
Construction Rules for the Morningstar® Global Bond Infrastructure IndexSM

Morningstar Indexes

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Overview

The Morningstar® Global Bond Infrastructure IndexSM is designed to provide global, multicurrency, diversified exposure to corporate debt issuers identified as infrastructure-related companies and security issuers using Morningstar's rigorous definition of infrastructure.

Index Inception Date and Performance Inception Date

The inception date of the index is September 1, 2014, and the performance inception date of the index is December 31, 2003, when the first back-tested index value was calculated.

Index Construction

Eligibility rules for the index are applied based on the criteria described in this section. Each criterion is applied only to the "survivors" of the previously applied criteria.

Bonds in the index are selected by a two-step process that involves sector/industry selection and security selection. The index methodology balances the need for adequate market coverage with that for easy replication and diversification. This is achieved by excluding smaller issues that are difficult to purchase and impose heavier transaction costs. A security must meet the following criteria:

Selection Universe

The universe of bonds for constructing the Morningstar Global Bond Infrastructure Index may be found in Appendix 1.

Sector/Industry Selection

To be eligible for the index, securities must be assigned to an infrastructure industry based on the infrastructure taxonomy. For details on the infrastructure taxonomy, refer to Appendix 2.

Constituent Selection

Inclusions

- ▶ Bonds issued by corporate and quasi-sovereign issuers are eligible. "Quasi-sovereign" is defined as a corporation with more than 50% government ownership.
- ▶ Only fixed-rate coupon bonds are included in the index.
- ▶ All securities must have a minimum of 13 months remaining to maturity.
- ▶ All securities must have a minimum of 24 months to maturity at time of inclusion.
- ▶ Bonds with embedded options, such as calls and puts, are included.
- ▶ Bonds with sinking funds are included.

Exclusions/Removal

- ▶ Fixed-to-floating-rate and payment-in-kind, or PIK, bonds are excluded.
- ▶ Subordinated debt is excluded.
- ▶ Loans, supranational, and perpetual bonds are excluded.
- ▶ Sukuk, commonly referred to as Islamic bonds, are excluded.
- ▶ Corporate issues in default will be removed at the next rebalancing. Bonds are considered in default for failure to make a scheduled coupon and/or principal payment. A company filing bankruptcy papers—or the local market equivalent—is considered to be in default.
- ▶ Illiquid bonds are excluded or eliminated from the index. A bond is deemed illiquid when pricing on a consistent basis is unavailable or becomes unavailable. Bonds with limited liquidity may be removed at the discretion of the index committee.

Private Placements

Bonds issued under Regulation S are eligible for the index. No seasoning period is required for REG S bonds.

Currency and Country of Risk

- ▶ There are no restrictions on the country of risk.
- ▶ Bonds must be denominated in one of the following currencies to be included in the index: Australian dollars, Canadian dollars, Swiss francs, euros, British pounds, or U.S. dollars.
- ▶ The base currency for the calculation of security, portfolio, and index values is U.S. dollars.
- ▶ In addition to the base currency, index returns will be calculated in euros and British pounds.

Minimum Par Amounts

- ▶ Each security must have a minimum remaining face amount outstanding in order to be included in the index, or to remain in the index, in accordance with the following schedule:

Currency	Min Par Amount O/S
AUD, CAD, CHF, GBP	250 million local currency
USD	300 million local currency
EUR	500 million local currency (before Jan. 1, 2016, 300 million local currency)

Credit Rating Criteria

To qualify for the index, a security must have at least one rating from Moody's or Standard & Poor's equal to Baa3/BBB- or above.

Sector Constraint

At each monthly rebalancing, the index is constrained so that no sector is greater than 50% of the total market value of the overall index measured in base currency. If the sector constraint is exceeded as a result of monthly drift, the security weights in that sector are reduced on a pro rata basis, and the excess weight is allocated on a pro rata basis to the remaining index constituents, i.e., the excess weight is redistributed on a market-weighted basis to the other issuers in the index outside of the utility sector. The new set of market weights is used to derive adjusted par amounts for each security, which remain static until the next monthly rebalancing.

Number of Constituents

The number of constituents in the index is subject to the selection and eligibility criteria at the time of reconstitution.

Index Maintenance

Scheduled Maintenance

The index is rebalanced monthly and is implemented after the close of the last business day of the month and is effective on the first business day of the following month. All securities must settle before the last business day of the month to be eligible for the rebalanced index for the following month.

Index Calculations

Overview

Morningstar partners with a third-party calculation agent to calculate the Morningstar Global Infrastructure Bond Index. This agent calculates the actual change in all measured characteristics of the respective indexes daily. All of the index measures are calculated for all levels of the aggregate indexes, including the individual bonds that make up the indexes.

Market-capitalization weighting is used for all index characteristics. The weightings are fixed as of the last business day of each month.

Indicative bid-side prices are used for all index calculations and are provided daily by outside pricing sources. Updates to the bond-level composition are made on the first business day of each month. Indicative offer-side prices are used when securities are added to an index. Transaction costs and tax consequences are ignored.

Return Calculations

There are three basic equations for calculating returns on individual bonds and on the indexes themselves: total return, price return, and interest return. Total return is the sum of the other two returns. If daily returns are known, users can calculate returns for any given period.

In what follows, a "clean price" is a quoted price that does not include accrued interest. A "dirty price" includes accrued interest.

The formulas for the three types of return are as follows:

The total return from date 0 to date t is defined as:

$$TR_{(0,t)} = \frac{Pc_{(t)} - Pc_{(0)} - AI_{(t)} + AI_{(0)} + IC_{(0,t)}}{Pd_{(0)}}$$

Where:

$Pc_{(0)}$ = clean price on date 0

$Pc_{(t)}$ = clean price on date t

$Pd_{(0)}$ = dirty price on date 0

$AI_{(0)}$ = accrued interest on date 0

$AI_{(t)}$ = accrued interest on date t

$IC_{(0,t)}$ = cash received between date 0 and date t including coupon reinvestment

Then, the one-day total percentage return between dates t-1 and date t is given by:

$$TR_{(t-1,t)} = \left(\frac{TR_{(0,t)} + 1}{TR_{(0,t-1)} + 1} - 1 \right) \times 100$$

The price return is based on the clean price appreciation over the dirty price. From (1), the price return (between date 0 and date t) component can be separated as:

$$PR_{(0,t)} = \frac{Pc_{(t)} - Pc_{(0)}}{Pd_{(0)}}$$

The interest return is given by:

$$IR_{(0,t)} = \frac{AI_{(t)} - AI_{(0)} + IC_{(0,t)}}{Pd_{(0)}}$$

There are two components to the interest return calculation: accrued interest appreciation and the reinvestment of the coupon during the period. The time between coupon payments on a bond is referred to as the coupon period. At any time during a given coupon period, the seller of the bond is entitled to that portion of the next coupon payment, known as accrued interest, that is proportionate to the time elapsed since the prior payment.

The reinvestment rate is based on the relevant local currency rate as of the last business date of the previous month. This rate is applied to the cash received during date 0 and date t. If there is no coupon payment during the period, the IC component is set to 0. For this index, the local currency rate is assumed to be zero, that is, cash is not reinvested until date t.

The IC component between date 0 and date t is calculated as:

$$IC_{(0,t)} = CF_{(0,t)} \times \left(1 + DCT_{(0,t)} \times \frac{Rt}{360} \right)$$

where:

$CF_{(0,t)}$ = coupon cash flow between date 0 and date t

$DCT_{(0,t)}$ = days between coupon date and date t where coupon date is between date 0 and date t

Rt = one-month Libor rate as of the last business date of the previous month

Coupon Reinvestment

Coupons are assumed to be received in full, not accounting for withholding taxes. Cash received intramonth due to a coupon payment is not reinvested intramonth. The accumulated cash is reinvested in the index at the end-of-month rebalancing.

Index Weights

All index-level (or portfolio-level) statistics aggregate bond-level measures by each bond's market weights. For return-related statistics, the bonds' weights are fixed on the last business date of the previous month (since the indexes rebalance on the last business date of each month).

For all other statistics, a bond's weight is defined as daily market weight with monthly fixed par amounts. Thus, the market value for the ith bond is given by:

$$w_i = (\text{price}_i + \text{accruedInterest}_i) \times \text{parAmount}_i$$

Then, an index's total weight is calculated as:

$$W = \sum_{i=1}^n w_i$$

where:

n = total number of bonds in the index

Then the ith bond in the given index has a weight given by:

$$\omega_i = \frac{w_i}{W}$$

Thus, for example, a given index's modified duration is calculated as:

$$D = \sum_{i=1}^n \omega_i \times m_i$$

Where:

m_i = modified duration of the ith bond

Duration Calculations

Duration can be described as the weighted average time to receipt of the future cash flows (or coupon payments), with weighting determined by the portion of the bond's overall present value that is represented by the present value of those future cash flows. Duration shows that for small changes in the bond's yield, the percentage change in the bond's price approximates the negative of its duration multiplied by the change in yield. In other words, for small parallel shifts in the yield curve, the ratio of two bonds' price changes will be the same as the ratio of their durations.

Duration is also a concept commonly used to describe the effective life of bonds. It is a method of assessing the risk profiles of different bonds regardless of differences in term to expiration, coupon rate, and yield to maturity. It is an important concept in the use of interest-rate futures for hedging. The duration of a bond is a measure of how long, on average, the holder of the bond has to wait before receiving cash payments. Duration calculation using the conventional yield is often referred to as "Macaulay Duration" and is represented mathematically as:

$$\text{MacDur} = \frac{1}{\text{freq}} \times \frac{1}{P} \sum_{i=1}^{n-1} t_i CF_i \left(1 + \frac{y}{\text{freq}}\right)^{t_i}$$

Where:

freq = frequency of cash flows

P	=	bond price
n	=	number of cash flows
t_i	=	time to maturity at the i'th coupon payment date
CF_i	=	i'th cash flow
y	=	yield

Macaulay Duration divided by one plus the conventional yield is often referred to as modified duration. Modified duration can be used like continuously compounded duration to calculate the percentage change in bond price for small changes in yield.

$$ModDur = \frac{MacDur}{1 + \frac{y}{freq}} = \left(-\frac{1}{P}\right) \frac{\partial P}{\partial y}$$

Mathematically, modified duration represents the slope of the tangent line, at a particular yield level, to the price-yield curve of the bond. At different yield levels, the slope of this tangent line will vary. Modified duration can then be used to measure the price sensitivity of a bond. Modified duration always assumes instantaneous and small yield changes and parallel shifts in the yield curve.

Effective Duration

Prepayments can alter future cash flows and thereby affect the duration of a mortgage pool. Therefore, the more appropriate measure for mortgage securities is effective duration, which takes into account the sensitivity of prepayments to interest-rate changes. Effective duration is calculated in the following steps:

- ▶ Shift the current yield, typically by 25 or 50 basis points.
- ▶ Use a prepayment model, which is a statistical model that predicts changes in prepayment rates as interest rates change, to calculate the prepayment rate at the new, shifted yield level.
- ▶ Calculate the new cash flow of the mortgage pool, based on the prepayment assumption derived in the above step.
- ▶ Price the security as the present value of the cash flow obtained in the previous step.
- ▶ These steps produce the following values needed for calculating effective duration:

Y_s	=	Yield shift (typically 25 or 50 basis points)
$Px(Down)$	=	Price of mortgage security when the yield shifts down
$Px(Up)$	=	Price of mortgage security when the yield shifts up
$Px(Base)$	=	Price of mortgage security if yield stays constant

Effective duration is then given by:

$$EffectiveDur = \frac{Px(Down) - Px(Up)}{2 \times Px(Base) \times Y_s} \times 100$$

Effective duration is thus the expected percentage change in price for a small change in yield.

Convexity

When moderate or large changes in interest rates are considered, a measure known as "convexity" is sometimes important. Convexity is a measure of the speed with which a bond's duration changes as its yield changes. Therefore, the duration of a bond with high convexity will get longer as yields fall faster than it will get shorter as yields rise. This is a desired feature for a security: It means that for parallel yield shifts of equal size, the price gain on a downward move in yield is larger than the price loss on an upward move. By contrast, a security with poor or negative convexity may present the opposite profile, performing poorly when market yields rise, but also failing to perform as well as a positively convex security when yields fall. This is a hallmark trait of securities bearing certain kinds of call options, such as mortgages, in particular. Mathematically, it is the second derivative of price with respect to yield.

Currency Exposure and Hedging

A significant portion of the Morningstar Global Bond Infrastructure Index consists of securities denominated in currencies other than the U.S. dollar. To make the indexes accessible to a wide variety of investors, certain factors must be taken into account when calculating returns, and depending on the investor, it may be desirable to examine more than one type of return.

Local Currency Return

For an investor simply wanting to understand the performance of an index, as it would be experienced by a local-currency investor domiciled in each country, one would examine the local currency variant of our indexes, denoted as IL. These calculations assume that one is investing in each local currency represented in the index and that the funds remain in that domicile and currency for the entirety of the period. Returns are calculated according to typical convention.

Unhedged Return

The more typical scenario that investors venturing outside of their home markets will experience exists when money from a home market account is invested in the securities of another country, denominated in that country's local currency. (We would typically refer to the home country currency as the "base" currency. For the purpose of this guide we assume the base currency to be U.S. dollars.) In this case, in addition to the underlying return of an index, investors are also exposed to any fluctuation in exchange rate that may occur between the U.S. dollar and the currency or currencies within which its securities are denominated. In order to properly account for that effect, currency translations must be performed so as to capture the difference in exchange rates at any time to and from which returns are calculated. In practice, that is done by incorporating each currency's "spot rate" relative to the base currency into the return calculation.

For the purpose of this example we assume the local currency return has already been calculated. We will refer to it as LTR. In order to calculate the index's unhedged return, we also need to calculate the "currency return," to capture differences in exchange rates, as noted.

The currency return (CR) is therefore defined as:

$$CR = (SR(e) / SR(b)) - 1$$

Where:

CR = Currency return

SR(e) = Spot rate at the end of the period

SR(b) = Spot rate at the beginning of the period

The unhedged return (UNHDG) is therefore defined as:

$$UNHDG = (1 + LTR) * (1 + CR) - 1$$

Where: UNHDG = Unhedged return expressed in the base currency

LTR = Local total return

CR = Currency return

Currency spot rates are obtained from WM/Reuters and represent closing spot rates fixed at 4 p.m. United Kingdom time. Earlier or later times may be chosen according to WM/Reuters' policy on national holidays, or in the case of technical difficulties with or failure in supply of the relevant data source, or special market conditions for particular currencies.

The Reuters System is the primary source of WM/Reuters' spot foreign exchange rates. Other sources may be used by exception where the appropriate rates are not available.

Hedged Return

Investors who wish to gain exposure to markets not denominated in their home currencies, but who aren't willing or permitted to gain exposure to the currencies within which those markets are denominated, will typically chose an index whose returns are hedged back to their home currencies. The effect of such a hedge is to eliminate nearly all exposure to the currency fluctuations of the market in which one is invested. There are limitations to that exercise in the real world, as it is not considered practical to constantly readjust hedges, and there are costs associated with implementing them, as well. As a result, an index's hedged return often diverges somewhat from its local currency return.

The most common method for including the effects of such hedges in index calculations is to factor in currency forward contracts that effectively counter the price-fluctuation risk inherent in translating one's assets from a base currency to an invested currency, holding them there for a period of time, and then converting them back to the home currency. Hedged returns for the Morningstar Global Bond Infrastructure Index are calculated in this fashion, using industry standard one-month forward rate contracts. In order to apply that calculation, we first derive the return produced by the forward contract over the period. We refer to this as the return on hedge.

The return on hedge (ROH) is therefore defined as:

$$\text{ROH} = 1\text{MFR} - \text{CR}$$

Where:

1MFR = Forward return (return on one-month forward contract)

CR = Currency return

Using the return on hedge, we can then calculate the index's overall hedged return (HDG), this is therefore defined as:

$$\text{HDG} = \text{LTR} + ((\text{CR}) * (1 + \text{LTR})) + \text{ROH}$$

Where:

HDG = Hedged return

LTR = Local total return

CR = Currency return

ROH = Return on hedge

Closing forward rates are obtained from WM/Reuters, and represent closing forward rates fixed at 4 p.m. U.K. time. Earlier or later times may be chosen according to WM/Reuters' policy on national holidays, or in the case of technical difficulties with or failure in supply of the relevant data source, or special market conditions for particular currencies. The Reuters System is the primary source of WM/Reuters' spot foreign exchange rates. Other sources may be used by exception where the appropriate rates are not available.

Trading, Settlement, and Transaction Costs

Trading and settlement of these securities follow local market conventions. The index does not take transaction costs (bid-offer spreads) or tax withholdings into account. Bid-side prices are used for the daily bond index calculations and offer-side for adding new bonds to the index.

Holiday Rules

If the bond market for an included currency is closed for a holiday, then the previous day's security prices will be carried forward and adjusted to reflect the change in foreign exchange rates for that day and then used to calculate the index values for that day. Index files will not be delivered on New Year's Day, Christmas Day, or Good Friday.

Methodology Review and Index Cessation Policy

The index methodology is continually reviewed to ensure it achieves all stated objectives. These reviews take into account corporate action treatment, selection, and maintenance procedures. Subscribers to the index will be notified before any methodology changes are made. For more details, refer to the [Morningstar Index Methodology Change Process](#).

Morningstar also notifies all subscribers and stakeholders of the index that circumstances might arise that require a material change to the index, or a possible cessation of the index. Circumstances that could lead to an index cessation include, but are not limited to, market structure change, product definition change, inadequate supply of data, insufficient revenue associated with the index, insufficient number of clients using the index, and/or other external factors beyond the control of the Morningstar Index Committee.

Because the cessation of the index or benchmark index could disrupt subscriber products that reference this index, all subscribers are encouraged to have robust fallback procedures if an index is terminated. For more details, refer to the [Morningstar Index Cessation Process](#).

Data Correction and Precision

Intraday Index Data Corrections

Commercially reasonable efforts are made to ensure the accuracy of data used in real-time index calculations. If incorrect price or corporate action data affect index daily highs or lows, they are corrected retroactively as soon as is feasible.

Index-Related Data and Divisor Corrections

Incorrect pricing and corporate action data for individual issues in the database will be corrected upon detection. In addition, an incorrect divisor of an index, if discovered within five days of its occurrence, will always be fixed retroactively on the day it is discovered to prevent an error from being carried forward. Commercially reasonable efforts are made to correct an older error subject to its significance and feasibility.

For more details, refer to the [Recalculation Guidelines](#).

Computational and Reporting Precision

For reporting purposes, index values are rounded to two decimal places and divisors are rounded to appropriate decimal places.

Market or Undocumented Events

In the case of a significant market event (default, delayed payment, debt restructuring), any affected securities will not be removed until the next rebalancing date. Market prices and the index team's best estimate of how to treat the securities in question will be used to compute index returns.

Appendixes

Appendix 1: Bond Universe

For purposes of constructing the Morningstar Global Bond Infrastructure Index, the universe of bonds is defined as the following set of indexes provided by Credit Suisse:

- ▶ Liquid Swiss Index (LSI)
- ▶ Liquid European Index EUR (LEI EUR)
- ▶ LEI — Crossover Index (EUROVR)
- ▶ Liquid European Index GBP (LEI GBP)
- ▶ Liquid US Corporate Index (LUCI)
- ▶ Liquid US Corporate Index PLUS (LUCI PLUS)
- ▶ Credit Suisse Latin America Corporate Bond Index (CS-LACI)
- ▶ Asian Bond Index (CS-ABI)
- ▶ LUCI — Crossover Index (USXOVR)
- ▶ Credit Suisse Eastern Europe Corporate Index (EEI)
- ▶ Credit Suisse Middle East and Africa Corporate Index (MACI)
- ▶ Liquid US High Yield Index (LUHY)

Additional details on these indexes may be found in [Credit Suisse's Guide to Global Tradable and Benchmark Index Products](#)

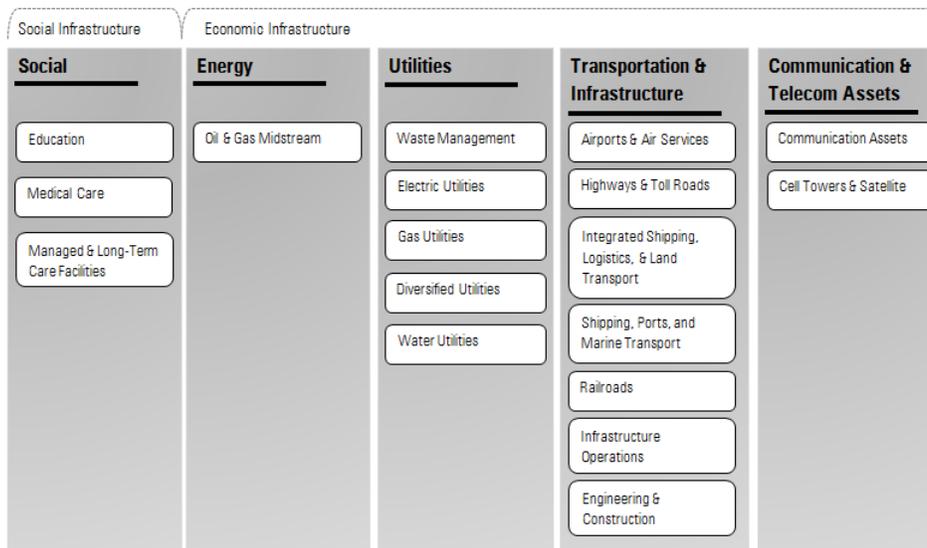
Appendix 2: Infrastructure Taxonomy Overview

The infrastructure taxonomy consists of 18 industries that meet the Morningstar definition of the infrastructure asset class. The industries fall into one of the five segments that are organized into two supersectors, social and economic, as shown below.

Morningstar Global Infrastructure Taxonomy



Global Infrastructure



Industry Assignments

Each security eligible for the index is classified into one of the 18 infrastructure industries that most accurately reflect the company's underlying business. This mapping is based on publicly available information from annual reports, Form 10-Ks, and security offering statements, and Morningstar equity/credit analyst input as its primary sources. Secondary sources of information may include company websites, sell-side research (if available), and trade publications.

Issuers are mapped into the industries that best reflect each company's majority revenue and income source. In situations where no clear revenue and income segment holds clear majority or in the case of not-for-profit fixed-income issuers, the classification will be determined by further research and analysis. Further, if the company has more than three sources of revenue and income and there is no clear dominant revenue and income stream, the company is assigned to the conglomerates industry, which is not eligible for the index.

Industry Assignment Maintenance

Based on Morningstar analyst research or third-party information, Morningstar may change industry assignments to more accurately reflect a company's changing business. Industry classification is

reviewed at least once a year when a new annual report is available or whenever a major corporate change occurs (a merger or acquisition, for example) that might affect business segment revenue or income.

Infrastructure Asset Class Definition

The infrastructure asset class generally has long-duration assets that elicit stable and predictable cash flows. High entry barriers and monopolistic business models, paired with inelastic demand for essential services provided by infrastructure companies, result in predictable revenue that is often indexed to inflation. Furthermore, the two main revenue drivers, pricing and volume, have particular characteristics within this space. Prices are generally tied to long-term contracts and/or regulation and are often adjusted with inflation. Volume tends to grow steadily because of inelastic demand, efficiencies of scale, and increasing GDP. Hence, in periods of rising inflation, infrastructure investments act as a real asset. Additionally, in times of economic contraction, such businesses tend to have defensive characteristics, since they are relatively insulated due to stable demand irrespective of the economic cycle.

Infrastructure Industry Definitions

The following definitions govern industry assignment when evaluating business-segment revenue and income for classification purposes.

Communication and Telecom Assets

Communication Equipment

Communication infrastructure is defined as those companies that offer equity and own and operate cell towers or satellites, and primarily generate revenue from long-term contracts that lease access to these assets. Cell tower owners often enjoy 10- to 15-year contracts that are indexed to inflation. Similarly, satellite owners lease bandwidth and are regulated with high barriers to entry. Included in the bond subindex are companies that manufacture telecommunications equipment, telecom technology-related products, hardware, and raw materials required for telecommunications systems.

Energy

Oil and Gas Midstream

Companies that own and operate oilfield pipelines and gather, process, and transport natural crude petroleum. This industry includes companies that process, store, market, and transport bulk natural gas, liquefied natural gas, refined petroleum products, crude oil, and to a lesser extent ethanol, coal, and carbon dioxide. Pipelines are characterized by relatively high barriers to entry, high capital costs, and significant regulatory oversight. While there is ample competition among midstream firms, once a pipeline is in service it demonstrates excess returns.

Social

Education

A handful of major universities worldwide issue corporate bonds to fund the growth and development of their facilities. These are generally private, not-for-profit institutions with high credit ratings and large capital investment and improvement programs.

Medical Care

The healthcare provider industry includes acute-care hospitals, ambulatory surgical centers, dialysis facilities, rehabilitation clinics, and other healthcare-service companies. They provide essential inpatient and outpatient medical services, including clinical visits, emergency care, rehabilitation, and surgical procedures. Healthcare providers generally compete in a fragmented industry, with a majority of revenue stemming from government-controlled reimbursements. Healthcare providers generally have a steady stream of patients who provide stable cash flows despite modest reimbursement concerns. An aging demographic shift in many global developed markets also supports an attractive growth trend for the industry.

Managed and Long-Term Care Facilities

Long-term care providers, including long-term care hospitals, nursing centers, assisted living facilities, retirement communities, and home health and hospice services, fill a wide range of medical needs for patients requiring varying levels of assistance over extended periods of time. This industry maintains a relatively stable inflow of patients and will likely become increasingly important as the result of an aging population demographic in numerous developed countries over the coming decades. These facilities largely depend on government payments, which keep profitability relatively low. However, facilities with less-intensive medical requirements, such as retirement communities, generally operate more like real estate companies that provide modest value-added medical services.

Transportation and Infrastructure

Airports and Air Services

Air-services companies include helicopter transportation, air-charter services, and other air emergency and business-related services. Public and private operators work within implied or granted authority to manage all the workings of the airport. Acquiring the rights to operate and manage an airport from the government is the most important source of competitive advantage. Returns on capital are driven by regulated revenue, related to tariffs charged to passengers and airline customers, and by more profitable sales of nonregulated, or commercial, items. Most operators are generally given decades-long rights to operate and manage airports. However, some governments do not allow operators to earn significant excess returns on capital, treating the airport more like a regulated utility than a private business.

Railroads

Companies that transport passengers and freight by line-haul railroad. Railroads haul coal, chemicals, grain, shipping containers, automobiles, and myriad other commodities. Unlike those in many other regions, North American railroads generally own the land or rights of way, track, and terminals over

which they operate, plus motive power and most rolling stock. While other transportation modes like barges, aircraft, and trucks also haul freight, railroads are the lowest-cost option by far when no waterway connects the origin and destination. Furthermore, railroads operate at an efficient scale.

Highways and Toll Roads

Public or private highways and toll roads are sometimes permanently financed by debt issued in the corporate market. These entities are included in the bond subindexes along with companies that construct or own highways or highway-related facilities.

Shipping, Ports, and Marine Transport

Companies that transport freight and cargo via water are vital to worldwide trade. Container shipping and terminals that focus on multiple modes of freight transport via shipping containers require a substantial infrastructure investment. In the marine segment, inland tank barge providers move bulk liquid cargo throughout waterway systems, while the large steamship lines concentrate on shipping containerized ocean freight, and the ports process containers and break down bulk cargo. On the other hand, competitive advantages exist in the inland barging industry and among port operators, as certain firms should continue to benefit from scale economies and related cost advantages.

Infrastructure Operations

Companies that develop, finance, maintain, and manage infrastructure operations such as airports and roadways. Infrastructure operations firms comprise business lines that span industries, geographies, and customer markets contained under one parent or holding company. These companies are similar to concessionaires in the public-private partnership space within the engineering and construction industry.

Integrated Shipping, Logistics, and Land Transport

Companies that transport freight and cargo via diversified methods such as trucks, airline, water, and railways. This industry again permits exposure to a wide range of infrastructure operations but is more specifically focused on transportation assets. Third-party logistics, or 3PL, providers typically operate asset-light business models, buying capacity from asset-based carriers and reselling it to shippers to earn a spread. The 3PL industry includes domestic truck brokers and air and ocean forwarders. Global integrators such as FedEx and UPS not only provide domestic and intercontinental express package delivery but also participate to a significant degree in the 3PL space. Network effect is normally the key source of competitive advantage. Only a handful of integrated shippers have sufficient scale to offer global parcel delivery service, and this oligopolistic market structure enables more pricing power than if a greater number of firms competed on an international scale. Among the asset-intensive global integrators, competitive advantage is often built by a combination of cost advantage (scale economies), efficient scale, and the network effect. In terms of scale-based cost advantage, the need for global distribution infrastructure and heavy capital investment to compete in international and domestic-express markets is a primary reason there are few providers in the space — DHL, FedEx, and UPS control the vast majority of the market.

Engineering and Construction

Companies in public-private partnerships that specialize in the design, construction, or contracting of large infrastructure building projects. This industry permits exposure to diversified infrastructure investments. The focus lies on firms that generate the majority of their revenue from building and operating toll roads, tunnels, bridges, railways, airports, seaports, and similar capital-intensive infrastructure. These engineering-services firms provide the expertise, services, and equipment necessary to efficiently and cost-effectively solve complex problems in often challenging operating environments. These firms are often asked to solve some of the most difficult engineering problems on the planet while operating in deeply hostile environments, and customers are very reluctant to use unproven providers because a mistake can cost hundreds of millions of dollars.

Utilities

Regulated Utilities

Regulated utilities generally own difficult-to-replicate distribution, transmission, and generation networks that produce and deliver energy sources such as electricity, natural gas, oil, propane, or water. Regulators must allow a reasonable opportunity for a utility to recover its operating and capital costs through customer rates. Service-territory monopolies and efficient-scale advantages are the primary sources of competitive advantage for regulated utilities. State and federal regulators typically grant regulated utilities exclusive rights to charge customers rates that allow the utilities to earn a fair return on and return of the capital they invest to build, operate, and maintain their distribution networks. In exchange for regulated utilities' service-territory monopolies, state and federal regulators typically set returns at levels that aim to minimize customer costs while offering fair returns for capital providers.

Diversified Utilities

Companies that generate, transmit, and/or distribute electricity and natural gas, and own and operate merchant power generation facilities and energy marketing operations.

Electric Utilities

Companies that generate, transmit, and/or distribute electric energy for sale.

Gas Utilities

Companies that transmit, store, and/or distribute natural gas.

Water Utilities

Companies that distribute water for sale.

Waste Management

Companies that collect, treat, store, transfer, recycle, and dispose of waste materials as well as companies that support environmental, engineering, and consulting services. Vertically integrated waste-management companies establish collection routes around a network of physical assets, such as landfills, incinerators, and recycling centers. Non-hazardous-waste vendors handle the majority of trash

generated by municipal, industrial, and commercial customers. Hazardous waste companies are subject to greater regulation and often handle specific types of waste, such as medical or radioactive. Hazardous waste handlers benefit from regulatory permits on the collections side of the business. Owning a landfill or incinerator can be a competitive advantage in countries with strict waste-handling regulations. Owning disposal capacity leads to pricing power in the industry, which provides the foundation for predictable, annuity-type cash flows. The necessity of waste handling provides some assurance for a basic level of demand throughout the economic cycle. Regulatory permits are valuable intangible assets that secure exclusive rights to run a disposal asset for 10-20 years on average. As such, the owners of landfills or incinerator sites develop the ability to set the price.

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For More Information

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