

## Contributions

### **DIESEL: A System for Generating Cash Flow During Retirement**

by **Stephan Quinn Cassaday, CFP®, CFS**

#### Executive Summary

- One of the greatest challenges facing retirees as life spans increase is how to generate a sustainable, reliable stream of cash flow from their investments that has an acceptably low probability of depletion. The DIESEL process, which stands for Dividends, Interest, and Equity SElect Liquidations, can facilitate the distribution of "retirement paychecks" each month to retired clients through a process that emphasizes stability and total return.
- Key to understanding the process is distinguishing the difference between income in retirement, which emphasizes bond interest and stock dividend payments, and cash flow, which reinvests dividends and interest while generating retirement funds by selectively liquidating securities in a quarterly rebalancing process.
- Historical data challenge the concept that very low withdrawal amounts from primarily fixed-income-oriented portfolios should be a standard portfolio strategy for clients seeking retirement income. Rather, a more broadly diversified portfolio containing an optimum mix of asset classes and subclasses historically could have produced a sustainable withdrawal materially larger than the generally accepted level of 3–4 percent.
- In a comparison of several portfolios using historical data, the sustainability of a 7 percent withdrawal, increased at 3 percent a year, varies dramatically. When the order of returns is randomized, the portfolio failure rates also are dramatically different.
- The DIESEL process starts with consolidating all investment accounts at a single institution. Retirees draw "paychecks" monthly from a single withdrawal account at the institution.
- The article also looks at how tax and transaction expense issues can affect the DIESEL approach.

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The first step in understanding how to generate sustainable, reliable, and ever-increasing income in retirement is to stop referring to it as income. What investors need is cash flow, not income. The difference is that income is associated with interest-bearing investments like bonds, and to a lesser extent dividend-paying stocks. Cash flow makes no distinction as to the origin of the money; it could come from a number of sources including interest, dividends, and the liquidation of securities.

That is the premise behind DIESEL, which stands for Dividends, Interest, and Equity SElect Liquidations. DIESEL is a system for producing "retirement paychecks" based on cash flow derived from the quarterly liquidations from a broadly diversified portfolio of stocks, bonds, cash, and hard assets. The optimum mix of asset classes and subclasses in a DIESEL portfolio produces a consistent total return with a low volatility that allows a 7 percent annual withdrawal rate, with a 3 percent annual inflation adjustment—well above the generally accepted withdrawal level of 3 to 4 percent. This article will show readers the premise behind DIESEL, its methodology, how DIESEL produces its retirement paychecks, and the impact of tax and transaction expenses on the approach.

#### **Bonds Not Truly 'Safe'**

Planners may encounter investors nearing retirement who believe that they should increase their bond holdings as a percentage of their portfolios. The belief is that this strategy provides a reliable stream of

income from a stable and "safe" platform of investments. As most planners know, there are a number of problems with this line of thinking. It is important to understand that, irrespective of credit risk, low returns, and call features, bonds are not truly "safe"—they are "certain." Bonds are certain to pay a certain interest payment and to return a certain maturity value based on a certain schedule. In exchange for this certainty, investors have historically experienced a lower rate of return with bonds as compared with other asset classes. Current low interest rates make bonds even less attractive. In the author's view, the coup de grâce for bonds as a major source for retirement cash flow is that, with the possible exception of Treasury inflation protection securities (TIPS), bonds offer little if any inflation protection.

There is some debate as to whether the Consumer Price Index—to which the TIPS inflation component and many pension cost-of-living allowances (COLAs) are tied—accurately measures real inflation for retirees. More important, retirees to whom we send retirement paychecks using the DIESEL system rarely ask for "raises." In fact, according to U.S. Census Bureau and Department of Labor studies, spending actually decreases for Americans after age 75<sup>1</sup> due to the fact that older retirees are less active, less likely to travel, and less likely to make major purchases. Our experience is that most are able to live comfortably with their beginning distribution amount. In the rare instance where an increase has been requested by a client, none has ever told us that the CPI was the reason. Further, our clients tend to be more affluent and the impact of increases in certain CPI components, many of which represent discretionary expenses, is unlikely to have a meaningful impact on their true cost of living. Despite these issues, for our planning purposes, we assume a 3 percent COLA in our retirement projections. To arrive at this figure, we took 75 percent of the average CPI for the 47 years ending November 1, 2005.<sup>2</sup> As with all investment and financial planning projections, we counsel clients that any such inflation assumptions are guesses and may require revision.

### **Underinvesting the Greatest Retiree Risk?**

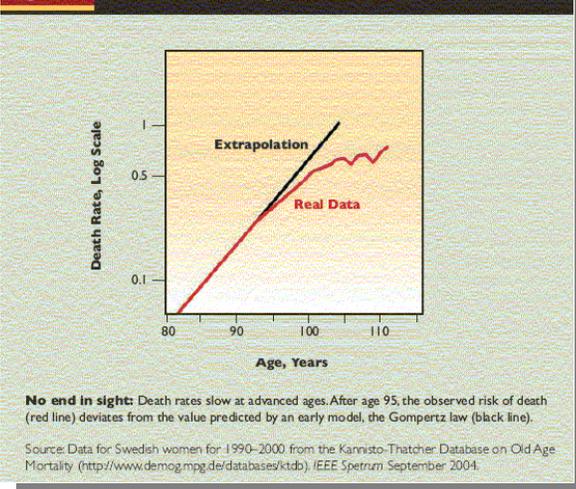
A real danger perhaps not properly considered by planners is that current life expectancy tables on which many planners rely may be incorrectly calculating average life expectancies. By using historical averages that are no longer relevant based on improving lifestyle patterns and advances in medical technology, planners may be significantly underestimating time in retirement and thus the duration of withdrawals from a portfolio. According to The Urban Futures Institute, Report 25, "The big killers of the pre-World War II years all had disappeared from the leading causes of death lists, and almost disappeared as causes of death by the 1980s." The study further concluded, "The...remaining barriers to further extending life expectancy are cancers (the leading cause of death for the 40 to 74 age group), and cardiovascular disease (the leading cause in the 75 and older age groups). As knowledge and technology, combined with life style changes, reduces these mortality rates, life expectancies will be further extended."<sup>3</sup>

Traditional actuarial theories need to be rethought and adjusted because of the higher probability of long life. The Gompertz law of mortality, which posits that the logarithm of death rates increases linearly with age, was first suggested by British actuary Benjamin Gompertz in 1825. This law is the basis for actuarial calculations in the life insurance business but recently has been questioned due to a leveling off of death rates in older people. The late-life mortality deceleration law states that death rates level off at extreme old age.<sup>4</sup> (See Figure 1.) That is, as a population ages, the survivors who make it to old age have a higher probability of surviving to an even older age. As this age threshold for the leveling off of death rates occurs at younger ages, a larger group of people will live to extreme old age.

When planning, we assume that clients will live to age 100 and never assume that they will be out of money at that time. Our objective is to assemble a portfolio that, based on historical data, has a high probability of having terminal values equal to or greater than the beginning values at the client's age 100. Bonds, or a portfolio dominated by bonds, may be unable to support the increasing cash flow that we believe is essential for long-lived retirees that may be drawing from their portfolios for 40 or 50 years.

Looking forward, we foresee the greatest risk to retirees is not a portfolio that is too risky, but rather may be a portfolio that is underinvested, one that doesn't generate enough total return to provide the necessary cash flow to support a long and active retirement.

**Figure 1: Late-Life Mortality Deceleration Law**



## Total Return, History, and Diversification

The DIESEL system is based on historical evidence that properly diversified portfolios containing an optimum mix of asset classes and subclasses have generated an average total return greater than a bond or mostly bond portfolio and have done so with acceptable volatility.<sup>5</sup> For purposes of this paper, the term diversified portfolio is defined as a portfolio that contains stocks (U.S. large, U.S. small, and foreign), bonds, cash equivalents, and hard assets (raw materials/commodities and real estate investment trusts).

The portfolio's goal is to combine investments that can potentially produce modest but consistent total returns in a low volatility portfolio from which occasional "harvesting" can occur. This harvesting process

generates the cash flow needed to fund retirement paychecks. Despite periods where percentage total returns are negative or below the cash-flow withdrawal percentage, properly allocated hypothetical portfolios could have sustained and increased their withdrawal rates using the DIESEL method. This can be attributed to the relative low volatility of properly allocated portfolios combined with returns that were higher than certain less "risky" alternatives.

Interestingly, although many individual investment choices have higher annual returns than diversified alternatives, their higher volatility makes them poor choices for a withdrawal program. Inadequately or improperly diversified portfolios can be volatile and experience a wide range of returns above and below their historical average. Despite good average annual returns, volatility means significant declines can occur. Constant dollar withdrawals made when values are depressed can mortally wound a portfolio and, thus wounded, it never recovers from its depressed value. Such portfolios can be depleted unless withdrawals are reduced or suspended. For this reason, stability—that is, low volatility, as measured by standard deviation—is of greater importance than absolute return in the DIESEL system.

A DIESEL portfolio investment allocation must include a mix of several non-highly correlated asset classes that would have historically achieved a modest return with low volatility. Historically, these hypothetical portfolios would have allowed a generation of reliable cash flow that steadily increased and had a reasonable probability of not being entirely depleted. Based on historical performance data, the stability of a properly allocated hypothetical portfolio would have allowed periodic withdrawals significantly higher than those available in other asset classes or combinations of asset classes.

## Methodology

- **Data source:** Investment View/Thompson Financial.
- **Data set:** Linear historical monthly return data from January 1, 1972, through July 31, 2005, using various combinations of indexes: S&P 500 Index, DFA Small Cap Index, MSCI EAFE Index (dollars), National Association of REITs, Goldman Sachs Commodity Index, Citigroup Composite Bond Index, and Three Month U.S. Treasury Bill Index.
- **Withdrawal parameters:** Rebalanced quarterly with quarterly withdrawals, taken proportionately from each asset class after rebalancing. Seven percent of beginning value per year. Withdrawals increased 3 percent annually. No taxes, fees, or transaction costs included. Even though some portfolios are depleted before 2005, we show the full-term returns.
- **Randomization:** Withdrawals, allocations, and rebalancing as above with randomization of rolling one-year returns; 50,000 permutations.

As illustrated in Table 1, these data show that certain combinations of asset classes would have historically supported a 7 percent withdrawal with a 3 percent annual increase per year, while others would not. When returns are randomized, some portfolios have a higher failure rate than others. This may indicate a lower probability of sustainability. The DIESEL portfolio has a failure rate of 9.1 percent,

the lowest of the group, which supports the contention that investors seeking higher sustainable withdrawals should consider broadly diversified portfolios.

**Table 1: Comparison of DIESEL with 7 Other Hypothetical Portfolios**

Index	Portfolio 1 DIESEL Allocation	Portfolio 2 1/3 Stocks, 1/3 Bonds, 1/3 Cash	Portfolio 3 50% Stocks/ 50% Bonds	Portfolio 4 100% Bonds
S&P 500	25%	33%	50%	
DFA Small Cap Index	25%			
MSCI EAFE	22.50%			
NAREIT	5%			
GSCI	5%			
Citigroup Composite Bond	15%	33%	50%	100%
T-Bill 3-Month	2.50%	34%		
<b>Statistical Summary</b>				
Compounded Annual Return	12.31%	9.82%	10.83%	8.98%
Standard Deviation	12.10%	7.02%	10.24%	4.45%
Months Until Depletion	Does Not Deplete	287 or 23.9 Years	283 or 23.6 Years	233 or 19.4 Years
Date of Depletion	N/A	1/130/1995	7/31/1995	5/31/1991
Randomization Failure Rate	9.10%	64.10%	28.50%	65.20%
<b>All-Equity Portfolios</b>				
Index	Portfolio 5 50% S&P, 50% DFA	Portfolio 6 1/3 S&P, 1/3 DFA, 1/3 EAFE	Portfolio 7 100% DFA	Portfolio 8 100% U.S. Stocks
S&P 500	50%	33%		100%
DFA Small Cap Index	50%	33%	100%	
MSCI EAFE		33%		
NAREIT				
GSCI				
Citigroup Composite Bond				
T-Bill 3-Month				
<b>Statistical Summary</b>				
Compounded Annual Return	13.08%	12.76%	14.27%	13.06%
Standard Deviation	17.14%	15.18%	21.73%	24.05%
Months Until Depletion	Does Not Deplete	Does Not Deplete	Does Not Deplete	306 or 25.5 Years
Date of Depletion	N/A	N/A	N/A	6/30/1997
Randomization Failure Rate	13.40%	12.10%	13.30%	26.20%

Figures 2 and 3 graphically illustrate the performance of the eight hypothetical portfolios shown in Table 1 based on linear historical data. Note that the highest terminal value is achieved by a portfolio that is one-third each small U.S. stocks, large U.S. stocks, and foreign stocks. Randomized failure rates and standard deviations are somewhat higher than the DIESEL portfolio and may mean that investors are less likely to stay invested due to higher volatility.

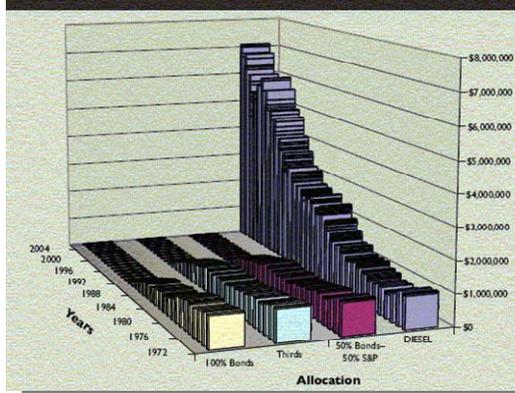
### How DIESEL Retirement Paychecks Work

To the extent possible, all investment and banking accounts should be transferred to a consolidation account at a single institution. IRAs, 401(k)s, 403(b)s, and other retirement accounts also should be consolidated into one IRA when these accounts are available for transfer. Other, nonqualified banking, brokerage, and mutual fund accounts should also be placed at the same institution. We also recommend direct deposit of all other retirement income such as pensions and Social Security to the consolidation account, thus allowing the retiree a full and complete picture of his or her money flows. The juxtaposition of deposits and spending information each month is often illuminating for clients.

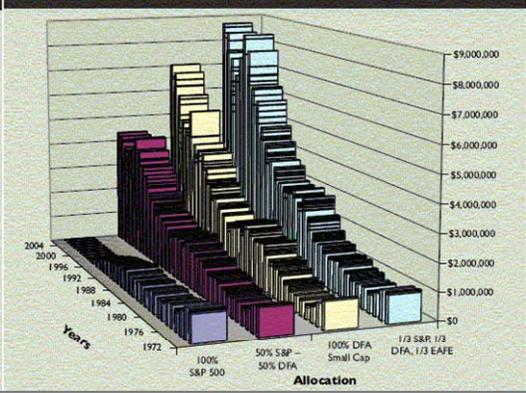
These accounts should offer money market checking, debit cards, automatic bill paying, and online banking. They also should provide detailed consolidated statements with comprehensive details on investment positions, values, and activity as well as year-end tax information.

Consolidation allows easy, one-stop shopping for all investment and financial activities. Consolidation has huge benefits for retirees, primarily due to the simplification of overall money-related responsibilities. Simplification becomes increasingly important as retirees age and become less interested in the details of their financial processes.

**Figure 2: Impact of Withdrawal Rate on Various Asset Class Combinations, Portfolios 1-4**



**Figure 3: Impact of Withdrawal Rate on Various Asset Class Combinations, Portfolios 4-8**



DIESEL cash flow is produced by maintaining a balance in a "withdrawal account" (usually the consolidation account's money market checking account) equal to three to five months of the retiree's

cash-flow requirement. (This allocation is in addition to what would be designated for the cash allocation pursuant to the client's investment policy statement). The withdrawal account is usually a money market fund that is part of the consolidation account. Retirees can get their retirement paychecks by having money electronically transferred to an operating checking account each month or by simply writing checks from the withdrawal account.

Although harvesting occurs quarterly, paychecks are generated monthly. This allows a monthly withdrawal while minimizing transaction costs and allowing for smaller balances in low-yielding money market funds. This also means that the portfolio is rebalanced quarterly. Monthly and quarterly rebalancing historically have added value versus annual and semi-annual frequency.<sup>6</sup> Because the differences between quarterly and monthly were de minimis in our study, we chose quarterly to limit transactions, paperwork and record keeping. Research available on the subject of frequency appears to support quarterly frequency.<sup>7</sup>

**Table 2: DIESEL Annual Withdrawals and Portfolio Values**

Assumed \$1 Million Initial Investment, Withdrawal 7% of Initial Value, 3% Annual Increase

Period Ending	Annual Withdrawal	Portfolio Value	Percent of Previous Year-End Balance
12/31/1972	\$70,000	\$1,044,937	7.00%
12/31/1973	\$72,100	\$823,576	6.90%
12/31/1974	\$74,263	\$602,308	9.02%
12/31/1975	\$76,491	\$754,137	12.70%
12/31/1976	\$78,786	\$851,306	10.45%
12/31/1977	\$81,149	\$849,202	9.53%
12/31/1978	\$83,584	\$911,497	9.84%
12/31/1979	\$86,091	\$999,296	9.45%
12/31/1980	\$88,674	\$1,144,586	8.87%
12/31/1981	\$91,334	\$1,070,649	7.98%
12/31/1982	\$94,074	\$1,181,963	8.79%
12/31/1983	\$96,896	\$1,367,650	8.20%
12/31/1984	\$99,803	\$1,337,211	7.30%
12/31/1985	\$102,797	\$1,649,483	7.69%
12/31/1986	\$105,881	\$1,954,091	6.42%
12/31/1987	\$109,058	\$1,974,783	5.58%
12/31/1988	\$112,329	\$2,258,063	5.69%
12/31/1989	\$115,699	\$2,537,353	5.12%
12/31/1990	\$119,170	\$2,179,030	4.70%
12/31/1991	\$122,745	\$2,610,798	5.63%
12/31/1992	\$126,428	\$2,666,535	4.84%
12/31/1993	\$130,221	\$2,994,707	4.88%
12/31/1994	\$134,127	\$2,935,512	4.48%
12/31/1995	\$138,151	\$3,566,923	4.71%
12/31/1996	\$142,296	\$3,964,990	3.99%
12/31/1997	\$146,564	\$4,421,097	3.70%
12/31/1998	\$150,961	\$4,695,411	3.41%
12/31/1999	\$155,490	\$5,434,217	3.31%
12/31/2000	\$160,155	\$5,262,039	2.95%
12/31/2001	\$164,960	\$5,017,617	3.13%
12/31/2002	\$169,908	\$4,386,908	3.39%
12/31/2003	\$175,006	\$5,712,141	3.99%
12/31/2004	\$180,256	\$6,403,570	3.16%
7/31/2005	\$92,832	\$6,596,295	1.45%

Taxes can be withheld from these paychecks, often obviating the need for those pesky quarterly estimated payments and adding further to the convenience of account consolidation.

Once the client has been designated a DIESEL Income Recipient, agreed to a monthly withdrawal amount, and the withdrawal account has been seeded, withdrawals can begin. (Table 2 shows an annual withdrawal history based on the DIESEL portfolio shown in Table 1.) The account is reviewed every 90 days to determine how much needs to be added to the withdrawal account to bring it in line with the three- to five-month threshold figure. Once this amount is determined, our portfolio managers review the account for appropriate "harvest" candidates. Generally, these liquidations are done in such a way as to rebalance the portfolio back to its target allocation by liquidating positions that are out of proportion, out of favor, or will generate a needed tax loss. By regularly pruning the account's holdings, advisors must repeatedly look at account positions and allocations with a critical eye. This process has the effect of rebalancing back to the allocation set forth in the investment policy statement. DIESEL's requisite quarterly review and accompanying pruning of account positions more fully ensures that client accounts are regularly reviewed and properly allocated. In addition to adding discipline to the investment management process, rebalancing has been shown to improve overall risk and return

performance in portfolios.<sup>8</sup>

### Works Best with Mutual Funds

This system works best when a portfolio is invested in mutual funds. Funds allow for efficient asset allocation, reinvestment of distributions, and incremental liquidity that lends itself to cash-flow generation and rebalancing. Traditional brokerage arrangements using load funds are not practicable due to high commissions charges. DIESEL works best in a fee-based, no-transaction-fee (NTF)

environment or a wrap arrangement. Most custodians offer many wrap and NTF fund choices; however, even with reasonable transaction charges, the system still works well. The top custodians charge from \$15 for buys and sells, to \$32.50 for buys only. With flat dollar amounts, the percentages that transaction charges represent become less meaningful as accounts get larger. In 2005, our DIESEL Income Recipient accounts' transaction charges averaged \$97.50, which represented less than 3 basis points on our average account. Our custodian charges only on the buy side, while DIESEL transactions are primarily sales. The rebalancing function is usually accomplished with the sales necessary for generating retiree cash flow. Therefore, these buy transactions were, in most cases, not done pursuant to the cash-flow generation/rebalancing process but rather would have occurred anyway.

Taxes associated with the DIESEL system depend on a number of factors. Obviously in qualified accounts there are no real tax planning opportunities. But in taxable accounts, tax efficiency is a consideration. In seasoned accounts that have been invested for more than one year, and using the average share cost method for gain calculations, most liquidations of securities will result in long-term capital gain treatment on a portion of the proceeds. Generally, the remainder of the liquidation proceeds will be nontaxable return of principal. Assuming average embedded gains of 20 percent, and 15 percent long-term gains treatment, the following calculation would apply:

$$.20 \times .15 = .03$$

Stated another way, \$1,000 in proceeds with \$200 taxable as long-term gain, times a 15 percent long-term capital gain tax, equals a \$30 tax cost, or 3 percent. Considered in isolation from other taxable events in the account, this withdrawal is 97 percent tax efficient. Even with 50 percent embedded gains, the tax efficiency could be as high as 92.5 percent.

Although it is a system for generating cash flow, DIESEL requires that all dividends, interest, and capital gains be reinvested. Rebalancing and reinvesting are not conflicting strategies. Reinvestment allows efficient and orderly compounding of irregular distributions that otherwise would flow to a money fund or be spent.

The DIESEL retirement paycheck arrangement must be systematized and staff persons properly trained in the process. One group is assigned to review and calculate the required funds for each DIESEL Income Recipient and one group is assigned to make the portfolio changes necessary to generate these funds.

In conclusion, historical evidence collected over 33½ years shows that a hypothetical portfolio containing multiple asset classes generated the right combination of return and volatility to sustain a fairly significant and annually increasing withdrawal. Other portfolios, which did not contain multiple asset classes, either were exhausted or declined significantly under the same withdrawal scenario, due either to their lower returns or to higher volatility. When the historical data were randomized, the probability of depletion with the DIESEL allocation remained less than 10 percent after 50,000 permutations, which was significantly better than other portfolios in the study.

Financial professionals can provide a systematic withdrawal program that produces retirement paychecks for their clients. This program requires account consolidation, an asset-allocated portfolio, properly trained support personnel, and some client education. Although not guaranteed, the DIESEL system may be an option worth considering when assessing supplemental retirement income alternatives.

## Endnotes

1. United States Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," United States Census Bureau, 2002.
2. United States Bureau of Labor Statistics, Consumer Price Index Historical Data.
3. [www.urbanfutures.com/Institute/abstracts/report25.htm](http://www.urbanfutures.com/Institute/abstracts/report25.htm).
4. <http://longevity-science.org/IEEE-Spectrum-2004.pdf>.
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7. Ibid.
8. Steven L. Beach, Ph.D. and Clarence C. Rose, Ph.D., "Does Portfolio Rebalancing Help Investors Avoid Common Mistakes?" *Journal of Financial Planning*, 18, 5 (May 2005): 56-61.

## DISCLAIMER REGARDING HYPOTHETICAL PERFORMANCE NUMBERS

- These are hypothetical portfolios.
- These are not actual portfolios.
- These are not actual results or the results of Cassaday & Company, Inc. advised portfolios.
- Past results are not indicative of future performance.
- Indexes are unmanaged portfolios and investors cannot invest directly in an index.
- The information provided on these slides is based on historical index data provided by Thomson Financial

## Explanations of Indexes

- Russell 2000® Index measures the performance of the 2,000 smallest companies in the Russell 3000 Index, which represents approximately 8% of the total market capitalization of the Russell 3000 Index
- The MSCI EAFE® Index comprises 21 MSCI country indices, representing the developed markets outside of North America: Europe, Australasia and the Far East.
- CitiCorp Bond Composite - Composed of securities from Lehman Brothers Government/Corporate Bond Index, Mortgage-Backed Securities Index, and the Asset-Backed Securities Index. The index's total return consists of price appreciation/depreciation plus income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization.
- The GSCI is a composite index of commodity sector returns, representing an unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. The returns are calculated on a fully-collateralized basis with full reinvestment. The combination of these attributes provides investors with a representative and realistic picture of realizable returns attainable in the commodities markets. Individual components qualify for inclusion in the GSCI on the basis of liquidity and are weighted by their respective world production quantities. The principles behind the construction of the index are public and designed to allow easy and cost-efficient investment implementation. Possible means of implementation include the purchase of GSCI-related instruments, such as the GSCI futures contract traded on the Chicago Mercantile Exchange (CME) or over-the-counter derivatives, or the direct purchase of the underlying futures contracts.
- The NAREIT Real-Time Index is the only REIT index to include all REITs currently trading on the New York Stock Exchange, the NASDAQ National Market System and the American Stock Exchange. It is also the first index to include monthly historical statistics from 1972. The NAREIT Real Time Index provides investors with modern, up-to-the-minute information for analyzing the REIT industry. The index provides a standard with which to measure the REIT industry's growth and performance on a real-time basis.