing to their collateralization, these are high-quality securities.

# Eurobond Indexes

The Eurobond Indexes provide a comprehensive and relevant measure of performance for Eurodollar, Eurosterling, and Euroyen bonds. Several subindexes are available based on credit, issuer nationality and type, and maturity sectors. Regularly calculated sectors include: sovereign and sovereign-guaranteed, supranational, official and agency, corporate, financial, and asset-backed.

Recognizing the implication for certain classes of investors in US-sourced income bonds, we publish returns on the subset of bonds issued by non-US entities for the Eurodollar Bond Index.

Figure 26 details the design criteria and calculation assumptions of this index. Figure 27 reviews the chronological summary of events/enhancements.

**Figure 26. Eurobond Indexes — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate<br>Zero-coupon bonds are included in the Eurodollar Bond Index only |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Eurodollar: US agency/supranational: US$1 billion, government/government guaranteed/government sponsored: US$500 million, corporate/financial/asset-backed: US$250 million<br>Eurosterling: £200 million<br>Euroyen: ¥50 billion |
| Denomination Limit | Eurodollar: US$100,000<br>Eurosterling: £100,000<br>Euroyen: ¥10 million |
| Composition | Eurobonds, Global bonds, Dragon bonds, and certain euro medium-term notes[a] |
| Minimum Quality | Investment-grade: BBB-/Baa3 by either S&P or Moody's |
| Redemption Features | Bullet, sinking fund, puttable, extendable, or callable |
| Seasoning | Unseasoned bonds are included |
| Reinvestment of Cash Flow | At daily average of the local one-month Eurodeposit rate. Calculated from actual scheduled payment date of cash flow through end of reporting period |
| Calculation Frequency | Daily |
| Pricing | Citigroup is the source for all pricing |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | Eurodollar: June 30, 1993<br>Eurosterling: December 31, 1994<br>Euroyen: December 31, 1994 |

[a] For a medium-term note to be included, it must meet all other criteria and be publicly announced. For self-led deals, we require the issue to be managed by a syndicate with a minimum of five members; for all other deals, we require a minimum of three syndicate members. For the purposes of determining the amount outstanding of such an issue, all fungible issues will be combined.

Source: Citigroup Index LLC.

**Figure 27. Chronological Summary of the Eurobond Indexes Events/Enhancements**

| Date Introduced | Enhancement/Event |
|---|---|
| January 1995 | Settlement date changed to same day for daily calculations and last calendar day for monthly calculations for the Eurodollar Bond Index<br>Issuance cut-off for profile changed to the twenty-fifth day of the calendar month for the Eurodollar Bond Index<br>Introduction of new Eurosterling, Euroyen, and Euro-Deutschemark Indexes |
| January 1999 | Euro-Deutschemark Index discontinued. Most issues are now included in the EuroBIG Index |
| July 2000 | Minimum amounts outstanding increased as follows:<br>Eurodollar: US$250 million<br>Eurosterling: £150 million<br>Euroyen: ¥50 billion |
| July 2004 | Minimum amounts outstanding increased as follows:<br>Eurodollar: US agency/supranational: US$1 billion, government/government guaranteed/government sponsored: US$500 million, corporate/financial/asset-backed: US$250 million<br>Eurosterling: £200 million<br>Euroyen: ¥50 billion |

Source: Citigroup Index LLC.

## Related Benchmarks

### Citigroup Eurodollar Bond Index

A market-capitalization-weighted index that includes fixed-rate (including zero-coupon) Eurodollar, global, and Dragon bonds and certain asset-backed and euro medium-term notes. All issues are investment-grade, have a remaining average life of at least one year, an amount outstanding of at least US$1 billion for US agency and supranational, US$500 million for government/government guaranteed/government sponsored, and US$250 for corporate/financial/asset-backed.

### Citigroup Eurosterling Bond Index

A market-capitalization-weighted index that includes fixed-rate Eurosterling, global, and Dragon bonds and certain asset-backed and euro medium-term notes. All issues are investment-grade, have a remaining average life of at least one year, and have an amount outstanding of at least £200 million.

### Citigroup Euroyen Bond Index

A market-capitalization-weighted index that includes fixed-rate Euroyen, global, and Dragon bonds and certain asset-backed and euro medium-term notes. All issues are investment-grade, have a remaining average life of at least one year, and have an amount outstanding of at least ¥50 billion.

# Australian Broad Investment-Grade (AusBIG) Bond Index

The Australian Broad Investment-Grade (AusBIG) Bond Index is designed to represent the Australian credit market. It covers all sectors of the investment-grade, Australian dollar-denominated fixed-income market that are accessible to Australian institutional investors and accurately measures their performance and risk characteristics.

The AusBIG Index includes any fixed-coupon, investment-grade bond issued in the Australian market or Semi-Government bond issued in the global market that meets specific amount-outstanding criteria and matures in more than one year. Figure 28 details the design criteria and calculation assumptions. Figure 29 details the sector classification of this index.

**Figure 28. Australian Broad Investment-Grade (AusBIG) Bond Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate including zero coupon bonds and fixed-to-float bonds |
| Minimum Maturity | One year; Fixed-to-float bonds are removed one year prior to the fixed-to-float date |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Government and Semi-Government: A$250 million, including amounts issued under interest-withholding tax-free formats [a]<br>Corporate, supranational, agency, and mortgage-backed securities: A$100 million |
| Minimum Quality | Investment-grade: BBB-/Baa3 by either S&P or Moody's or bonds guaranteed by the Commonwealth of Australia |
| Redemption Features | Bullet, callable, puttable, extendable, nonamortizing MBS |
| Method of Issuance | Public tender or tap (reverse inquiry bonds included if offered under one of these methods). Includes only bonds issued in the domestic Australian market. |
| Reinvestment of Cash Flow | At daily average of the one-month Australian dollar bank bill swap reference rate (BBSW). Calculated from actual scheduled payment date of cash flow through end of period |
| Calculation Frequency | Daily |
| Pricing | Bid side sourced from Citigroup Fixed-Income Australia as of 4:30 p.m. Sydney time |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day. |
| Base Date | June 30, 2000 |

[a] Such as Queensland Treasury Corporation's Global Bond Program and New South Wales Treasury Corporation's Exchangeable Program. These bonds may be exchanged at any time for ordinary bonds from the issuer.
Source: Citigroup Index LLC.

**Figure 29. Australian Broad Investment-Grade (AusBIG) Index-Sector Classification**

| Government Debt | All Industrials | All Resources |
|---|---|---|
| Commonwealth Government (CGS) | Manufacturing | Metals/Mining |
| Semi-Government | Services | Other |
| | Consumer Goods | |
| **Supranational** | Transportation | **Financial Services** |
| | Energy Equipment | Banks |
| | Telecommunications | Life Insurance |
| **Collateralized** | Real Estate Investment Trust | Other |
| Fixed-Rate Mortgage Backed (MBS) | Other | |
| Asset-Backed | | **Gas/Electricity** |
| | | Gas |
| | | Electricity |
| | | Other |

Source: Citigroup Index LLC.

# US High-Yield Market Index

The US High-Yield Market Index captures the performance of below-investment-grade debt issued by corporations domiciled in the United States or Canada. This index is our broadest high-yield market measure and includes cash-pay and deferred-interest securities. All the bonds are publicly placed, have a fixed coupon, and are nonconvertible. Bonds issued under Rule 144A are included in their unregistered form.

Figure 30 details the design criteria of this index and Figure 31 reviews the chronological summary of events/enhancements.

**Figure 30. US High-Yield Market Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | Entry: US$100 million minimum outstanding per issue when the issuer has a minimum of US$400 million total outstanding debt that qualifies for inclusion, or US$200 million minimum outstanding per issue when the issuer does not meet the US$400 million minimum. Exit: A bond will exit when its amount outstanding falls below US$100 million par amount. An issuer that has already satisfied the US$400 million requirement will remain in the index — even if the total par amount outstanding of its bonds drops below the US$400 million minimum. |
| Composition | Cash-Pay, Zero-to-Full (ZTF), Pay-in-Kind (PIK), step-coupon bonds, and Rule 144A bonds issued by corporations domiciled in the United States or Canada only |
| Maximum Quality | BB+/Ba1 by both S&P and Moody's |
| Minimum Quality | C by S&P or Moody's (please see Special Situations section below) |
| Reinvestment of Cash Flow | Continuous at the daily average of the one-month Eurodeposit rate for the calculation period |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing at 3:00 p.m. EST with supplemental pricing provided by pricing vendors. |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | December 31, 1988 |

Source: Citigroup Index LLC.

**Figure 31. Chronological Summary of US High-Yield Market Index Events/Enhancements**

| Date Introduced | Enhancement/Event |
|---|---|
| January 1989 | 1–7 year sector added to the credit sectors (BB-, B-, and CCC- rated indexes)<br>Prior to this date, these indexes contained those securities with a remaining maturity of at least 7 years.) |
| January 1991 | Deferred-interest securities added to applicable indexes |
| January 1997 | Entry criteria increased to US$100 million from US$50 million<br>Exit criteria increased to US$75 million from US$50 million |
| January 1998 | Maximum rating changed to speculative-grade by both S&P and Moody's<br>Exit criteria increased to US$100 million from US$75 million<br>Changes to industry sectors:<br>Conglomerate/Diversified Manufacturing and Machinery combined to form Capital Goods<br>Electronics/Information/Data Technology name changed to Technology |
| January 1999 | Include Rule 144A bonds at issuance<br>Limit securities to those issued by US- or Canadian-domiciled issuers only<br>Raise minimum quality to C by S&P or Moody's from none<br>Eliminate the Extended High-Yield Market Index (held the same issues as the High-Yield Market Index in addition to bankrupt and/or defaulted securities).<br>Eliminated the Distressed Index |
| April 2001 | Minimum amount outstanding changed as follows:<br>Entry Criteria: US$100 million minimum size outstanding per issue when the issuer has a minimum of US$400 million total outstanding debt that qualifies for inclusion in the High-Yield Market Index; or US$200 million minimum outstanding per issue when the issuer does not meet the US$400 million requirement.<br>Exit Criteria: A bond will exit the High-Yield Market Index when its amount outstanding falls below US$100 million par amount. An issuer that has already satisfied the US$400 million will remain in the index — even if the total par amount outstanding of its bonds drops below the US$400 million minimum. |

Source: Citigroup Index LLC.

## Industry Classification

**Figure 32. US High-Yield Market Index — Industry Sector Classification**

| Industrial — Manufacturing | Industrial — Energy |
|---|---|
| Aerospace | Secondary Oil & Gas Producers |
| Automotive Manufacturers/Vehicle Parts | Oil Equipment |
| Building Products | Energy — Other |
| Home Builders | |
| Capital Goods | |
| Chemicals | **Industrial — Consumer** |
| Containers | Consumer Products/Tobacco |
| Metals/Mining | Food Processors/Beverage/Bottling |
| Paper/Forest Products | |
| Technology | **Industrial — Transportation** |
| Textiles/Apparel/Shoe Manufacturers | Airlines |
| | Transportation — Rail & Other |
| **Industrial — Service** | |
| Cable | **Industrial — Other** |
| Broadcast/Outdoor | |
| Satellite | |
| Publishing | **Utility** |
| Gaming | Electric, Power, Gas, and Other |
| Leisure | Broadband |
| Lodging | Competitive Local Exchange Company (CLEC) |
| Healthcare Facilities/Supplies | Diversified Telecommunications |
| Pharmaceuticals | ISP/Data |
| Publishing | Paging |
| Restaurants | Wireless |
| Retail — Food & Drugs | |
| Retail Stores | **Finance** |
| Environmental Services | Banking |
| Tower | Finance — Other |
| Service — Other | |

Source: Citigroup Index LLC.

### Index Quality

An index quality is assigned to each index bond as of profile fixing. The quality is first mapped to the S&P rating. If a bond is not rated by S&P, we define the index quality as the S&P equivalent of the Moody's rating. For defaulted bonds, please see the Special Situation section that follows.

### Average Spread to Worst and Average Treasury Benchmark

The average yield to worst is the lower of the yield to worst call and yield to maturity. The spread to worst is the difference between the yield to worst and the yield to maturity at the average life point on the interpolated Treasury model curve. The yield to worst is capped at 35% and the spread to worst is capped at 3,500bp.

## Special Situations

### Defaults

When an issuer defaults or expects to default on an interest payment, or enters into Chapter 7 or Chapter 11 bankruptcy protection, we make adjustments to the current month's index returns and the following month's index profile. After the announcement by the company, we adjust the current-month returns for the company's bonds to reflect the loss of coupon payments or accrued interest, where applicable. Returns for bankrupt securities only incorporate the gain or loss on principal, except in unique situations when bankrupt bonds trade with accrued interest.

We also remove the bankrupt securities from the following month's High-Yield Market Index profile and place them in the Bankrupt/Default Index, beginning with the next month's index. In addition, we exclude bankrupt bonds when calculating the average yields of the indexes. As a final note, any bond that is assigned a D rating by S&P, regardless of whether that issuer has filed for bankruptcy protection, will be placed into our Bankrupt/Default Index for the following month's profile. A bond exits the Bankrupt/Default Index when reorganization is completed or exchanged for other securities, or upon liquidation, or when neither S&P nor Moody's rates the bonds.

## Related Benchmarks

### Citigroup High-Yield Cash-Pay Index

The High-Yield Cash-Pay Index includes only cash-pay bonds (both registered and Rule 144A) with remaining maturities of at least one year and a minimum amount outstanding of US$100 million. (Base date: December 31, 1988.)

### Citigroup Deferred-Interest Index

The Deferred-Interest Index includes pay-in-kind bonds (PIKs), zero-to-full coupon bonds (ZTFs), zero-to-maturity bonds, step-up coupon bonds, and credit sensitive notes. (Base date: December 31, 1990.)

## Maturity Sectors

#### High-Yield Market 1–7 Year Index

The High-Yield Market 1–7 Year Index (formerly, the Short-Term High Yield) includes those securities in the High-Yield Market Index with a remaining maturity of at least one year, but less than seven years. (Base date: December 31, 1988.)

#### High-Yield Market 7–10 Year Index

The High-Yield Market 7–10 Year Index (formerly, the Intermediate-Term High-Yield) includes those securities in the High-Yield Market Index with a remaining maturity of at least seven years, but less than ten years. (Base date: June 30, 1985.)

#### High-Yield Market 10+ Year Index

The High-Yield Market 10+ Year Index (formerly, the Long-Term High-Yield) includes those securities in the High-Yield Market Index with a remaining maturity of at least ten years. (Base date: December 31, 1979.)

#### High-Yield Market 7+ Year Index

The High-Yield Market 7+ Year Index (formerly, the Composite High-Yield) includes those securities in the High-Yield Market Index with a remaining maturity of at least seven years. (Base date: December 31, 1984.)

## Quality Sectors

#### All BB-Rated Index

The All BB-Rated Index includes those bonds in the High-Yield Market Index (and before January 1989, the High-Yield 7+ Year Index) with an index quality of BB+, BB, or BB- rating. (Base date: December 31, 1984.)

#### All B-Rated Index

The All B-Rated Index includes those bonds in the High-Yield Market Index (and before January 1989, the High-Yield 7+ Year Index) with an index quality of B+, B, or B- rating. (Base date: December 31, 1984.)

#### All CCC-Rated Index

The All CCC-Rated Index includes those bonds in the High-Yield Market Index (and before January 1989, the High-Yield 7+ Year Index) with an index quality of CCC+ to C rating. (Base date: December 31, 1984.)

## Additional Index

#### Bankrupt/Default Index

The Bankrupt/Default Index includes all securities (previously in the High-Yield Market Index) of companies that have already filed or are soon expected to file for Chapter 7 or Chapter 11 bankruptcy protection (see Special Situations section). The index also includes bonds of companies that have missed or expect to miss required interest payments. (Base date: December 31, 1990.)

# US High-Yield Market Capped Index

The US High-Yield Market Capped Index uses the US High-Yield Market Index as its foundation. In addition to the basic design criteria used in the creation of the High-Yield Market Index (outlined in Figure 30), we impose a cap on the par amount of each issuer and delay the entry of fallen angels after their downgrade.

The US High-Yield Market Capped Index caps the total debt of any single individual issuer at US$5 billion par amount outstanding. When the total eligible par amount from one issuer exceeds US$5 billion, the par amount of each bond from this issuer is scaled pro rata to reduce the total to US$5 billion. By capping the par amount outstanding of large issuers, we limit the exposure that these issuers have on the High-Yield Market Capped Index, but retain the characteristics of the issuer's distribution across different maturities.

The High-Yield Market Capped Index addresses the disproportionate influence that a large, recently downgraded issuer can have on the index's characteristics upon entry. This is accomplished by delaying the entry of a fallen angel issuer's debt for a minimum of one month from its downgrade to high-yield status. Specifically, if both S&P and Moody's downgrade an issuer's debt to BB+/Ba1 or below, it will be eligible for the High-Yield Market Capped Index after a waiting period of one full calendar month. For example, if an issuer's debt is downgraded to high-yield status any day during the calendar month of May, it will be eligible for inclusion in the July High-Yield Market Capped Index. This aspect of the criteria provides time for the market to evaluate and adjust to any credit events associated with the fallen angels. In addition, it allows investors time to assess the value and risk of fallen angels without being underweighted in any sectors in which they are included.

Figure 33 details the design criteria and calculation assumptions for the High-Yield Market Capped Index.

**Figure 33. US High-Yield Market Capped Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding (Prior to Capping) | Entry: US$100 million minimum outstanding per issue when the issuer has a minimum of US$400 million total outstanding debt that qualifies for inclusion, or US$200 million minimum outstanding per issue when the issuer does not meet the US$400 million minimum. Exit: A bond will exit when its amount outstanding falls below US$100 million par amount. An issuer that has already satisfied the US$400 million requirement will remain in the index — even if the total par amount outstanding of its bonds drops below the US$400 million minimum. |
| Maximum Size Outstanding | Capped at US$5 billion maximum amount outstanding per issuer. |
| Composition | Cash-pay, zero-to-full (ZTF), pay-in-kind (PIK), step-coupon bonds, and Rule 144A bonds issued by corporations domiciled in the United States or Canada only. Fallen angels: entry is subject to a waiting period of one full calendar month. |
| Maximum Quality | BB+/Ba1 by both S&P and Moody's |
| Minimum Quality | C by S&P or Moody's |
| Reinvestment of Cash Flow | Continuous at the daily average of the one-month Eurodeposit rate for the calculation period |
| Calculation Frequency | Daily |
| Pricing | Individual Citigroup trader pricing at 3:00 p.m. EST with supplemental pricing provided by an outside source. |
| Settlement Date | Monthly: Last calendar day<br>Daily: Same day except last business day of the month, when settlement is last calendar day |
| Base Date | December 31, 2001 |

Source: Citigroup Index LLC.

# Global Emerging Market Sovereign Bond Index (ESBI)

The Global Emerging Market Sovereign Bond Index (ESBI) includes Brady bonds and US dollar-denominated emerging market sovereign debt issued in the global, Yankee, and Eurodollar markets excluding loans. The ESBI offers diversification benefits with respect to the geographical and asset class dimensions. It comprises debt in Africa, Asia, Europe, and Latin America.

We classify an emerging market as a sovereign with a maximum foreign debt rating of BBB+/Baa1 by S&P or Moody's. Brady bonds, restructured in accordance with the Brady Plan, of countries with no foreign debt, or with foreign debt that is not rated by S&P and Moody's, are included in the ESBI. We exclude defaulted issues from the ESBI (the definition for default is provided in the section that follows).

Figure 34 summarizes the design criteria and calculation assumptions for the ESBI.

**Figure 34. Global Emerging Market Sovereign Bond Index (ESBI) — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Stated Coupon | Fixed rate or step, floating rate (Brady bonds only), no zero-coupon bonds |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Amount Outstanding | US$500 million amount outstanding |
| Maximum Quality | BBB+/Baa1 by S&P or Moody's. Brady bonds, restructured in accordance to the Brady Plan, of countries with no foreign debt, or with foreign debt that is not rated by S&P and Moody's, are included in the ESBI. |
| Minimum Quality | ESBI and ESBI-C: Exclude defaulted issues<br>ESBI-E and ESBI-CE: Include defaulted issues |
| Redemption Features | Bullet, sinking fund, puttable, or callable |
| Calculation Frequency | Daily |
| Settlement Date | Monthly: last calendar day<br>Daily: same day except last business day of month when settlement is last calendar day |
| Reinvestment of Cash Flow | Continuous at the daily average of the one-month Eurodeposit rate for the calculation period |
| Pricing | Individual Citigroup trader pricing as of local market close — United States: 3:00 p.m. EST; United Kingdom: 4:15 p.m. (London) |
| Volatility | 10% single volatility |
| Yield Curve | Citigroup US Treasury Model (off-the-run) |
| Base Date | December 31, 1995 |

Source: Citigroup Index LLC.

**Figure 35. Chronological Summary of Global Emerging Market Sovereign Bond Index (ESBI), Brady Bond Index, and Emerging Market Mutual Fund (EMMF) Debt Index Events/Enhancements Undertaken**

| Date Introduced[a] | Enhancement/Event |
|---|---|
| March 1990 | First Brady Bond Issue — Mexico |
| June 1990 | Inclusion of Costa Rica and Philippines |
| January 1991 | Inclusion of Venezuela |
| March 1991 | Inclusion of Uruguay |
| February 1992 | Inclusion of Nigeria |
| December 1992 | Inclusion of Brazil IDU |
| January 1993 | Two new Philippine Brady bonds issued |
| March 1993 | Final Philippine Brady issued |
| May 1993 | Inclusion of Argentina |
| November 1993 | Final Argentine Brady issued |
| January 1994 | Introduction of the Emerging Market Mutual Fund Debt Index |
| February 1994 | Minimum entry size increased to US$500 million from US$200 million<br>Exclusion of Uruguay and Costa Rica |
| May 1994 | Final Brazilian Brady bonds included |
| August 1994 | Inclusion of Bulgaria |
| November 1994 | Inclusion of Poland |
| January 1995 | Settlement date changed to same day for daily calculations and last calendar day for monthly calculations<br>Issuance cutoff for profile changed to the twenty-fifth day of the calendar month |
| April 1995 | Inclusion of Ecuador |
| May 1995 | Inclusion of Ecuador PDI |
| July 1996 | Inclusion of Panama |
| March 1997 | Inclusion of Peru |
| December 1997 | EMMF Index: Russia V-bank loans exchanged for Russia IANs and Prins |
| August 2000 | Brady Bond Index: Ecuador removed as a result of the Ecuador Brady Exchange<br>EMMF Index: Ecuador 2012 and 2030 global bonds replace Bradys; Russia 2010 and 2030 Global bonds replace IANs and Prins as a result of an exchange |
| September 2000 | Exclusion of Ivory Coast from ESBI due to default event |
| January 2002 | Introduction of the Global Emerging Market Sovereign Bond Index (ESBI) |
| January 2002 | Exclusion of Argentina from ESBI due to default event |
| May 2003 | Mexico calls 2008 and 2033 Brady par bonds<br>Mexico sector drops out of Brady Bond Index<br>EMMF Index reweighted to reflect termination of Mexico sector. Argentina and Brazil weights increase to 25% from 15% and 20%, respectively. Mexico weight drops to 0%. |
| July 2003 | Brady Bond Index — Market coverage was migrated to the Global Emerging Market Sovereign Index<br>Discontinued EMMF Index[b] |

[a] Inception date is April 1990 for Brady Bond Index; January 1994 for EMMF; and January 1996 for the ESBI. [b] An alternative to the EMMF Index is our ESBI-Capped, which limits exposure to any one country by placing a ceiling on the par value contribution of each country.
IAN Interest Amortization Notes. IDU Interest due and unpaid. PDI Past-due interest. Prin Restructured Principal Loan.
Source: Citigroup Index LLC.

## Sector Classification

For the ESBI, we publish the characteristics of the index in maturity, rating, region, and country breakdowns. The country classification is based on the sovereign government issuing the debt. In addition to US dollar terms, the returns are available in a total of 28 base currencies unhedged, including euro, sterling, and yen.

## Credit

We impose a credit rule on the foreign sovereign markets included in the ESBI. We classify an emerging market as a sovereign with a foreign debt rating of BBB+/Baa1 by S&P or Moody's. Split-rated countries with ratings of A-/Baa1 or BBB+/A3 are

included in the ESBI. If a country has foreign debt that is rated above BBB+/Baa1 by S&P and Moody's, neither its foreign debt nor its Brady bonds are included. The family of the ESBI can be subdivided into the following credit quality sectors:

#### Investment-Grade

Recognizing that some investment-grade sovereign bonds resemble emerging market products in valuation and trading, we include the Brady bonds and the sovereign debt that are in our US dollar WorldBIG Index with a maximum rating of BBB+/Baa1 by either S&P or Moody's. Split-rated issues (that is, Five Bs, A-/Baa1, BBB+/A3) would be included in this category.

#### Sub-Investment-Grade

Sub-investment-grade comprises below-investment-grade Brady bonds and sovereign debt with a maximum rating of BB+/Ba1 by S&P and Moody's. This sector excludes defaulted bonds.

#### Default

A country's bonds are placed in the Extended Indexes if the sovereign government meets the following default criteria:

1. Failure to pay: The sovereign has failed to make a full principal or interest payment by the due date (including any applicable grace period).
2. Repudiation/moratorium: The sovereign repudiates or challenges the validity of its bonds or declares a moratorium or standstill applicable to the bond payments.
3. Acceleration: The sovereign bonds become due and payable in full or eligible for acceleration by meeting the conditions of acceleration specified in their terms.
4. Restructuring: The sovereign, because of a deterioration in financial conditions or creditworthiness, changes the financial terms or causes subordination of its bonds not provided for in their terms and imposes such changes on bondholders.

### Sector-Level Spread Computation

With the ESBI Indexes, we introduce a new methodology in computing sector level spread by weighting the spreads with dollar duration as follows:

$$sprd_{sector} = \frac{\sum_{i=1}^{n} sprd_i \times mkv_i \times spddur_i}{\sum_{j=1}^{n} mkv_j \times spddur_j}$$

In this equation, $n$ is the number of issues in the sector and for each issue; *sprd* is the stripped spread; *mkv* is market value; and *spddur* is the spread duration. We refer to the product of the market value and the spread duration as the spread-dollar duration.

This methodology will calculate the average spread of a sector according to both the market value and the duration of the underlying issues within the sector. Weighting by spread-dollar duration helps to more accurately reflect changes to the value of the portfolio associated with spread curve movement by assigning a larger weight to securities with larger spread duration. For example, given two bonds of the same market value, the spread of the long-duration bond will have a larger weight in the sector-level spread than the spread of the short-duration bond.

## Related Benchmarks

### Citigroup Global Emerging Market Sovereign-Capped Bond Index (ESBI-C)

The Global Emerging Market Sovereign-Capped Bond Index (ESBI-C) represents a modified version of the ESBI. It imposes a maximum par amount of US$15 billion per country, thereby limiting the effect of debt-burdened countries on index characteristics and performance. Large debt markets can be explained by one of two reasons: The countries have large economies with reasonable debt-to-GDP ratios, or they have smaller economies and larger debt-to-GDP ratios. The former are more likely to have stable outstanding amounts and stable or even increasing prices leading to positive returns. The latter might be expected to have unstable outstanding amounts and fluctuating prices resulting in volatile returns. Capping the par size of a country will prevent the latter group from dominating.

### Citigroup Global Emerging Market Sovereign-Extended Bond Index (ESBI-E) and Global Emerging Market Sovereign-Capped Extended Bond Index (ESBI-CE)

The ESBI-Extended Bond Index (ESBI-E) and ESBI Capped Extended Bond Index (ESBI-CE) capture the bonds that are excluded from the ESBI and ESBI-Capped because of default by the issuer.

For a country to be moved to the Extended Indexes, at least one foreign currency debt that is a direct obligation of the sovereign government in the ESBI and ESBI-Capped meets the default criteria stated above.

In the event that a country defaults, all of its issues in the ESBI and ESBI-Capped, including its Brady bonds, are moved to the Extended Indexes. We also adjust the returns for the bonds to reflect the loss of coupon payments or accrued interest, where applicable. The adjustment occurs at the month-end following the default of the issuer. The return calculation for the default issues reflects only principal gains or losses.

## Additional Definitions

### Spread Duration

Spread duration is a measure of relative changes in the full price because of changes in the stripped spread.

### Stripped Yield

Yield calculated on cash flows reduced by any guaranteed payments of principal and interest and with the price reduced by the present value of the guaranteed payments.

### Stripped Spread

The spread (in basis points) over the pricing yield curve for the unguaranteed portion of a security's cash flows, equal to the amount that, when added to each of the yield curve's spot rates, makes the present value of the unguaranteed portion of the cash flows equal to the price reduced by the present value of the guaranteed payments.

### Blended Yield

Blended yield is the yield obtained from discounting both the sovereign and collateral component of future cash flows.

### Cash Flow Yield

The rate of return indicated by the security's full price, settlement date, and assumed cash flows.

### Cash Flow Spread

The security's yield, minus the yield of a suitable benchmark security, in basis points.

# World Money Market Index

The World Money Market Index approximates the performance of money market instruments in the following 17 currencies: US dollar, Canadian dollar, Czech koruna, Danish krone, euro, Hungarian forint, Norwegian krone, Polish zloty, Swedish krona, Swiss franc, UK sterling, Australian dollar, Hong Kong dollar, Japanese yen, New Zealand dollar, Singapore dollar, and South African rand. The index tracks the following instruments: one-, two-, three-, six-, and 12-month Eurodeposits. We believe that Eurodeposits represent a common, liquid asset class across currencies and provide a good proxy for short-term markets.

We compute returns daily and monthly for each of these instruments in their local currencies and in US dollar terms.

The index dates back to December 1997 and measures the return of money market instruments, making the following assumptions:

- All Eurodeposits are held to maturity.
- The index invests only in Eurodeposits with maturities that correspond to the index. For example, the three-month US Dollar Money Market Index invests only in three-month US dollar Eurodeposits, and the six-month Japanese yen invests only in six-month Japanese yen Eurodeposits.
- For each index, at the beginning of each month, a fraction of the index matures and is rolled over into a new Eurodeposit of the same maturity. In any given month, the index includes a group of Eurodeposits equal in number to the number of months in the maturity of instruments in that particular index. For example, a three-month index is at any given time composed of three three-month Eurodeposits, and at the beginning of each month one of the three Eurodeposits matures and is rolled over into a new three-month Eurodeposit. Similarly, a six-month index is at any given time composed of six six-month Eurodeposits, and at the beginning of each month one of the six Eurodeposits matures and is rolled over into a new six-month Eurodeposit.
- The returns for any given maturity index are computed from the actual Eurodeposits that constitute the index in that particular month. For example, the return for October for the three-month indexes would include the return of a laddered investment from July, August, and September. At the end of October, the July 31 Eurodeposit would mature and a new Eurodeposit would be included as of October 31 to continue the ladder for future returns. More details of return computation are given in the next section.
- For one-month Eurodeposits, a new Eurodeposit replaces a matured Eurodeposit at the beginning of every month and the returns correspond to the Eurodeposit rate for the month for which the returns are computed.

**Figure 36. World Money Market Index (WMMI) — Design Criteria and Calculation Assumptions**

| Category | Criteria |
|---|---|
| Maturity | One, two, three, six, and 12 months |
| Pricing | Monthly yields (bid), obtained from Reuters, 4:00 p.m. London time |
| Calculation Frequency | Daily |
| Composition | Generic Eurodeposits in the following currencies: US dollar, Canadian dollar, Czech koruna, Danish kroner, euro, Hungarian forint, Norwegian krone, Polish zloty, Swedish krona, Swiss franc, UK sterling, Australian dollar, Hong Kong dollar, Japanese yen, New Zealand dollar, Singapore dollar, and South African rand |
| Base Date | December 31, 1997 |

Source: Citigroup Index LLC.

**Figure 37. Chronological Summary of World Money Market Index (WMMI) Events/Enhancements**

| Date Introduced | Enhancement/Event |
|---|---|
| January 1978 | Original Money Market Index introduced: Equally weighted composite of three-month deposits in eight currencies (US dollar, Canadian dollar, Deutschemark, Dutch guilder, French franc, Japanese yen, Swiss franc, and UK sterling) |
| January 1999 | Expanded currency coverage to include Australian dollar, New Zealand dollar, Danish krone, euro, Norwegian krone, and Swedish krona<br>Discontinued tracking deposits in the Deutschemark, Dutch guilder, and French franc (all EMU currencies folded into the euro)<br>Composition changed to cover one- and three-month Eurodeposits for each currency |
| April 2000 | Introduction of Greece drachma one- and three-month indexes. Greek drachma also included within the equally weighted composite WMMI |
| November 2000 | Expanded currency coverage of the World Money Market Index to include six new currencies (Czech koruna, Hong Kong dollar, Hungarian forint, Polish zloty, Singapore dollar, and South African rand)<br>Expanded maturity coverage of money market instruments to include the one-, two-, three-, six-, and 12-month Eurodeposits in each of the 18 currencies<br>(Expansion in coverage does not affect the composite World Money Market Indexes) |
| January 2001 | Composite World Money Market Index discontinued Greece drachma indexes discontinued as Greece joins the EMU |

Source: Citigroup Index LLC.

## Steps for Local Currency Return Computation

The return computation methodology is consistent across maturities. We detail below the steps for computing returns on three-month Eurodeposits for a given month, *m*.

**Step 1.** Obtain the nominal three-month Eurodeposit rates (quoted on an annual basis), $y_{m\text{-}i}$, as of the end of the months *m*-1, *m*-2, and *m*-3.

**Step 2.** Convert $y_{m\text{-}i}$ into an effective term yield (equivalent to the three-month return), $e_{m\text{-}i}$, for the three-month term starting on the last calendar day of month *m-i* and ending on the last calendar date of month *m-i+3*, using the actual number of days in the term and the day-count convention of the quoted rate (360 days per year for most, but not all, Eurodeposit rates):

$e_{m\text{-}i} = y_{m\text{-}i} *$ (Actual days in term)/360, $i = 1,2,3$

**Step 3.** Calculate the effective monthly return, $r_{m\text{-}i}$, which when compounded through the length of the three-month term would result in the effective term yield computed in Step 2:

$r_{m\text{-}i} = (1 + e_{m\text{-}i})^{\text{Days in } m \text{ / Days in 3-month term}} - 1$, $i = 1,2,3$

**Step 4.** Calculate an average of the three monthly period yields derived in Step 3. This is the return on three-month deposits for the month *m*.

The same method is used to compute month-to-date returns on three-month Eurodeposits; the number of days used in Step 3 is appropriately modified.

For calculating returns for any other maturity, similar methodology is used. For example, to calculate returns for the six-month Eurodeposits for a given month *m,* we average the six effective monthly returns calculated using the six six-month Eurodeposit rates as of the end of months *m*-1, *m*-2, *m*-3, *m*-4, *m*-5, and *m*-6.

For one-month Eurodeposits, since a new Eurodeposit replaces a matured Eurodeposit at the beginning of every month, the averaging in Step 4 is omitted for calculating returns.

## Sample Base Currency Return Computation

The following example illustrates the computation steps for local and US dollar based returns on a three-month Sterling Eurodeposit.

**Figure 38. World Money Market Index (WMMI)— Assumed Conventions and Data**

| Conventions | Data | |
|---|---|---|
| Month for Which Returns Are Being Computed | April 2003 | |
| Quote Convention | Yield (%/Annum) | |
| Day-Count Basis | ACT/365 | |
| Yields | January 31 | 3.91% |
| | February 28 | 3.60% |
| | March 31 | 3.50% |
| US Dollar/UK Sterling Spot Exchange Rates | March 31 | 1.58065 |
| | April 30 | 1.59825 |

Source: Citigroup Index LLC.

### Compute Local Currency Return

Calculate the term yield:

$$y_{\text{January-3m}} = 3.91\% * (28+31+30)/365 = 0.9534\%$$

$$y_{\text{February-3m}} = 3.60\% * (31+30+31)/365 = 0.9074\%$$

$$y_{\text{March-3m}} = 3.50\% * (30+31+30)/365 = 0.8726\%$$

where $y_{\text{month}}$ should be interpreted as the effective yield for the three-month return. In other words, the Eurodeposit that yielded 3.91% per annum on January 31 returns 0.9534% for the three-month term (89 days).

Calculate the effective monthly returns:

$$y_{\text{January-1m}} = (1+0.9534\%)^{(30/89)} - 1 = 0.3204\%$$

$$y_{\text{February-1m}} = (1+0.9074\%)^{(30/92)} - 1 = 0.2950\%$$

$$y_{\text{March-1m}} = (1+0.8726\%)^{(30/91)} - 1 = 0.2868\%$$

where $y_{month\text{-}1m}$ is the Eurodeposit return for the 30-day month of April. For example, the January 31 Eurodeposit returned 0.3204% for the month of April. This return, in turn, would compound over 89 days to yield $y_{month\text{-}3m}$ or 0.9534%.

Compute the average of the monthly returns from above. This is our sector return for the month in local (sterling) terms.

$$y_{avg} = (y_{January\text{-}1m} + y_{February\text{-}1m} + y_{March\text{-}1m})/3 = 0.3007\%$$

### Compute Currency Return

$$C_{uk} = (1.59825 - 1.58065)/(1.58065) = 1.1135\%$$

### Compute Total Return (in US Dollar Terms)

$$R_{usd} = [(1+0.3007\%) * (1+1.1135\%)] - 1 = 1.418\%$$

**Figure 39. World Money Market Index — Reuters Instrument Codes (RICs) Used to Obtain Monthly Yields (Bid) for Eurodeposits**

| Currency | 1-Month | 2-Month | 3-Month | 6-Month | 12-Month |
|---|---|---|---|---|---|
| US Dollar | USD1MD | USD2MD | USD3MD | USD6MD | USD1YD |
| Australian Dollar | AUD1MD | AUD2MD | AUD3MD | AUD6MD | AUD1YD |
| Canadian Dollar | CAD1MD | CAD2MD | CAD3MD | CAD6MD | CAD1YD |
| New Zealand Dollar | NZD1MD | NZD2MD | NZD3MD | NZD6MD | NZD1YD |
| Japanese Yen | JPY1MD | JPY2MD | JPY3MD | JPY6MD | JPY1YD |
| Danish Krone | DKK1MD | DKK2MD | DKK3MD | DKK6MD | DKK1YD |
| Euro | EUR1MD | EUR2MD | EUR3MD | EUR6MD | EUR1YD |
| Norwegian Krone | NOK1MD | NOK2MD | NOK3MD | NOK6MD | NOK1YD |
| Swedish Krona | SEK1MD | SEK2MD | SEK3MD | SEK6MD | SEK1YD |
| Swiss Franc | CHF1MD | CHF2MD | CHF3MD | CHF6MD | CHF1YD |
| UK Sterling | GBP1MD | GBP2MD | GBP3MD | GBP6MD | GBP1YD |
| Czech Koruna | CZK1MD | CZK2MD | CZK3MD | CZK6MD | CZK1YD |
| Hong Kong Dollar | HKD1MD | HKD2MD | HKD3MD | HKD6MD | HKD1YD |
| Hungarian Forint | HUF1MD | HUF2MD | HUF3MD | HUF6MD | HUF1YD |
| Polish Zloty | PLN1MD | PLN2MD | PLN3MD | PLN6MD | PLN1YD |
| Singapore Dollar | SGD1MD | SGD2MD | SGD3MD | SGD6MD | SGD1YD |
| South African Rand | ZAR1MD | ZAR2MD | ZAR3MD | ZAR6MD | ZAR1YD |

Source: Reuters.

# Dow Jones Citigroup® Sukuk Index

The Dow Jones Citigroup Sukuk Index is designed to measure the performance of global Islamic fixed-income securities — also known as *sukuk*. This index includes US dollar-denominated investment-grade sukuk issued in the global market that are Sharia compliant.

The Dow Jones Citigroup Sukuk Index shares design criteria and calculation assumptions with the broader Citigroup fixed-income index family, including Citigroup's World Broad Investment-Grade (WorldBIG) Bond Index and follows the same consistent, quantitative methodology as the Dow Jones Islamic Market (DJIM) Indexes, which are monitored to ensure their continued compliance with Sharia Law.

## Composition

Figure 40 details the design criteria and calculation of the Dow Jones Citigroup Sukuk Index.

**Figure 40. Dow Jones Citigroup Sukuk Index — Design Criteria and Calculation Assumptions**

| | |
|---|---|
| Composition | Global US dollar-denominated investment-grade bonds that are Sharia compliant (please see the Sharia Compliance section that follows). |
| Stated Coupon | Fixed rate, floating rate |
| Minimum Maturity | One year |
| Weighting | Market capitalization updated once a month |
| Minimum Size Outstanding | US$250 million amount outstanding |
| Minimum Quality | An explicit or implicit rating of at least BBB-/Baa3 by S&P, Moody's, or a leading rating agency. |
| Yield Curve | Citigroup Treasury Model (off-the-run) Curve |
| Reinvestment of Cash Flow | One-month US dollar Eurodeposit for the calculation period |
| Calculation Frequency | Daily |
| Pricing | All pricing generally taken as of the local market close |
| Volatility | 10% single volatility |
| Base Date | September 30, 2005 |

Source: Citigroup Index LLC.

### Pricing

Bid-side prices from Citigroup are collected at the close of the local market for use in calculating monthly returns. However, because of the illiquid nature of the bonds, the valuations placed on the bonds by traders are based more on their estimate of where the bonds might trade rather than an observation of where they actually trade.

## Sharia Compliance

Sukuk are essentially asset-backed bonds, neither equity nor debt from the perspective of conventional capital markets. As such, the content and structure of sukuk must be examined carefully to assure that they are Sharia compliant. While it is possible for an index to stipulate criteria relating to the nature of the underlying assets of sukuk to determine whether or not sukuk are Sharia compliant, the structure

of sukuk presents a far more complicated picture. First, given the complexities involved when structuring such instruments for assets held in one jurisdiction by special purpose vehicles (SPVs) or trusts domiciled in other jurisdictions, or held by investors in still other jurisdictions, certification of compliance by an internationally recognized Sharia supervisory board (SSB) must be established. Second, the basic structure of sukuk must fall under one of the categories specified by the Auditing and Accounting Organization of Islamic Financial Institutions (AAOIFI). After these two criteria are established, the final Sharia screening criteria will deal exclusively with the nature of the underlying assets. To summarize the Sharia screening criteria:

1. certification by a recognized Sharia supervisory board
2. compliance with AAOIFI standards for tradable sukuk
3. compliance of the underlying assets with Sharia principles (similar to the set of guidelines established by the DJIM Indexes for primary business.

### The First Screen

The first criterion for considering sukuk is to ensure that the issuance is certified by a reputable SSB. In many cases, sukuk will be certified not only by the issuer's SSB, or the arranger, but also by the investor's SSB as well. To address the potential problem of differing SSB interpretations, the screen will be passed only if sukuk have been certified by a Sharia supervisory board with international membership or if more than one SSB from different geographic regions have certified sukuk.

### The Second Screen

The second criterion is the most complex of all. Because of the standards for sukuk issued by the AAOIFI in 2004, a diverse range of instruments has been identified, and their acceptance by Islamic banks and financial institutions has been universal.

### The Third Screen

The underlying assets to be securitized in sukuk must comply with Sharia principles, similar to the way stocks are screened for compliance of the primary business, so as not to permit companies that are engaged in any of the so-called prohibited industries. The industry-based screening criteria are similar to those established for the DJIM Indexes.

## Data Accessibility

The Dow Jones Citigroup Sukuk Index is available on www.djindexes.com, The Yield Book® fixed-income analytical system (www.yieldbook.com), and major data vendor services.

# Discontinued Indexes

The Citigroup indexes in this section have been discontinued.

## Global Government Bond Composite Index

The Global Government Bond Composite Index, discontinued on September 2006, included all government bond markets that Citigroup currently tracked. In addition to the 22 countries included in the WGBI, New Zealand was included in this index.

## European Government Bond Composite Index

The European Government Bond Composite Index, discontinued on September 2006, included the 17 sectors of the Global Government Bond Composite Index that were geographically located in Europe, namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

## Targeted Index Matrix Series (TIMS)

The Targeted Index Matrix Series (TIMS), discontinued on March 31, 2005, was designed to provide a generalized framework for constructing customized benchmarks that spanned the realm of duration and quality combinations available in the investment-grade fixed-income market. The matrix was based on two fundamental variables: (1) a percentage core holding in the credit and collateralized component of the USBIG Index, which provided an approximate gauge of quality level; and (2) effective duration as a measure of interest-rate sensitivity. For a desired effective duration, an index "cell" was created by combining the credit/collateralized core with an appropriate sector of Treasury securities. The Treasury sector acted as the swing component required to attain the desired index duration.

## Brady Bond Index

Market coverage of the Brady bonds was migrated to the ESBI Index. The performance and characteristics will be available via the Brady bond sector of the ESBI family of indexes.

The Brady Bond Index was designed to measure the performance of US dollar emerging market debt that has been restructured under the Brady Plan and has a minimum of US$500 million per issue amount outstanding. The index measured returns for all Brady bonds beginning with the first issue by Mexico in March 1990.

## Emerging Markets Mutual Fund (EMMF) Debt Index

The Emerging Markets Mutual Fund (EMMF) Debt Index, discontinued on June 30, 2003, was designed to provide the managers of regulated mutual funds with a more appropriate benchmark than the Brady Bond Index. Regulated mutual funds face

diversification rules that prevent the managers from matching the market weightings of the Brady Bond Index, which are concentrated in a few large credits. The EMMF Index was constructed to conform to mutual fund diversification regulations. Under these rules, half of a portfolio could have been invested in individual credits in amounts of less than 5% of the total portfolio size. The remaining half could have been invested in positions no greater than 25%.

An alternative to the EMMF Index is our ESBI-Capped Index, which limits exposure to any one country by placing a ceiling on the par value contribution of each country.

## Safest of High-Yields Index

The Safest of High-Yields Index, discontinued on June 30, 2003, was a market-capitalization-weighted managed portfolio of high-yield securities selected by Citigroup credit research analysts for high-coupon income and stable or improving credit quality.

## Government and Eurobond Composite Index (GECI)

The GECI was discontinued in January 2002. It was originally created to track the performance of the international investment-grade bond markets. With the launch of the World Broad Investment-Grade (WorldBIG) Bond Index in August 2000, the GECI benchmark grew obsolete. The WorldBIG Index is designed to be our broadest market measure for global investors. It is a liquid-replicable index that offers a natural extension of credit risk for investors who favor traditional government debt.

## World Bond Index

The World Bond Index was discontinued on December 31, 1995. This index served as a broad benchmark measuring the performance of government, Eurobonds, and foreign bonds in ten currencies. The index was sample-based and focused on the five-year and longer sectors of these markets. It was introduced in 1981 and had historical returns dating back to January 1978. The introduction of the World Government Bond Index in 1986 made the World Bond Index obsolete.

# Fixed-Income Glossary

## Asset-Backed

This sector includes financings that are backed purely by pools of assets and supporting credit enhancement structures, such as American Express Master Trust issues that are backed by credit card loans.

## Corporate

This sector includes bonds issued by industrial companies, utilities, and financial service companies, including those that carry bank guarantees. In addition, special purpose debt-issuing subsidiaries of such corporations are included, as are subsidiaries whose primary purpose is to provide financing to customers for the purchase and/or lease of the parent companies' products.

## Covered

We define this sector to include all Pfandbrief and Pfandbrief-like securities predominant in the euro region.

## Eurodollar Bond

A bond issued outside the boundaries of the United States that pays interest and principal in US dollars.

## Euro Medium-Term Note

A facility for an issuer to issue debt opportunistically in the Euromarkets in various currencies, maturities, and structures, using a single set of documentation.

## European Economic and Monetary Union (EMU) Member Countries (as of September 2006)

Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain.

## European Union (EU) Member States (as of September 2006)

Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

## Eurosterling Bond

A bond issued outside the boundaries of the United Kingdom that pays interest and principal in British pounds sterling.

## Euroyen Bond

A bond issued outside the boundaries of Japan that pays interest and principal in Japanese yen.

## Financial

The issuer must be solely engaged in the financial sector. This includes commercial and investment banks, insurance companies, savings and loans, and building societies. It also includes the financial subsidiaries of conglomerates when the subsidiary does not operate for the primary benefit of the manufacturing arm (such as General Electric Capital Corporation).

## Global Bond

Registered bonds issued simultaneously within and outside the United States. These issues are traded across all markets and can settle through Cedel, Euroclear, and DTC.

## Group-of-Ten (G-10) Countries

Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States (Switzerland is the honorary eleventh member of the G-10).

## National Currency Unit (NCU)

The pre-EMU currencies of the EMU member countries (for example, French francs). These currencies continue to exist and circulate, but the intra-NCU exchange rates and the NCU exchange rates with the euro are irrevocably locked. Most EMU sovereign debt issued in NCUs has been redenominated into euros, but most other bonds remain denominated in NCUs. For index purposes, we quote all NCU amounts in euro terms whether or not individual bonds have been redenominated, because there is no foreign exchange effect.

## Official and Agency

This includes all local government, provincial, and city debt as well as other agencies such as nonsovereign-guaranteed central and state banks and export credit agencies. Issues in this sector may have provincial or local government guarantees, but do not have sovereign guarantees. Examples include Canadian provinces, Bank of Greece, Crédit Local de France, and the German Landesbanks.

## Regulation S and Rule 144A

Regulation S (Reg S) of the US Securities and Exchange Commission (SEC) sets forth a "safe harbor" that exempts certain securities from the registration requirements of the Securities Act of 1933, provided that such securities are not offered in the primary market to US investors. Rule 144A modifies the primary market restriction to allow the sale of such securities to Qualified Institutional Buyers (QIBs).

Securities issued under Reg S and sold initially to non-US investors may subsequently be sold to US investors in the secondary market after a brief "seasoning" period has elapsed, typically 40 days. However, a holding of securities issued under Reg S and sold initially to QIBs under Rule 144A cannot be sold to other US investors in the secondary market until a two-year seasoning period has elapsed.

The US Broad Investment-Grade Bond Index includes securities issued under Rule 144A that have registration rights.

The High-Yield Market Index includes issues available for sale under Rule 144A immediately on satisfaction of our entry criteria. Before 1999, we delayed entry of these securities until the SEC registration process was completed.

The Eurodollar Index includes these securities immediately on satisfaction of our entry criteria.

## Seasoning

The rules defining the length of time by which a bond is seasoned are complex and vary for different issuers; there has been a trend toward shortening this period. We adopt a simplifying rule for the purpose of determining when a bond becomes seasoned: An issue is to be deemed seasoned for the purposes of the Eurobond Indexes 40 calendar days after the initial payment date.

## Sovereign and Sovereign-Guaranteed

This sector includes sovereign debt and any issues carrying an explicit sovereign guarantee irrespective of the function of the issuer — for example, Qantas Airways and Kobe City.

## Supranational

Supranationals are supported by the capital of more than one sovereign state, such as the World Bank and the Asian Development Bank.

## Yankee

A bond denominated in US dollars issued in the United States by foreign banks, sovereigns, other government entities, and corporations whose parent companies resides outside the United States. These bonds are registered with the SEC.

## Disclosure Appendix A1

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## Other Disclosures

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