INDEXING 101 | GLOBAL

Weighing in on the Dow Jones Commodity Index and the S&P GSCI®

CONTRIBUTOR

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Weighting schemes can be essential to meeting portfolio goals across all asset classes, and commodities are no exception. Our two flagship commodity indices, the S&P GSCI® and the Dow Jones Commodity Index (DJCI), employ similar index construction methodologies, with weighting as the main difference between them.
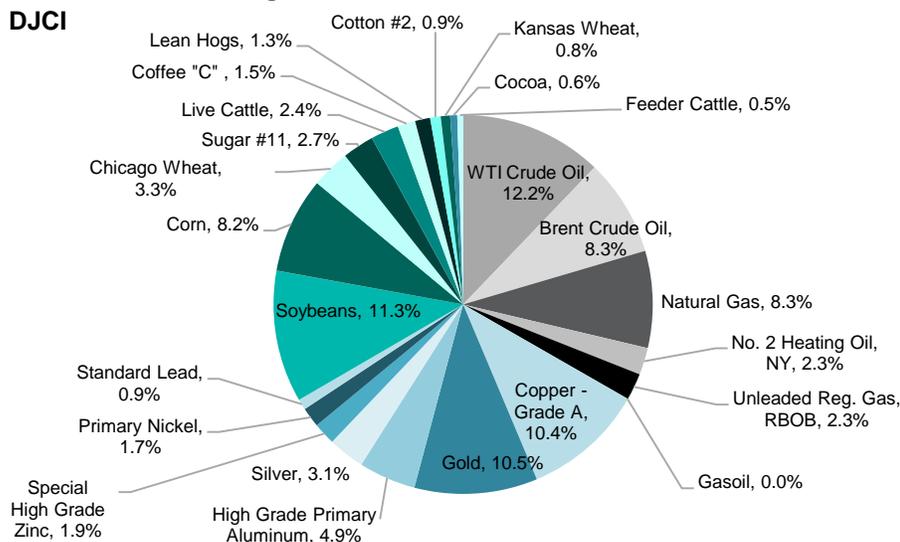
2 Indices, 2 Weighting Schemes

The DJCI is an equally weighted index designed to include diversification and liquidity as intrinsic characteristics. Each commodity is liquidity weighted by a five-year average of its total dollar value traded. To apply caps for further diversification, the commodities in the index are grouped into components according to their physical similarities and correlations. The caps are applied so that no more than one component is greater than 32% and no subsequent component is greater than 17%. Lastly, the sectors are limited to 33% weight in the index.

The two flagship commodity indices, the S&P GSCI and the Dow Jones Commodity Index (DJCI), employ similar index construction methodologies, with weighting as the main difference between them.

The S&P GSCI, on the other hand, is a world production weighted index. This index is designed to reflect the relative significance of its constituents to the world economy, while preserving its tradability by limiting eligible contracts to those with adequate liquidity. With respect to each designated contract, a contract production weight (CPW) is calculated based on world production and trading volume. Calculating a designated contract's CPW involves the following four-step process:
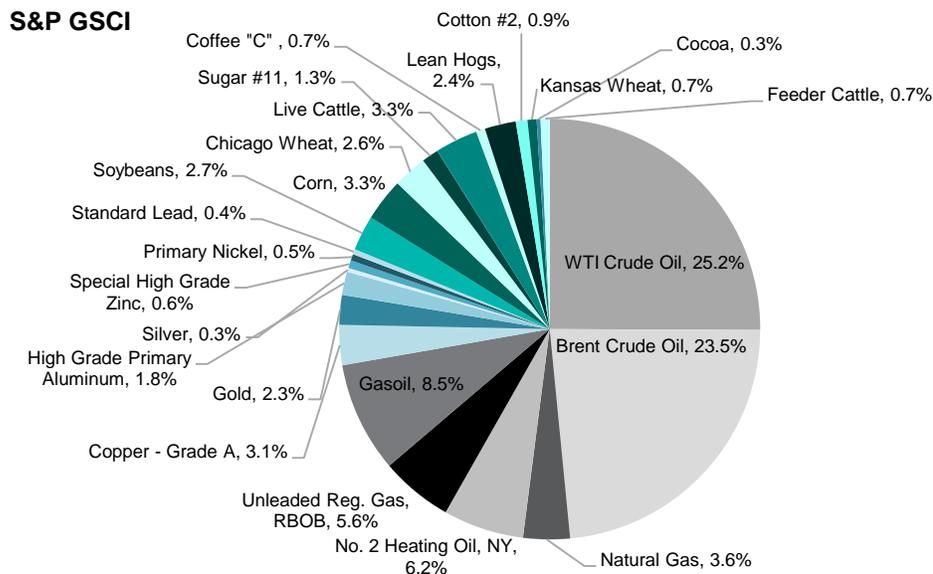
1. Determination of the world production quantity (WPQ) of each S&P GSCI commodity;
2. Determination of the world production average (WPA) of each S&P GSCI commodity over the WPQ period;
3. Calculation of the CPW based on the contract's percentage of the relevant total quantity traded (TQT); and
4. Certain adjustments to the CPWs.

The resulting index compositions differ dramatically. Energy is weighted higher in the S&P GSCI at 72.1% vs. 33.8% in the DJCI. In addition, metals has a relatively low weight in the S&P GSCI at 9.6%, compared with 35.5% in the DJCI, while agriculture and livestock hold 18.2% in the S&P GSCI vs. 30.7% in the DJCI (see Exhibit 1).

Exhibit 1: Sector Weights in the S&P GSCI and the DJCI

DJCI

Cotton #2, 0.9%
Lean Hogs, 1.3%
Coffee "C" , 1.5%
Live Cattle, 2.4%
Sugar #11, 2.7%
Chicago Wheat, 3.3%
Corn, 8.2%
Soybeans, 11.3%
Standard Lead, 0.9%
Primary Nickel, 1.7%
Special High Grade Zinc, 1.9%
Silver, 3.1%
High Grade Primary Aluminum, 4.9%
Gold, 10.5%
Copper - Grade A, 10.4%
Kansas Wheat, 0.8%
Cocoa, 0.6%
Feeder Cattle, 0.5%
WTI Crude Oil, 12.2%
Brent Crude Oil, 8.3%
Natural Gas, 8.3%
No. 2 Heating Oil, NY, 2.3%
Unleaded Reg. Gas, RBOB, 2.3%
Gasoil, 0.0%

The index compositions resulting from the S&P GSCI's world production weighting and the DJCI's equal weighting differ dramatically.

S&P GSCI

Cotton #2, 0.9%
Coffee "C" , 0.7%
Lean Hogs, 2.4%
Sugar #11, 1.3%
Live Cattle, 3.3%
Chicago Wheat, 2.6%
Soybeans, 2.7%
Corn, 3.3%
Standard Lead, 0.4%
Primary Nickel, 0.5%
Special High Grade Zinc, 0.6%
Silver, 0.3%
High Grade Primary Aluminum, 1.8%
Gold, 2.3%
Copper - Grade A, 3.1%
Unleaded Reg. Gas, RBOB, 5.6%
No. 2 Heating Oil, NY, 6.2%
Gasoil, 8.5%
Cocoa, 0.3%
Kansas Wheat, 0.7%
Feeder Cattle, 0.7%
WTI Crude Oil, 25.2%
Brent Crude Oil, 23.5%
Natural Gas, 3.6%

Source: S&P Dow Jones Indices LLC. Data as of July 1, 2014. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

| **Exhibit 2: Annualized Returns for the S&P GSCI and the DJCI**		
Time Period	S&P GSCI (%)	DJCI (%)
2013	-1.22	-7.77
3-Years	-0.77	-4.41
5-Years	3.86	5.25
10-Years	0.71	6.03
Since 1999	6.15	9.52

Source: S&P Dow Jones Indices LLC. Index performance based on annualized return. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and tables may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Weighting Effect on Inflation

Investments in commodities may be useful for a variety of reasons, most commonly for inflation protection and diversification. There is currently some market speculation about inflation in 2015. Commodities may provide a source of inflation protection, given that the same food and energy that are in the Consumer Price Index (CPI) are also constituents of commodity indices. However, it is important to examine the impact of index composition when determining which weighting scheme does a better job at protecting against inflation (see Exhibit 3).

Exhibit 3: Commodity Indices and Inflation

Both baskets of commodities may provide some inflation protection, but the S&P GSCI provides slightly more.
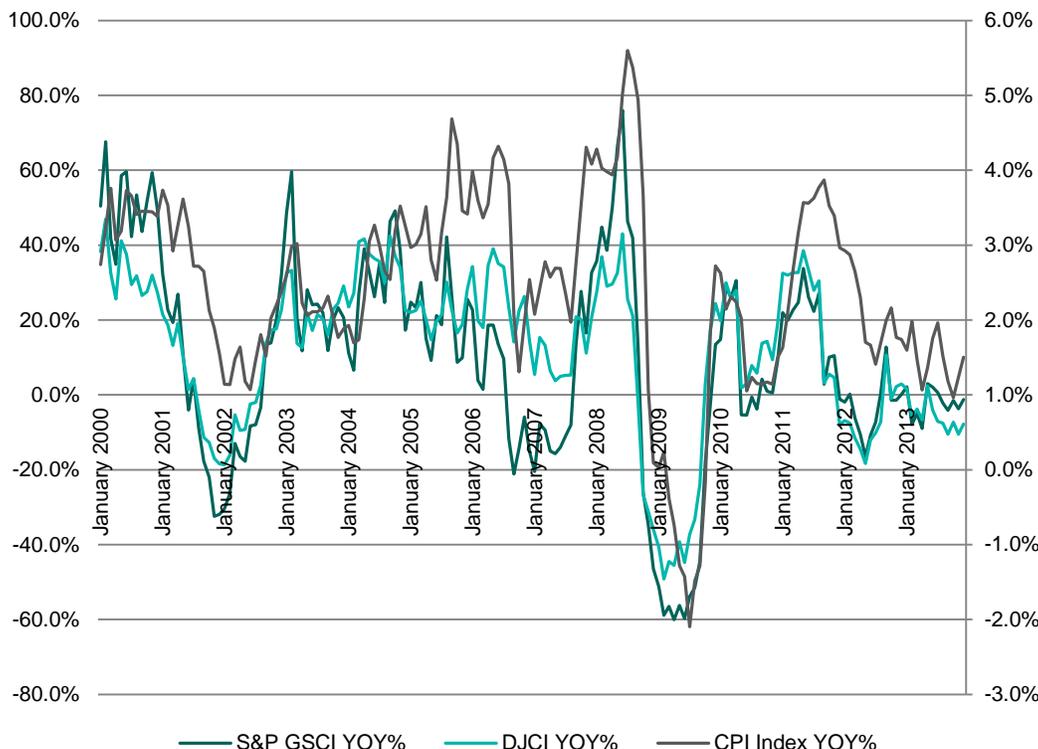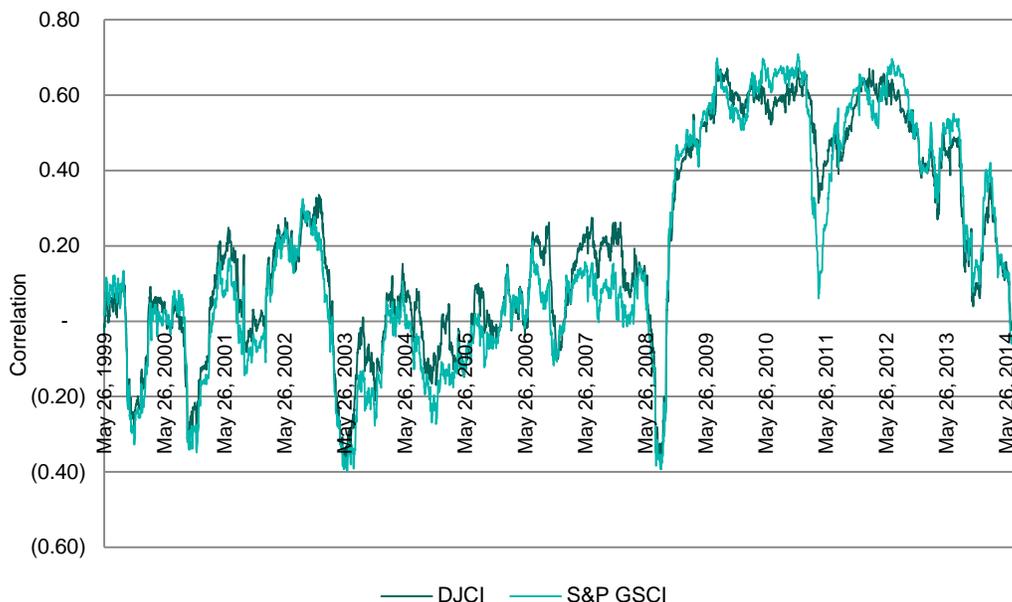

Source: S&P Dow Jones Indices LLC, Bureau of Labor Statistics. Data from January 2000 to December 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and tables may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

When using year-over-year (YOY) data going back to January 2000—which is as far as historical data use allows—the correlation between the CPI and the S&P GSCI is 0.73, compared with a correlation of 0.69 with the DJCI. Over shorter periods of time, including 5 and 10 years from year-end 2013, the correlation increases for both indices, but it does so more significantly for the S&P GSCI. The 5- and 10-year correlations between the CPI and the S&P GSCI are 0.77 and 0.84, respectively, and they are 0.70 and 0.72 for the DJCI. In other words, both baskets of commodities may provide some inflation protection, but the S&P GSCI provides slightly more.

There is a clear relationship between commodity index returns and inflation changes, but how much protection do commodity indices actually provide? We measured this using a concept called inflation beta, which compares the sensitivity of commodity index returns to inflation changes. This works similarly to equity beta; for example, if a stock is more volatile than the S&P 500[®], the beta is greater than 1. The only main difference with inflation beta is that it uses the CPI as the benchmark instead of the S&P 500.

Since food and energy typically represent a higher percentage of commodity indices than of the CPI, one dollar of investment in a commodity index provides a basis for more than one dollar's worth of inflation protection. In Exhibit 4, the inflation beta can be interpreted as a 1% increase in inflation yielding an 11.0% gain in the DJCI and a 15.3% increase in the S&P GSCI from 2000 to 2013.

Exhibit 4: Inflation Beta for the S&P GSCI and the DJCI				
Year	Inflation Beta		R-Squared	
	S&P GSCI	DJCI	S&P GSCI	DJCI
1971-2013	2.8	-	0.12	-
1987-2013	13.0	-	0.48	-
2000-2013	15.3	11.0	0.53	0.47
2004-2013	14.0	10.7	0.55	0.47
2009-2013	15.1	11.7	0.72	0.51

Source: S&P Dow Jones Indices LLC, Bureau of Labor Statistics. Data from January 1971 to December 2013. Charts and tables provided for illustrative purposes. Past performance is no guarantee of future results. These charts and tables may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

In Exhibit 4, the inflation beta can be interpreted as a 1% increase in inflation yielding an 11.0% gain in the DJCI and a 15.3% increase in the S&P GSCI from 2000 to 2013.

There was a spike in inflation beta for the S&P GSCI from 1987 to 2013, which can be directly attributed to the addition of oil into the index. This increase is not surprising given the fact that energy, which is used to produce every other commodity, is the most volatile component of the CPI. The world production weighting scheme of the S&P GSCI yields a higher energy weighting, resulting in a greater inflation beta than the DJCI. However, it is important to note that inflation betas of more than 10.0 in the DJCI are significant.

This trend also holds true for global inflation betas, except in countries where the prices are independent of the economy (see Exhibit 5).

Exhibit 5:Global Inflation Beta		
Region	S&P GSCI	DJCI
Eurozone	20.3	13.0
USA	14.0	10.7
Australia	10.9	8.1
Japan	10.2	3.7
South Korea	9.1	5.2
China	7.9	5.1
South Africa	-1.8	-3.4
Mexico	-10.4	-12.1

Source: S&P Dow Jones Indices LLC, Bloomberg and Bureau of Labor Statistics. Data from January 2004 to December 2013. Charts and tables provided for illustrative purposes. Past performance is no guarantee of future results. These charts and tables may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Weighting Effect on Diversification

Investors started to lose confidence in the diversification component of this asset class after it dropped in tandem with equities in 2011 and 2008 (and less recently in 2001 and 1981). Confidence has been starting to creep back up as the correlation between the two asset classes is falling into the negatives—even lower than the historical averages of 0.20 for the DJCI and 0.17 for the S&P GSCI, when measured against the S&P 500 (see Exhibit 6).

Exhibit 6: Rolling 90-Day Correlation Between Commodities and Equities (S&P 500)

Confidence in the diversification component of commodities has been starting to increase as the correlation between equities and commodities is falling into the negatives.

There may be diversification benefits to both the DJCI and the S&P GSCI, but which index could provide more? Through the lens of a correlation matrix (like in Exhibit 7), the S&P GSCI fares slightly better than the DJCI, with a correlation of 0.30 vs. 0.42.

Exhibit 7: Correlation on Monthly Returns				
Index	S&P 500	Barclays Capital U.S. Aggregate Bond Index	S&P GSCI	DJCI
S&P 500	1.00	-0.08	0.30	0.42
Barclays Capital U.S. Aggregate Bond Index	-0.08	1.00	-0.02	0.02
S&P GSCI	0.30	-0.02	1.00	0.91
DJCI	0.42	0.02	0.91	1.00

Diversification can also be defined as a preservation of capital, which can include protection against losses in equities. From 1999 to 2013, when the S&P 500 yearly returns were negative, they were down by an average of 17.01%. During the same time period, the DJCI only lost 2.43% and the S&P GSCI gained 0.44% (see Exhibit 8).

Exhibit 8: Yearly Returns for the S&P 500, the S&P GSC and the DJCI

Year	S&P GSCI	DJCI	S&P 500
1999	40.31%	32.16%	14.82%
2000	49.74%	27.46%	-10.14%
2001	-31.93%	-18.41%	-13.04%
2002	32.07%	22.73%	-23.37%
2003	20.72%	29.11%	26.38%
2004	17.28%	22.52%	8.99%
2005	25.55%	28.33%	3.00%
2006	-15.09%	14.40%	13.62%
2007	32.67%	20.67%	3.53%
2008	-46.49%	-35.95%	-38.49%
2009	13.49%	24.38%	23.45%
2010	9.02%	18.88%	12.78%
2011	-1.18%	-7.99%	0.00%
2012	0.08%	2.91%	13.41%
2013	-1.22%	-7.77%	29.60%
Average S&P 500 Down Year	0.44%	-2.43%	-17.01%

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and graphs may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance. Cells shaded in light teal are representative of the better performing commodity index of S&P GSCI or DJCI. Cells shaded in light grey represent negative S&P 500 years.

When measuring the risk-adjusted return of a portfolio in which commodities are added to stocks and bonds, the DJCI comes out slightly ahead of the S&P GSCI.

So far, it seems that the S&P GSCI shows slightly stronger diversification benefits than the DJCI. However, when measuring the risk-adjusted return of a portfolio in which commodities are added to stocks and bonds, the DCJI comes out slightly ahead (see Exhibits 9 and 10).

Exhibit 9: Hypothetical Portfolio Composition

Index Metric	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5
S&P 500 (%)	100	50	40	40	40
Barclays Capital U.S. Aggregate Bond Index (%)	-	50	50	50	50
S&P GSCI (%)	-	-	10	-	5
DJCI (%)	-	-	-	10	5
Annualized Return (%)	2.50	4.05	4.62	4.82	4.72
Annualized Risk (%)	15.50	7.84	7.37	7.21	7.27
Sharpe Ratio	0.16	0.52	0.62	0.67	0.65

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 10: Historical Performance for Hypothetical Portfolios

Source: S&P Dow Jones Indices LLC. Data from January 1999 to December 2013. Charts and tables are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and graphs may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The addition of commodities to hypothetical portfolios resulted in a cumulative return above that of a 50% stock/50% bond mix, and far above a portfolio that solely consists of equities.

Both indices could provide diversification benefits, although for the time period studied (from 1999 to 2013), the risk-adjusted return of the DJCI slightly outweighs that of the S&P GSCI, adding 20 bps with 16 bps less of risk as measured by standard deviation. The addition of commodities to the hypothetical portfolios resulted in a cumulative return above that of a 50% stock/50% bond mix, and far above a portfolio that solely consists of equities.

Key Takeaways

In conclusion, commodity indices have generally provided both inflation protection and diversification in a portfolio context. Choosing an equally weighted index like the DJCI or a world production weighted index like the S&P GSCI would depend on the goals of the allocation. If liquidity or inflation protection is very high priority, all else equal, S&P GSCI has historically been a better fit. If managing weight limits within the index were a goal, so that not too much energy or too little gold were in the index, then the profile of DJCI would perhaps be favorable.

Appendix

World Production Quantity (WPQ)

The WPQ period is defined as the most recent five-year period for which complete world production data is available for all S&P GSCI commodities from sources determined by S&P Dow Jones Indices to be reasonably accurate and reliable. This procedure is intended to ensure that the same WPQ period is used for all S&P GSCI commodities, which allows comparisons between production figures to be made without taking into account temporary aberrations in different time periods.

The period is intended to mitigate the effect of any aberrational years with respect to the production of a particular commodity. For example, if a given commodity is produced primarily in one part of the world that suffers damage from hurricanes or earthquakes in a particular year (resulting in curtailed production levels), the use of that year's production figures might not accurately reflect the significance of the commodity to the world economy. Commodity production in a particular year may also be higher or lower than would normally be the case as a result of general production cycles, supply and demand cycles, or worldwide economic conditions. Measuring production levels over a five-year period should generally smooth out any such aberrational years.

The definition of the WPQ period imposes a delay of approximately one-and-one-half (1 ½) years between the end of the WPQ period and the end of the relevant annual calculation period. This delay is because world production statistics are often incomplete and subject to revision after their original publication. Imposing a delay on the WPQ period generally enhances its accuracy and reliability.

World Production Average (WPA)

The WPA is simply the average annual production amount of the S&P GSCI commodity based on the WPQ over a five-year period.

Contract Production Weight (CPW)

In calculating the CPW of each designated contract on a particular S&P GSCI commodity, the WPA of such commodity is allocated to those designated contracts that can best support liquidity.

With respect to each designated contract, the CPW is equal to the percentage total quantity traded (TQT) for such contract multiplied by the WPA of the underlying S&P GSCI commodity (after any necessary conversion made for purposes of the calculation) and divided by 1,000,000.

The simpler of the two indices is the equally weighted DJCI. However, both indices could be used as asset class representations in order to fulfill different portfolio goals. The most popular reasons investors may use commodity indices are for diversification and inflation protection, so we evaluated the historical effectiveness of both indices in these roles. Additionally, we explored how well each of the indices fills requirements of other motivations behind commodity allocations such as liquidity, emerging markets exposure or hedging against rising interest rates.

PERFORMANCE DISCLOSURES

The Dow Jones Commodity Index (the "Index") was launched on Oct. 26, 2011. All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

The S&P GSCI (the "Index") was launched on May 1, 1991. All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

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

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

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

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

GENERAL DISCLAIMER

S&P acquired the GSCI from Goldman Sachs on February 2, 2007 and it was subsequently renamed the S&P GSCI. Goldman Sachs began first publishing the GSCI related indices in 1991 but has calculated the historical value of the GSCI beginning January 2, 1970 based on actual prices from that date forward and the selection criteria, methodology and procedures in effect during the applicable periods of calculation (or, in the case of all calculation periods prior to 1991, based on the selection criteria, methodology and procedures adopted in 1991). The GSCI has been normalized to a value of 100 on January 2, 1970, in order to permit comparisons of the value of the GSCI to be made over time.