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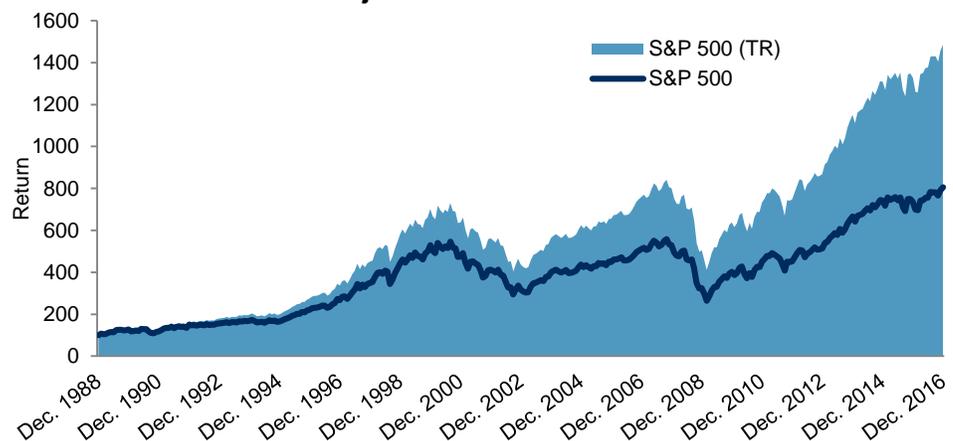
Incorporating Free Cash Flow Yield in Dividend Analysis

DIVIDENDS – A POTENTIAL SOURCE OF INCOME AND HEDGE AGAINST MARKET VOLATILITY

The importance of dividend investing is a widely studied topic by academics and market participants alike. Our own research has shown that dividends are a key contributor to equity returns. Nearly half of the total return of the [S&P 500®](#) came from the reinvestment of dividends and the effect of compounding over the 28-year period ending December 2016 (see Exhibit 1). From 1928 to 2016, dividend income return contributed 43% of the monthly total return of the S&P 500. According to a study done by Robert Arnott, for over 200 years, ending in 2002, the U.S. stock market generated an average 7.9% total return on an annualized basis,¹ with dividend reinvestment contributing 5% per year.

In addition to contributing to total return, dividends can also act as a cushion in down markets. Numerous studies have demonstrated that dividend-paying companies have historically exhibited less relative downside risk^{2,3} and take less time to regain losses, therefore delivering higher risk-adjusted returns over the long-term investment horizon.

Exhibit 1: Dividends as a Major Contributor to Total Return

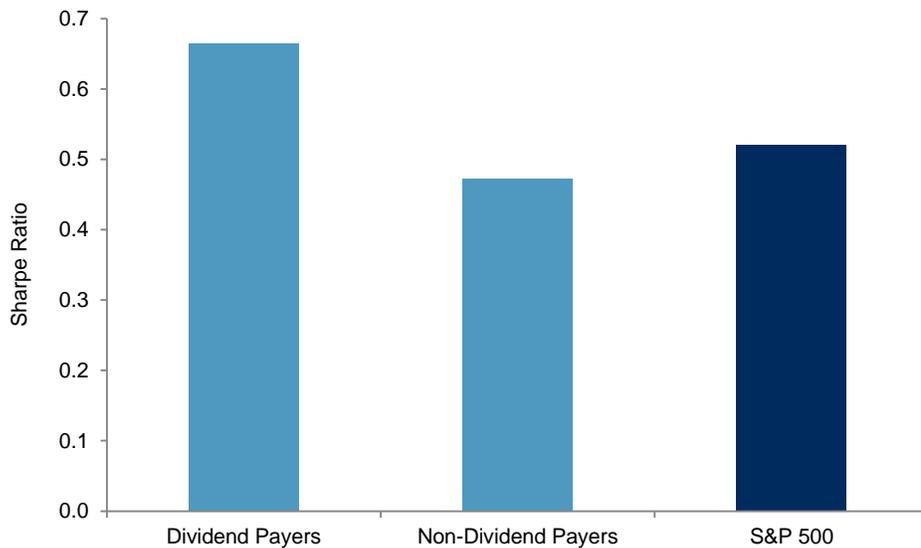


Source: S&P Dow Jones Indices LLC. Data from December 1988 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

- ¹ R Arnott. "Dividends and the Three Dwarfs." 2003.
- ² A Ang, J Chen, and Y Xing. "Downside Risk." 2005
- ³ K Fuller and M Goldstein. "Do Dividends Matter More in Declining Markets?" 2005.

Our own research confirms that equity markets tend to reward dividend payers over non-dividend payers, with the former outperforming the latter on average. Between December 1990 and June 2017, dividend payers generated higher risk-adjusted return than non-payers and the market (see Exhibit 2).⁴ Over a longer time horizon, the outperformance is even more pronounced. In a study of a 90-year return history of dividend payers and non-dividend payers, dividend-paying stocks accumulated over three times the terminal wealth when compared with non-dividend payers⁵.

Exhibit 2: Dividend Payers Offered Higher Risk-Adjusted Returns Than Non-Dividend Payers



High-dividend-yielding stocks generated higher returns than their low-dividend-yielding peers.

Dividend payers and non-dividend payers are hypothetical portfolios. Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Higher-Dividend-Yielding Stocks Generate Higher Returns

Over the one-year period ending June 2017, [S&P 500](#) member companies paid out USD 430 billion in dividends, representing 44% of their total earnings. The size of dividend payments alone should not be used to determine the value of dividends. The figure ignores the size of the companies, the price market participants pay to receive that income, and the sustainability of the payout figure. Dividend yield, measured as dividends divided by current share price, shows how much dividends are paid out relative to share price without indicating the quality of dividends. In a study⁶ conducted by Professor J. Siegel, the top 20% of the highest-dividend-yielding stocks in the S&P 500 produced an annualized return of

⁴ We created two portfolios based on stocks' dividend distribution policy. Taking from S&P 500 member stocks, one portfolio was constructed with only dividend payers and the other was formed with non-dividend paying stocks. The portfolios were reconstituted every six months and stocks were equal weighted.

⁵ Ploutos. "Do Dividend Stocks Outperform?" 2016.

⁶ J. Siegel. "The Future for Investors: Why the Tried and the True Triumph Over the Bold and the New" 2005, pp. 127.

14.27% between 1957 and 2002, higher than the return of 11.19% from the S&P 500. Our own research also shows that high-dividend-yielding stocks generated higher returns than their low-dividend-yielding peers. The top quintile, which represents the top 20% of the highest-dividend-yield stocks, provided higher returns with lower volatility than the bottom-quintile stocks from December 1990 to June 2017 (see Exhibit 3). However, as other S&P Dow Jones Indices studies have shown⁷⁸, the top quintile stocks do not always have the highest Sharpe ratio among all the quintiles after taking volatility into consideration.

Exhibit 3: Quintiles by Dividend Yield

FACTOR	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5	S&P 500
Annual Return (%)	12.47	12.49	12.20	11.48	11.26	10.07
Annual Volatility (%)	15.97	13.75	14.84	14.23	16.35	14.17
Sharpe Ratio	0.61	0.70	0.64	0.61	0.52	0.52

Top and bottom quintiles are hypothetical portfolios.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

FREE CASH FLOW – A BETTER ASSESSMENT FOR A COMPANY’S STRENGTH IN CASH

Companies with sufficient cash have better opportunities to maintain and expand their business while paying out persistent or growing dividends.

It is evident that dividend payers can produce attractive returns in the long run. However, a company bearing high dividend yield may not necessarily be in a financial condition to pay dividends for a number of reasons. First, a high dividend yield could be the result of decreasing stock price. Second, profitability is an accrual accounting concept, and does not carry the same strength as cash flow in terms of a company’s solvency and liquidity. A company can be profitable but have little cash available. As dividends are paid in cash, it is important to evaluate the source and sustainability of the dividends. Companies with sufficient cash have better opportunities to maintain and expand their business while paying out persistent or growing dividends.

To determine the level of potential dividend sustainability, we need to evaluate if dividends are covered by the cash generated from the company’s operating activities and how much cash is available, which is the concept of free cash flow. Free cash flow can be defined as cash flow from operating activities minus capital expenditures, which is the amount that a company spends on purchasing properties, plants, and equipment (PP&E) for business needs. A company can use excess cash to distribute dividends, pay off debt, buy back stocks, or expand the business. Positive or growing free cash flows often indicates sustainable or growing profits.

⁷ P. Luk. [“The Beauty of Simplicity: The S&P 500 Low Volatility High Dividend Index”](#) S&P Dow Jones Indices, 2015.

⁸ L. Zeng and P. Luk. [“How Smart Beta Strategies Work in the Hong Kong Market”](#) S&P Dow Jones Indices, 2017.

On the other hand, negative or decreasing free cash flows could mean that a company does not have adequate cash to support its operational growth.

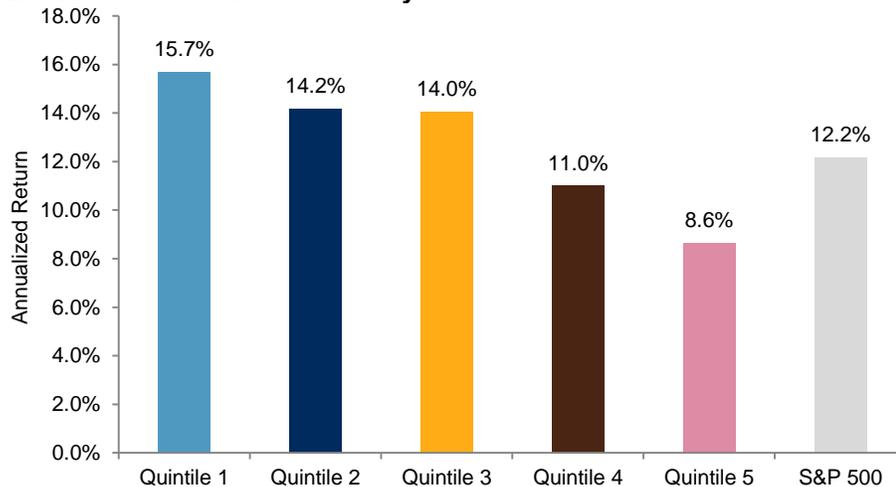
Stocks With a Higher Free Cash Flow Yield Provide Higher Returns

With high free cash flow possibly indicating a strong, healthy balance sheet, we tested to see if free cash flow yield, defined here as annual free cash flow per share divided by stock price, contains any meaningful return information. Our investment thesis is that all else being equal, a company with a higher free cash flow yield will deliver higher free cash income for each U.S. dollar invested and is preferable to one with a lower free cash flow yield.

We divided the [S&P 500](#) universe into quintiles based on free cash flow yield. As shown in Exhibit 4, the top-quintile stocks generated an annualized return of 15.7% from December 1990 to June 2017, exceeding the rest of the quintiles and outperforming the overall market by an average of 3.6%. Although the bottom two quintiles demonstrated sound performance, with average annualized returns of 11.0% and 8.6%, respectively, they both fell short when compared with the overall equity market, as shown in Exhibit 5.

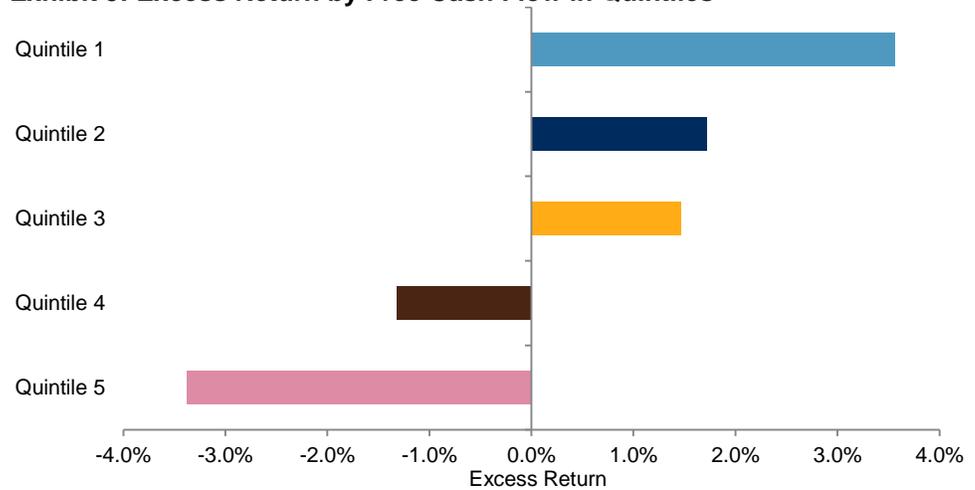
The top-quintile stocks by free cash flow yield generated an annualized return of 15.7% from December 1990 to June 2017, exceeding the rest of the quintiles and outperforming the overall market by an average of 3.6%.

Exhibit 4: Annualized Returns by Free Cash Flow Yield in Quintiles



Quintiles 1-5 are hypothetical portfolios. Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Exhibit 5: Excess Return by Free Cash Flow in Quintiles

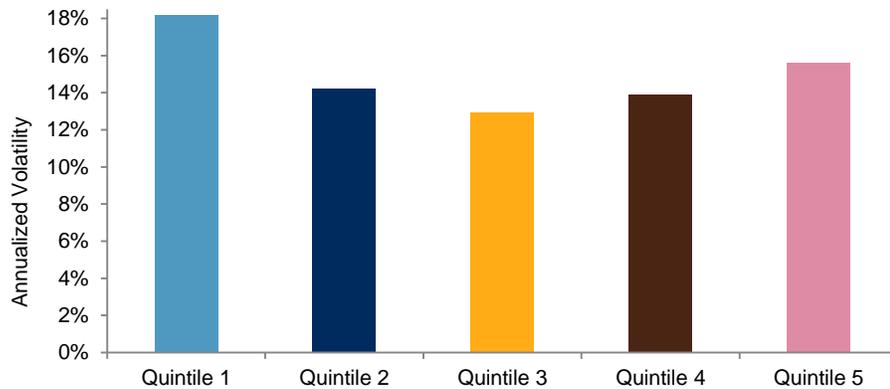


Quintiles 1-5 are hypothetical portfolios.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The risk/return tradeoff is clearly seen in the top three quintiles, as higher returns are associated with higher risk taken by the portfolios.

The risk/return tradeoff is clearly seen in the top three quintiles, as higher returns are associated with higher risk taken by the portfolios. However, accepting more risk did not bring in better return for the bottom two quintile portfolios.

Exhibit 6: Annualized Volatility by Free Cash Flow Yield in Quintiles



Quintiles 1-5 are hypothetical portfolios.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The top-quintile portfolio, which comprises the securities with the highest free cash flow yield, outperformed the underlying universe nearly 75% of the time, displaying the highest hit rate among all of the quintile portfolios (see Exhibit 7). Securities in Quintile 1 also had the highest hit rate during bull markets. During down markets, we saw less favorable performance from the Quintile 1 portfolio; the portfolio only outperformed the market 50% of the time.

Exhibit 7: Hit Rate of Quintiles by Free Cash Flow Yield in Up and Down Markets

PORTFOLIO	% OF TIME PORTFOLIO OUTPERFORMED THE S&P 500		
	ALL MARKETS	UP MARKETS	DOWN MARKETS
Quintile 1	72	78	50
Quintile 2	62	61	67
Quintile 3	68	59	100
Quintile 4	42	32	75
Quintile 5	38	32	58

Quintiles 1-5 are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

INCORPORATING FREE CASH FLOW WITH DIVIDEND YIELD

The negative correlation between factor returns indicates that combining dividend yield and free cash flow yield in a multifactor framework can potentially offer diversification benefits.

As we previously noted, stocks with high dividend yield have historically exhibited higher average returns, and stocks with high free cash flow yield had similar desirable performance behavior over the long term. Since each yield metric contains return information, we further explored the relationship between the two factors.

Using the same period, we examined the return correlation between dividend yield and free cash flow yield—calculated as the correlation coefficient of the return from the top-quintile portfolio minus the return from the bottom-quintile portfolio. The negative correlation between factor returns indicates that combining dividend yield and free cash flow yield in a multifactor framework can potentially offer diversification benefits (see Exhibit 8).

Exhibit 8: Return Correlation Between Dividend Yield and Free Cash Flow Yield

FACTOR	DIVIDEND YIELD	FREE CASH FLOW YIELD
DIVIDEND YIELD	1.00	-0.12
FREE CASH FLOW YIELD	-0.12	1.00

Note: Quintiles 1-5 and the Dividend and Free Cash Flow Yield portfolio are hypothetical portfolios.

Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

We constructed a hypothetical large-cap portfolio, which incorporated dividend yield and free cash flow yield, to explore whether a combined portfolio offers more desirable risk/return characteristics than the pure dividend yield and cash flow yield portfolios.

To form the multifactor portfolio, we first standardized the dividend yield and free cash flow yield data for each security in the universe by calculating the z-score. To reduce outlier impact, the data was winsorized.⁹ The z-scores of the dividend yield and free cash flow yield for each stock were then transformed to cumulative normal distribution from 0 to 1 to form the final

⁹ For a stock with fundamental data positioning outside of the top or bottom 2.5 percentile ranks, its value is replaced with the value at the top or bottom 2.5 percentile ranks.

dividend yield score and free cash flow yield score. The product of the two scores gave us an integrated multifactor value to form security selection.

Exhibit 9 shows the returns of ranked quintile portfolios by multifactor value. We can see that returns predicted by the integrated value are consistent with the performance indicated by dividend yield and free cash flow yield when used separately. It comes as no surprise that the combined Quintile 1 portfolio, which also had the highest excess returns, outperformed the broader market by an average of 6.03% per year, compared with annualized excess returns of 0.10% and 3.57% from the first quintile portfolios ranked by pure dividend yield and free cash flow yield, respectively.

The combined Quintile 1 portfolio, which also had the highest excess returns, outperformed the broader market by an average of 6.03% per year.

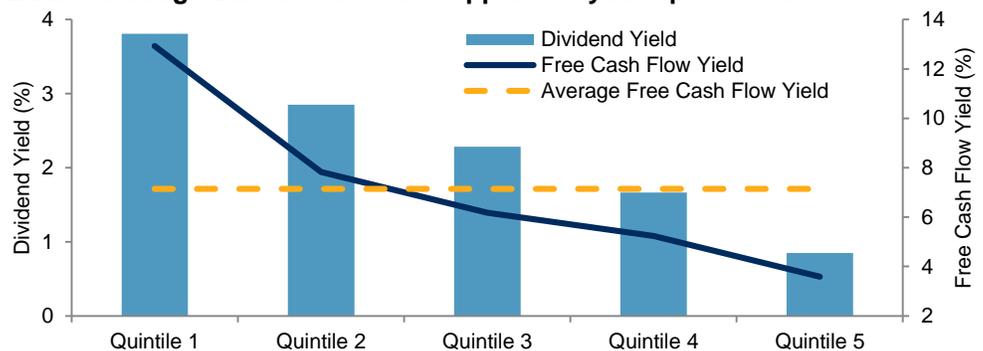
Exhibit 9: Annualized Excess Return Over S&P 500 by Quintile

PORTFOLIO	COMBINED FACTORS (%)	PURE DIVIDEND YIELD (%)	PURE FREE CASH FLOW YIELD (%)
Quintile 1	6.03	0.10	3.57
Quintile 2	5.13	-0.03	1.72
Quintile 3	0.04	-0.05	1.46
Quintile 4	-12.05	-0.76	-1.32
Quintile 5	-13.51	-0.64	-3.37

Quintiles 1-5 are hypothetical portfolios.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Incorporating cash flow yield into dividend portfolios does not result in lower yield. The Quintile1 portfolio also had the highest dividend yield (see Exhibit 10), with an average annual yield of 3.8% during the period. This high dividend yield is supported by an average free cash flow yield of 12.9% for the quintile, compared with the overall universe average free cash flow yield of 7.1%.

Exhibit 10: High Dividend Yield Is Supported by Adequate Cash



Quintiles 1-5 are hypothetical portfolios.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The Quintile 1 portfolio, which consists of the highest multifactor value, has demonstrated the most significant outperformance over the universe. Hence, a strategy can be formed to invest in only the Quintile 1 securities. By conducting contribution analysis, we further explored the investment

value of this strategy. Exhibit 11 shows that the financials, utilities, and industrials sectors were the top three contributors to return, all with around 0.2% for a monthly average over the period. However, a heavy sector concentration is observed. On average, stocks from the financials sector dominated 23.35% of the Quintile 1 stocks, followed by utilities (17.33%) and consumer discretionary (13.57%). While defensive sectors such as utilities tend to have a more stable performance through economic cycles, sectors such as financials are more sensitive to economic cycles and tend to fluctuate more in up and down markets.

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Exhibit 11: Financials Sector Dominates the Top Quintile

SECTOR	MONTHLY AVERAGE WEIGHT (%)	MONTHLY AVERAGE TOTAL RETURN (%)	MONTHLY AVERAGE CONTRIBUTION TO RETURN (%)
Consumer Discretionary	13.57	1.29	0.14
Consumer Staples	6.86	1.20	0.09
Energy	3.62	0.75	0.04
Financials	23.35	1.13	0.22
Health Care	2.97	0.62	0.03
Industrials	11.36	1.34	0.17
Information Technology	3.28	0.86	0.06
Materials	7.54	1.51	0.11
Real Estate	2.52	0.67	0.03
Telecommunication Services	4.54	0.66	0.05
Utilities	17.33	0.87	0.18
[Unassigned]	3.05	1.26	0.04

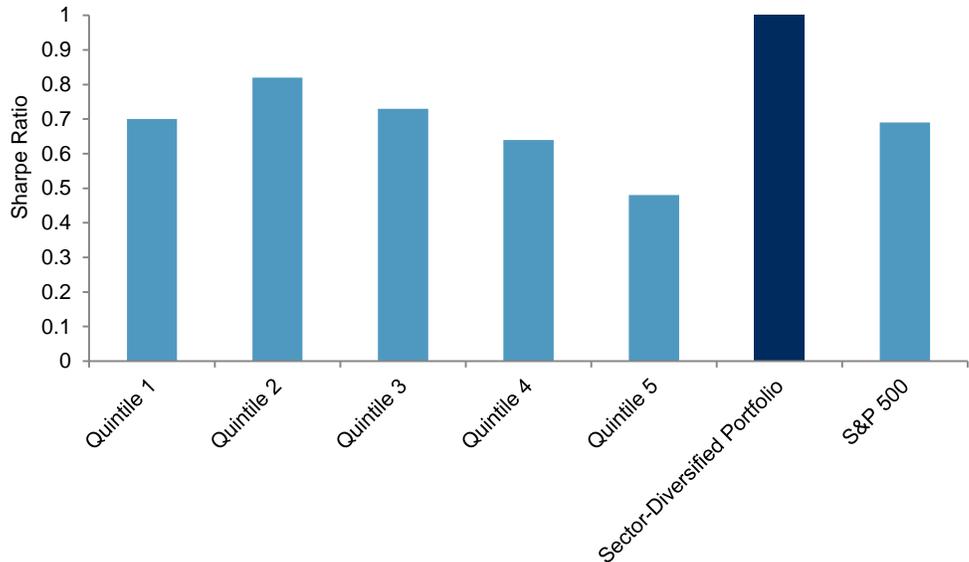
Quintile 1 is a hypothetical portfolio.
 Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes. Shaded rows represent the sectors that had the highest concentration and monthly average contribution to return.

Empirical studies^{10 11 12} have suggested that sector diversification can help reduce volatility and positively influence risk-adjusted return. To achieve diversified sector exposure, we selected the top five stocks in each sector based on their integrated value, and weighted equally. As shown in Exhibit 12, the modified sector allocation led to an improvement in risk-adjusted return. The sector-diversified portfolio (shown in dark blue) had better risk-adjusted return than all the quintile multifactor portfolios.

¹⁰ R Weiss. "Global Sector Rotation: New Look at an Old Idea." 1998.
¹¹ S Baca, B Garbe, and R Weiss. "The Rise of Sector Effects in Major Equity Markets." 2000.
¹² M Brière and A Szafare. "Factors and Sectors in Asset Allocation: Strong Together?" 2017.

Exhibit 12: Sector Diversification Improves Risk-Adjusted Return

CATEGORY	QUINTILE 1	QUINTILE 2	QUINTILE 3	QUINTILE 4	QUINTILE 5	SECTOR-DIVERSIFIED PORTFOLIO	S&P 500
Return (%)	14.91	13.63	12.43	11.71	10.27	15.57	9.90
Risk (%)	17.26	13.20	13.25	13.90	15.70	15.35	14.29

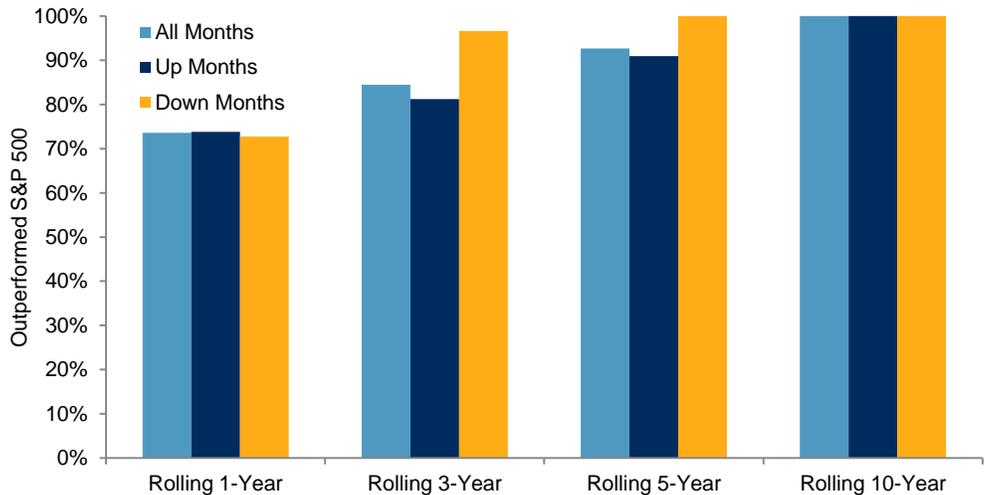


On a rolling 12-month basis, the portfolio outperformed 74% of the time through all market conditions.

Quintiles 1-5 and the sector-diversified portfolio are hypothetical portfolios. Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to December 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The sector-diversified portfolio outperformed the S&P 500 over the short- and long-term investment horizons (see Exhibit 13). On a rolling 12-month basis, the portfolio outperformed 74% of the time, through all market conditions. The multifactor portfolio had better returns in market downturns, outperforming during all the downside markets on a rolling 5- and 10-year basis.

Exhibit 13: Sector-Diversified Portfolio Versus the S&P 500



The sector-diversified portfolio is a hypothetical portfolio. Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to June 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The sector-diversified portfolio, on average, displayed higher dividend yield than the market (3.71% versus 1.96%), showing the benefit of sector diversification. In addition, the portfolio demonstrated a strong tilt toward the value factor, with lower average multiples than the benchmark (see Exhibit 14).

Exhibit 14: Hypothetical Portfolio Shows Strong Value Tilt and High Dividend Yield

FACTOR	SECTOR UNCONSTRAINED MULTIFACTOR PORTFOLIO (%)	SECTOR-DIVERSIFIED PORTFOLIO (%)	S&P 500 (%)
Dividend Yield	4.04	3.71	1.96
Price/Earnings	13.98	15.01	18.88
P/E Using FY1 Estimation	12.10	12.66	16.27
P/E Using FY2 Estimation	11.17	11.70	14.50
Estimated 3-5 Year EPS Growth	7.79	7.59	12.31
Price/Cash Flow	5.94	6.34	9.84
Price/Book	1.71	2.08	2.83
Price/Sales	0.79	0.74	1.40
ROE	13.39	15.57	18.99

We found that a portfolio of companies with high free cash flow yield outperformed the overall market and companies with low free cash flow yield.

The sector-diversified portfolio is a hypothetical portfolio. Source: S&P Dow Jones Indices LLC, FactSet. Data from December 1990 to December 2016. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

CONCLUSION

Dividend investing is an important part of total return generation over the long-term investment horizon. Our research shows that dividend-paying stocks have historically outperformed non-dividend payers. Moreover, the top-quintile portfolio ranked by dividend yield had higher risk-adjusted returns than the bottom-quintile portfolio. When choosing high-dividend-yield stocks, the sustainability and quality of dividends should not be overlooked. We found that a portfolio of companies with high free cash flow yield outperformed the overall market and companies with low free cash flow yield. For market participants seeking solid and durable dividend income, combining free cash flow yield with dividend strategies can serve as a starting point. Our study showed that a hypothetical portfolio constructed by incorporating free cash flow yield and dividend yield metrics historically displayed higher risk-adjusted returns than pure dividend yield or free cash flow yield portfolios, without sacrificing income.

GLOSSARY

Smart Beta

It is also called factor investing, strategic beta or alternative beta. Smart beta strategy seeks to capture and exploit particular investment factors, and access the return that comes from exposure to non-market risk factors, as opposed to the return stemming from risk associated with the broad market.

S&P 500®

S&P 500 is an equity index that tracks the large-cap stocks in the U.S. stock market. The index includes 500 leading companies and captures approximately 80% coverage of available market capitalization.

Sharpe Ratio

Sharpe ratio, named after William F. Sharpe, is a measure of risk-adjust return. It is calculated as the excess return of a portfolio over the risk-free rate relative to the portfolio's standard deviation. Typically, the 3-Month Treasury Bill Rate is used as proxy for risk-free rate.

$$SR = (R_p - R_f) / \sigma_p$$

where:

R_p = portfolio return

R_f = risk-free rate

σ_p = standard deviation of the portfolio

USD

Abbreviation of U.S.dollar

Dividend Yield

Dividend yield is a stock's annual dividend relative to the stock price

Free Cash Flow Yield

Free cash flow yield is a stock's free cash flow per share relative to the stock price.

Free cash flow is the excess cash that a business has after paying all of the operations and capital expenditures.

Correlation Coefficient

Correlation Coefficient is a statistical term. It measures the linear relationship between the movements of two variables. The value of the correlation coefficient is between -1 and 1, with -1 being a perfect negative correlation, and 1 indicating a perfect positive correlation.

Z-score

Computing a z-score is a widely adopted method of standardizing a variable in order to combine it with other variables that may have a different scale or unit of measurement.

After winsorizing dividend yield and free cash flow yield, the z-score for each of the two ratios for each security is calculated using the mean and standard deviation of the relevant variable within each of the index universes.

The z-score is calculated as follows:

$$z_{\alpha} = (x_{\alpha} - \mu_{\alpha}) / \sigma_{\alpha}$$

where:

z_{α} = Z-score for a given security.

x_{α} = Winsorized variable for a given security.

μ_{α} = Arithmetic mean of the winsorized variable in the selection universe, excluding any missing values.

σ_{α} = Standard deviation of the winsorized variable in the selection universe.

Price/Earnings

Price/Earnings ratio is a stock valuation measure. It is calculated as stock price relative to its earnings per share.

P/E using FY1 Estimation

Price to Earnings Using FY1 Estimation is calculated as $P_i / \text{EPS}_{\text{FY1},i}$

where:

P_i = Price for security i as of the report date

$\text{EPS}_{\text{FY1},i}$ = Mean EPS estimate of security i for the next unreported fiscal year as of the report date. FY1 is defined as the next unreported fiscal year as of the report date.

P/E using FY2 Estimation

Price to Earnings Using FY2 Estimation is calculated as $P_i/EP_{FY2,i}$

where:

P_i = Price for security i as of the report date

$EP_{FY2,i}$ = Mean EPS estimate of security i for FY2 as of the report date. FY2 is defined as the unreported fiscal year following FY1.

Estimated 3-5 Year EPS Growth

This is the estimated 3-5 year earnings per share (EPS) growth rate as of the report date. The data uses pre-calculated mean long-term EPS growth rate estimate from FactSet, First Call, I/B/E/S Consensus, and Reuters, which is calculated using each individual broker's methodology.

Price/Cash Flow

Price/Cash Flow ratio is a stock valuation measure. It is calculated as a stock's price relative to its cash flow per share.

Price/Book

Price/Book ratio is a stock valuation measure. It is calculated as a stock's price relative to its book value per share.

Price/Sales

Price/Sales ratio is a stock valuation measure. It is calculated as a stock's price relative to its sales per share.

ROE

Return on Equity (ROE) is calculated as net income divided by shareholder's equity. It is a profitability ratio and measures how much profit a company returns to the investment from the shareholders.

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