

Trading Index Dividends

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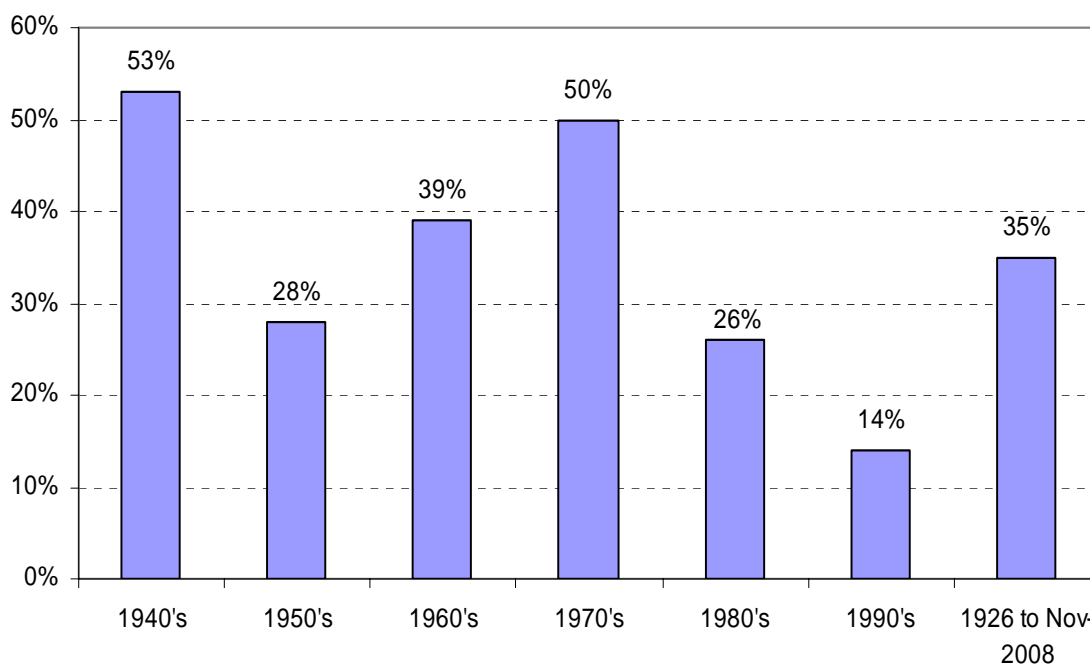
- ❑ Dividends are an important part of the total return stream of S&P 500, contributing one-third of long term total returns. S&P 500 linked index derivatives have meaningful exposure to dividend risk.
- ❑ Globally, index dividends are widely traded in over-the-counter markets and over the past year have begun trading on exchange environments.
- ❑ A sector analysis of S&P 500 dividend points suggests that while Financials and Consumer Staples are typically the largest contributors, dividends from individual sectors may contribute differently in dissimilar environments.
- ❑ The S&P 500 Dividend Index isolates dividend points of the S&P 500 on a quarterly basis, providing a benchmark for dividend risk management and trading contracts. Applications include:
 - **Hedging:** The index can be used as the underlying basis to hedge dividend risk embedded in index derivatives.
 - **Arbitrage:** Implied dividend points deviate and may often underestimate, realized dividends. This provides an opportunity to execute index-linked dividend arbitrage strategies.
 - **Calendar spreads:** Market implied dividends are driven by dividend growth expectations and perceptions of risk to dividends. As a result, implied levels incorporate a “dividend risk premium”, which is compounded with increasing maturity. This provides opportunities to execute calendar spreads between longer-dated and shorter-dated dividends using index-linked tools.
 - **Dividend stripping:** A portfolio manager may synthetically sell index dividends to buy more cash equities. This strategy can be executed when the expected capital appreciation is greater than the dividend income.

The Importance of Dividends

Dividends contribute a significant portion of total equity returns. Opinions relating to the relationship between dividends and stock prices have varied since the dividend discount model was established in the 1930's. Indeed evidence suggests that there is limited synchronicity between dividend changes and stock price movement over time, thereby raising the possibility that dividends represent a distinct cash-flow stream that can provide diversification benefits.

Whether or not dividend paying equities are a better investment is inconclusive, however it is clear that dividends do make a significant contribution to the value of an investment. Since 1926, dividends have contributed approximately one-third of total returns, while the remaining return component is sourced from capital appreciation.

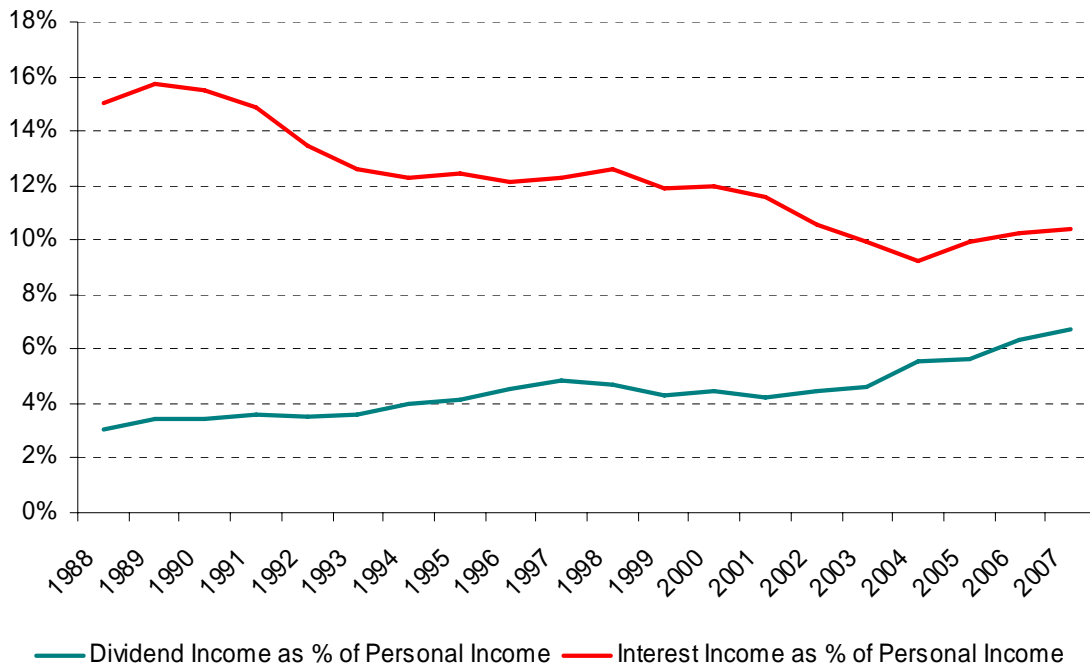
Figure 1: Historical Dividend Contributions to Total Equity Returns



Source: S&P

Furthermore, total dividend income has increased significantly from US\$ 129.7 billion in 1988 to US\$ 785.8 billion in 2008, representing over 600% growth. While dividends have grown in proportion to increasing stock market capitalization, evidence shows that dividends have also grown as a portion of personal income.

Figure 2: Dividend Income and Interest Income



Source: S&P

Dividend Risk and Index Derivatives

Estimating the size and timing of dividends is an important determinant in the pricing of equity index options through the Black-Scholes model. It is assumed that the size and timing of the dividend is known with certainty and paid continuously, given a certain dividend yield. The forward price – also displayed component of the Black-Scholes option pricing model - of the equity index is determined given a set assumption of the dividend yield of the index, which reduces the future expected spot price.

The formula for the option price with a known dividend yield is given as:

$$C(S_0, T) = e^{-rT} (FN(d_1) - KN(d_2)) \quad (1)$$

Where

C = Call price

S_0 = Index Spot Price

T = Term to Expiry

r = Risk-free Rate

F = Index Forward Price

K = Strike Price

And the corresponding forward / futures price is

$$F = S_0 e^{(r-q)T} \quad (2)$$

Where

q = dividend yield

The dividend yield on the index relates to declared ordinary gross dividends paid on stocks going ex-dividend in the given period. The dividends that are included as part of the yield are recurring, whereas special or extraordinary dividends are not included in most situations.

In simplified terms, purchasers of call options (or long forwards/futures) on equity indexes do not receive the expected benefit of dividend payments prior to expiration and as a result pay a lower price for the option (forward/futures). The reverse is true for the buyer of a put option (or short forwards/futures), where expected dividends raise the premium on the option (forward/futures).

Factors that affect the dividends relating to an equity index include:

- Chosen index constituents and their weights within the index
- Company performance
- Dividend Payout Ratio

Each of the variables above has a greater propensity to change and fluctuate over a longer period, therefore making it increasingly difficult to approximate the yield on the index and leaving longer maturity index derivatives susceptible to greater dividend risk. Conversely dividends for short-life options and futures are typically predicted with a high degree of certainty

However, during times of heightened stock market volatility where company performance and dividend payout forecasts are revised on a more regular basis, the task of approximating yield even in the short-term is a challenging.. The implied dividends in derivatives prices may therefore be a misleading indicator of future dividends, presenting a greater risk to the buyers and sellers of options and futures.

The risks associated with implied dividends in options and futures prices creates an unwanted dividend exposure for investors who attempt to hedge the long position in underlying equity indexes that pay a realized dividend. Investors can solve for the implied dividend level in the derivative pricing model and hedge the dividend exposure through a swap transaction.

Growth and Evolution of Dividend Trading

Dividend transactions have increased significantly as dividend payments have contributed a larger share of total income and dividends since 2000. The growth and importance of dividends in creating value, coupled with the increase in structured products that invested in equity indexes, increased the supply of dividends that were available for trade in the OTC market since 2004. The supply of dividends and the correspondingly low demand resulted in low implied future dividend growth and attracted hedge funds to the dividend market, adding further liquidity and increasing the appeal of dividend transactions.

Dividends are typically traded OTC through a swap arrangement. Dividend swaps allow investors to form an expectation on the total dividend points that will be paid by an equity index over a given period of time. The swap transaction will take place in the following manner:

- The dividend purchaser will pay the market-implied level that is derived from an equity index derivative multiplied by the overall exposure per index point. This is known as the fixed dividend value given that it is derived from the set price of an option or futures contract.
- The counterparty, with a long position in the equity index, will pay the realized dividend level multiplied by the exposure per index point. This is known as the floating payment since the dividend level may vary from expectations due to market risk.

Payments for the swap are made at maturity, though an initial margin combined with an ongoing maintenance margin, may be required upon entering into the agreement. The swap is therefore, a forward contract on dividends and provides exposure to the difference between the implied dividends defined by the market and realized dividends at maturity. The swap takes place independently of price changes in the underlying index, thereby allowing investors to separate their view of dividends from the price of an index.

The development of dividend trading on the OTC market has generated interest from a wide-range of market stakeholders that has propelled the introduction of exchange-traded

dividend contracts. NYSE Liffe and Eurex have launched futures contracts on the FTSE 100 dividend index and Dow Jones EURO STOXX 50 dividend index, respectively. Such futures contracts have introduced dividend trading to an exchange environment, providing a complementary derivatives product to the OTC swap.

Trading index dividends in a transparent exchange environment, where the derivatives contract have standardized features, provides more trading opportunities for investors who wish to take a view on index dividends over a discrete period of time. The exchange environment also has the added benefit of a centralized settlement and clearing system with initial and ongoing margin requirements that are designed to eliminate counterparty risk.

S&P 500 Dividend Index

The S&P 500 Dividend Index is designed to track the total dividends from S&P 500 constituents. The level of the index is based on a running total of dividends of the constituents of the underlying index. The index resets to zero on a quarterly basis – after the close on the 3rd Friday of the last month of each calendar quarter - so that it reflects the frequency of dividend payments made by constituents of the S&P 500 index while also coinciding with the futures settlement date.

Which Dividends are Included?

Declared ordinary gross dividends paid on stocks going ex-dividend in that period are included. These are most likely to be recurring and thus potentially forecastable. Special or extraordinary dividends are not included in most situations. A special dividend is usually defined as not fitting a regular payment out of operating earnings and does not have an impact on future dividend payments. S&P defines special dividends as those dividends that are outside of the normal payment pattern established historically by the issuing corporation. These may be described by the company as “special”, “extra”, “year-end”, or “return of capital”. However, even if a company calls a dividend “special” but it is recurring, S&P includes it as part of its index dividend calculation.

How is the S&P 500 dividend index calculated?

The formula for calculating the dividend index on any date, t , for the S&P 500 index, is:

$$\text{Dividend Index}_{t,x} = \sum_{i=r+I}^t ID_{i,x}$$

Where:

$ID_{i,x}$ = The index dividend of S&P 500 on day i .

t = The current date.

$r + I$ = The current date immediately following the reset date

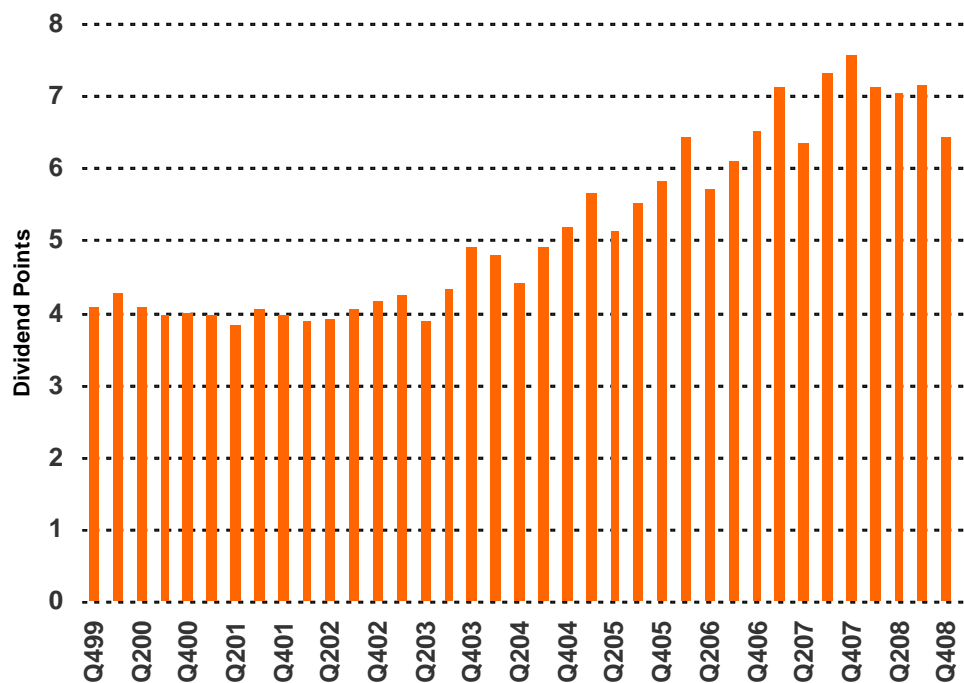
The index dividend (ID) of S&P 500 is calculated on any given day as the total dividend value for all constituents of the index divided by the index divisor. The total dividend value is calculated as the sum of dividends per share multiplied by index shares for all constituents of the index which have a dividend going ex on the date in question.

The index is reset to zero after the close on the 3rd Friday of the last month of every calendar quarter, to coincide with futures and options expirations. Thus the index measures the total dividend points of the S&P 500 since the previous reset date.

History of the S&P 500 Dividend Index

Figure 3 shows the quarterly dividend index points of the S&P 500 since 2000. The quarters used in this section match with the quarterly reset of the S&P 500 Dividend Index. The chart illustrates peaks and troughs in dividend points, highlighting the importance of dividend risk management tools.

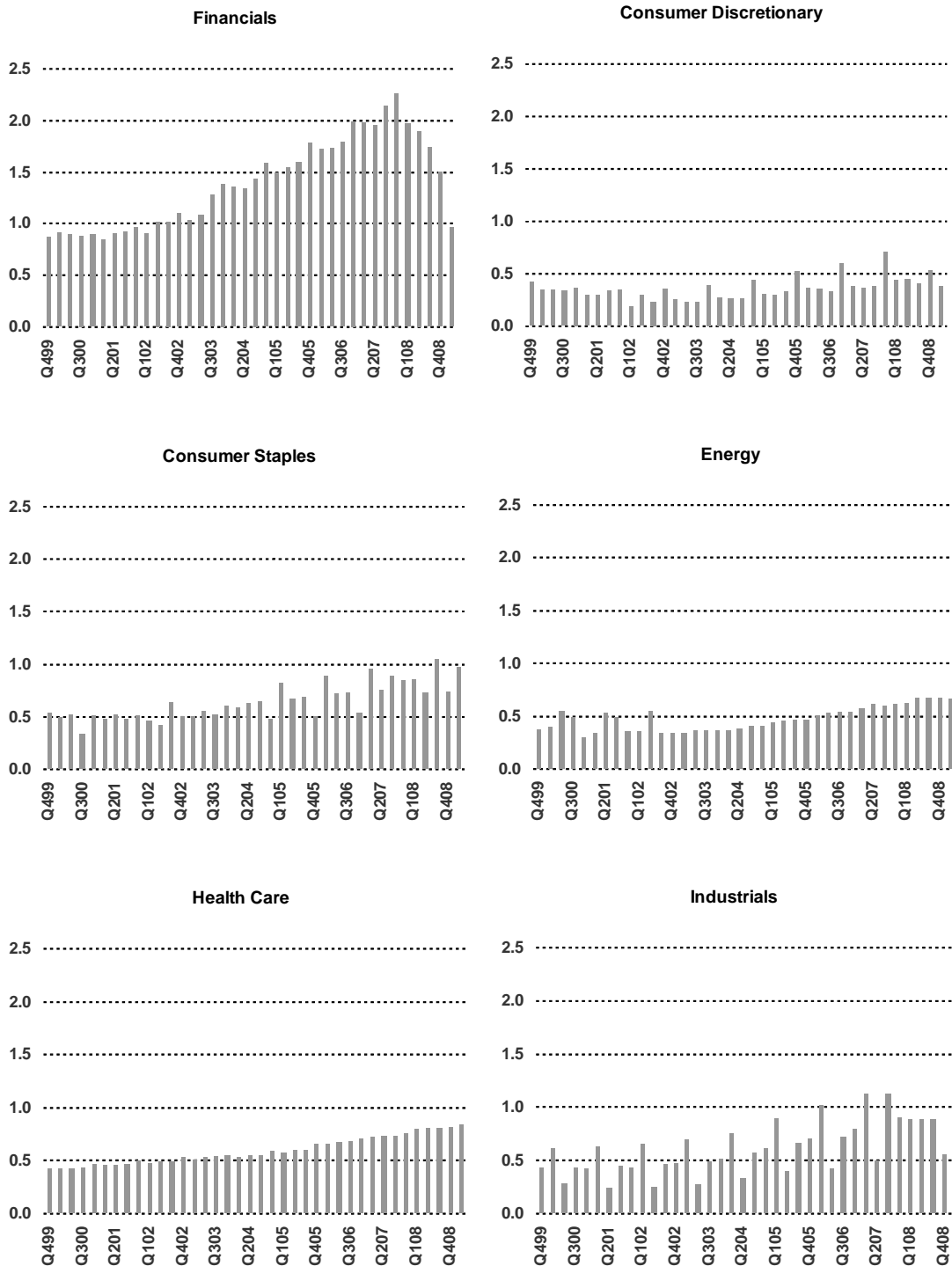
Figure 3: Quarterly Dividend Index Points of S&P 500 (Q4 1999 – Q1 2009)

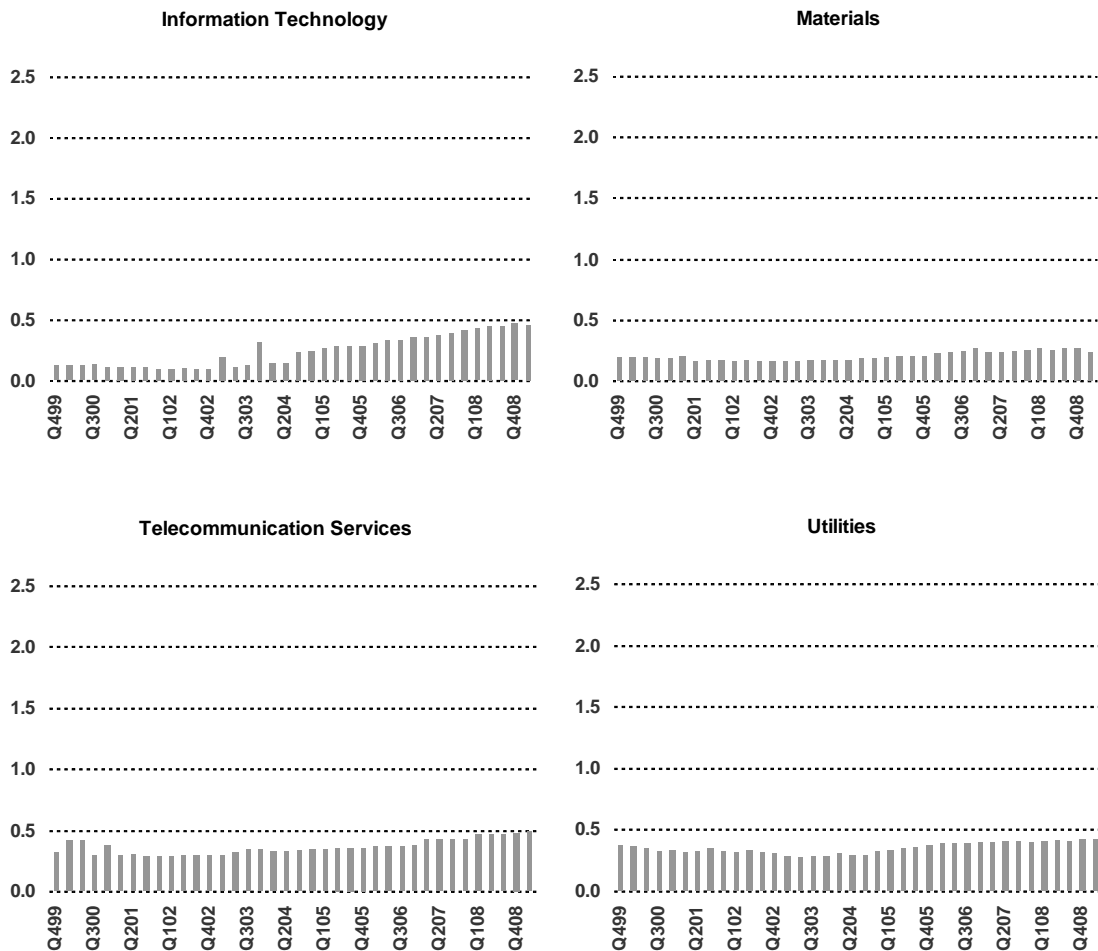


Source: S&P

Dividend traders often estimate index dividends using a bottom up aggregation of sector dividend estimates. In figure 4 we show the dividend index points of S&P 500 sectors within the same sample period as above. The charts show inter-temporal effects in dividend point contributions from various sectors. For example, the drop off in Telecommunications dividend points at the start of the decade and the rise and fall of Financials dividend points over five years ending first quarter of 2009, are clearly discernible.

Figure 4: Quarterly Index Dividend Points of S&P 500 Sectors (Q1 2000 – Q1 2009)





Source: S&P

Unlike parts of Europe and Asia where dividends are paid annually or semi-annually, U.S. companies declare dividends annually and pay them quarterly. Table 1 shows the historical average quarterly dividend points for each quarter from Q1 2000 – Q1 2009. While some of the average differences are attributable to ex-date timing issues, one can also notice large average differences in some sectors which may point to seasonality with respect to dividend changes for the subsequent fiscal year.

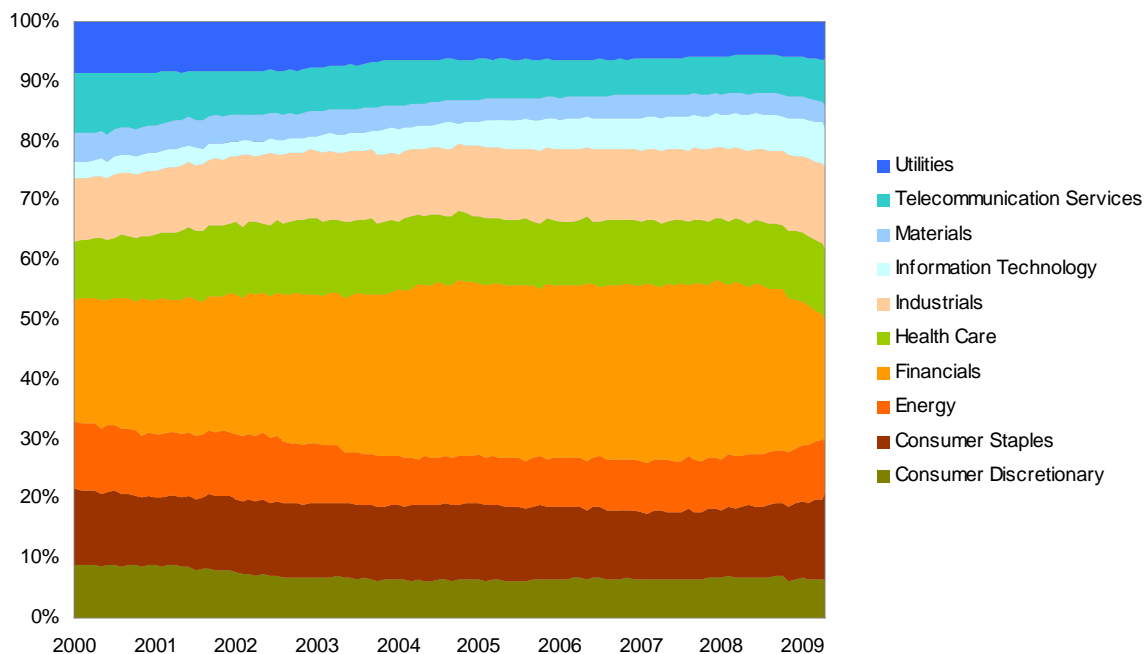
Table 1: Historical Average Quarterly Dividend Level and Dividend Growth across S&P 500 Sectors (Q1 2000 – Q1 2009)

Average Change	Q1	Q2	Q3	Q4	Q2 - Q1	Q3 -Q2	Q4 -Q3	Q1 -Q4
Consumer Discretionary	0.32	0.32	0.31	0.47	3.9%	-2.1%	52.2%	-30.4%
Consumer Staples	0.70	0.61	0.66	0.58	-5.7%	8.2%	-6.8%	23.6%
Energy	0.46	0.51	0.48	0.45	20.4%	-5.2%	-7.1%	4.2%
Financials	1.31	1.37	1.42	1.49	2.2%	4.0%	5.3%	-7.5%
Health Care	0.59	0.58	0.59	0.61	2.3%	1.1%	5.0%	-0.5%
Industrials	0.85	0.39	0.64	0.60	-51.8%	71.3%	-3.4%	50.4%
Information Technology	0.25	0.23	0.24	0.26	0.1%	7.7%	17.2%	6.1%
Materials	0.20	0.20	0.20	0.21	-1.0%	1.6%	2.1%	-0.1%
Telecommunication Services	0.37	0.36	0.35	0.36	2.4%	-2.9%	4.1%	2.8%
Utilities	0.35	0.34	0.34	0.35	0.6%	0.4%	1.3%	-0.4%
S&P 500	5.41	4.92	5.25	5.39	-6.2%	6.7%	3.0%	2.6%

Source: S&P

Figure 5 illustrates the breakdown of S&P 500 dividend points across sectors over the past decade. At the beginning of the decade, dividend point contribution is more evenly split across the sectors relative to the end of 2008. The top three dividend weights at the beginning of the decade were financials, consumer staples, and energy, which accounted for 44.4% of the total dividend points of the S&P 500. At the end of the period, the top three dividend point contributors were financials, consumer staples, and industrials, which in total accounted for 48.5% of the total dividend points of the S&P 500. Table 2 provides a more granular breakdown of sectors.

Figure 5: Historical Sector Dividend Index Compositions of S&P 500



Source: S&P

Table 2: Historical Sector Dividend Composition of S&P 500 (Q1, 07 – Q1, 09)

	Q1 - 07	Q2 - 07	Q3 - 07	Q4 - 07	Q1 - 08	Q2 - 08	Q3 - 08	Q4 - 08	Q1 - 09
Consumer Discretionary	0.38	0.37	0.38	0.71	0.44	0.45	0.41	0.53	0.38
Consumer Staples	0.95	0.75	0.89	0.84	0.85	0.73	1.05	0.73	0.97
Energy	0.57	0.60	0.60	0.60	0.62	0.67	0.67	0.67	0.66
Financials	1.97	1.95	2.13	2.26	1.97	1.90	1.74	1.50	0.96
Health Care	0.72	0.73	0.73	0.75	0.79	0.81	0.81	0.81	0.83
Industrials	1.12	0.50	1.12	0.90	0.88	0.88	0.88	0.55	1.31
Information Technology	0.35	0.38	0.39	0.41	0.43	0.45	0.45	0.47	0.45
Materials	0.24	0.24	0.25	0.25	0.26	0.26	0.26	0.27	0.23
Telecommunication Services	0.42	0.43	0.43	0.43	0.47	0.47	0.47	0.47	0.48
Utilities	0.40	0.40	0.40	0.40	0.40	0.41	0.40	0.43	0.43
S&P 500	7.11	6.34	7.31	7.55	7.11	7.02	7.14	6.43	6.70

Source: S&P

Derivatives and Implied Dividend Index Levels

The index options markets provide a continuous and easily calculated view of expected or implied dividends. These implied dividends can be calculated using the put-call parity.

The put-call parity of options prices is based on the argument that in a frictionless market, the spot asset and the put and call options written on it can form a risk free portfolio. From the put-call parity for dividend paying index we know that:

$$S - PV(\text{Div}) + P = C + PV(K) \quad (4)$$

Where:

$S = \text{Index spot price}$

$PV(\text{Div}) = \text{Present Value of Dividend Payment in Index Points}$

$P = \text{Put Price}$

$C = \text{Call Price}$

$PV(K) = \text{Present Value of Strike Price}$

Solving for $PV(\text{Div})$ gives:

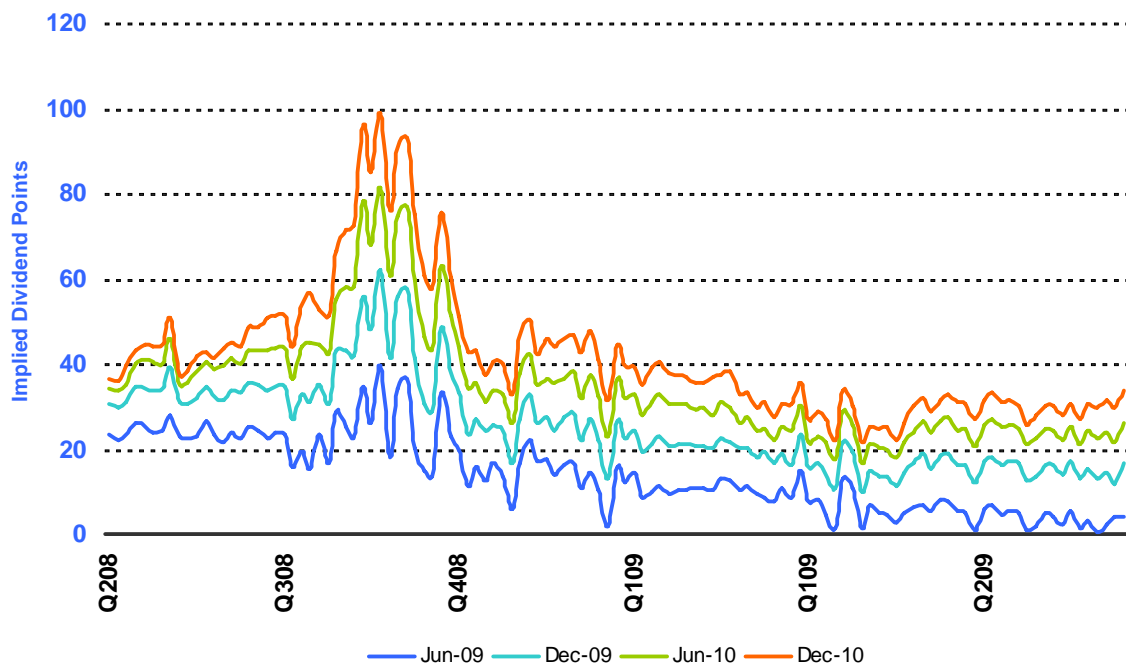
$$PV(\text{Div}) = S + P - C - PV(K) \quad (5)$$

In order to calculate the implied dividends, we have to consider put and call options with the same strike price and expiration date that are both actively traded on the same day. For both put and call options, we select the contracts immediately above the strike, which is set based on the price level of the S&P 500 index on the same day. We obtain the daily option price data from DeltaNeutral via <http://www.marketdataexpress.com/>.

It is important to note that market participants suggest that equation 4 may not hold precisely true in practice. Specifically, the options market may be taking its cues from the futures market, or the discounted forward index level, as opposed to the index spot price, S. Therefore, the implied dividends reported in subsequent section may be considered theoretical or illustrative only.

Figure 7 shows the implied dividend yields for June 2009 to December 2011 maturities since June 2008. Clearly, the market implied yields vary with time due to new information and changing sentiment of dividends. The spread among different maturities may also change with time.

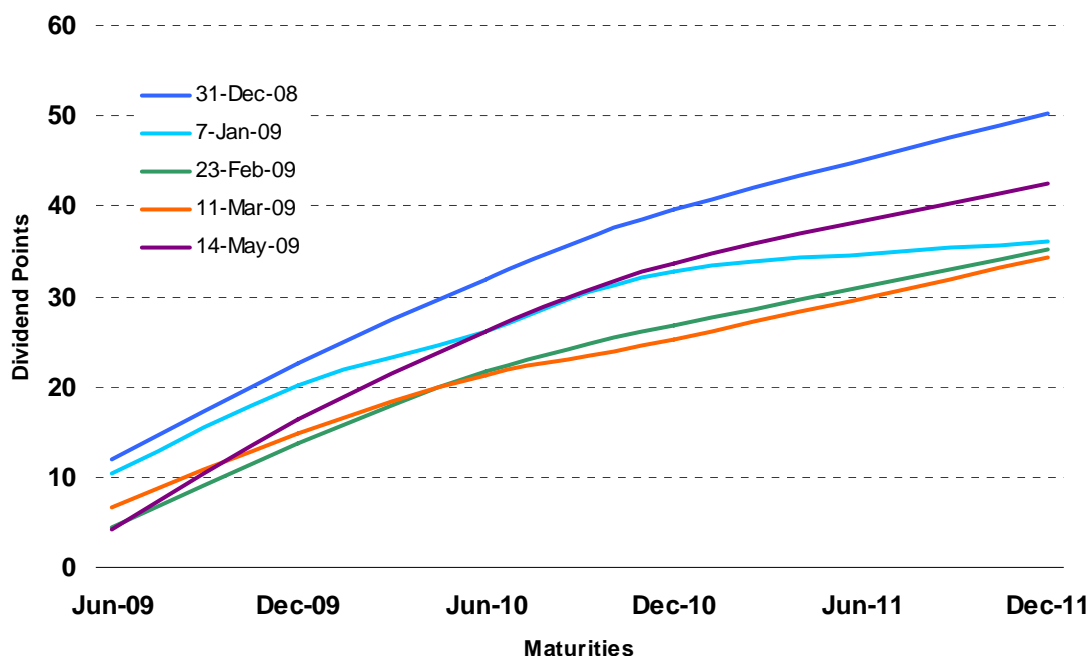
Figure 7: Market Implied June 09 – Dec 11 S&P 500 Implied Dividend Yields



Source: DeltaNeutral, S&P. Implied yields are theoretical and illustrative only.

Figure 8 shows the variation of the dividend term structures implied by the different maturities on a selected number of calendar dates. This provides further insights on expectations of S&P 500 dividend points. For example, the curve on May 14 is much steeper than the curve on January 7, suggesting that expected dividends in quarters farther out has increased.

Figure 8: Changes in Market Implied S&P 500 Implied Dividends Term Structure



Source: DeltaNeutral, S&P. Implied yields are theoretical and illustrative only.

Application of the S&P 500 Dividend Index

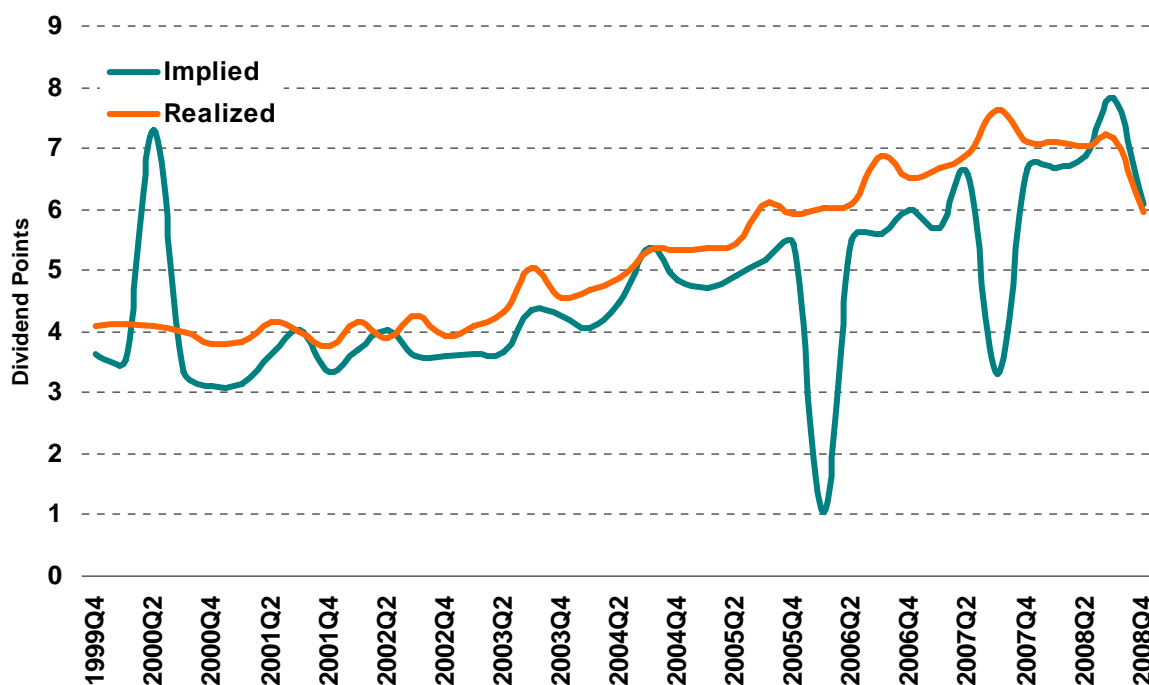
Hedging

In previous sections, we demonstrated how dividend points are factored into the pricing of index futures and options. OTC option traders and issuers of total returns based structured products also need to manage their dividend risk pro-actively. Convertible bond portfolio managers' exposures to dividend will increase if their underlying convertibles investments are in the money, with little or no dividend protection. Equity portfolio managers, especially equity income fund managers, also have meaningful exposures to dividend risks. Given the changing dividend environments, market participants exposed to dividend risks may wish to hedge their exposure. The S&P 500 Dividend Index provides a benchmark for such hedging products.

Implied Versus Realized Dividend Arbitrage

Implied dividend points deviate and may often underestimate, realized dividends. Figure 9 shows the historical S&P 500 realized dividend points on a quarterly basis and the corresponding implied dividend yield. This provides an opportunity to use S&P 500 Dividend Index based tools to execute dividend arbitrage strategies.

Figure 9: Historical S&P 500 Realized Quarterly Dividend and Corresponding Implied Dividend



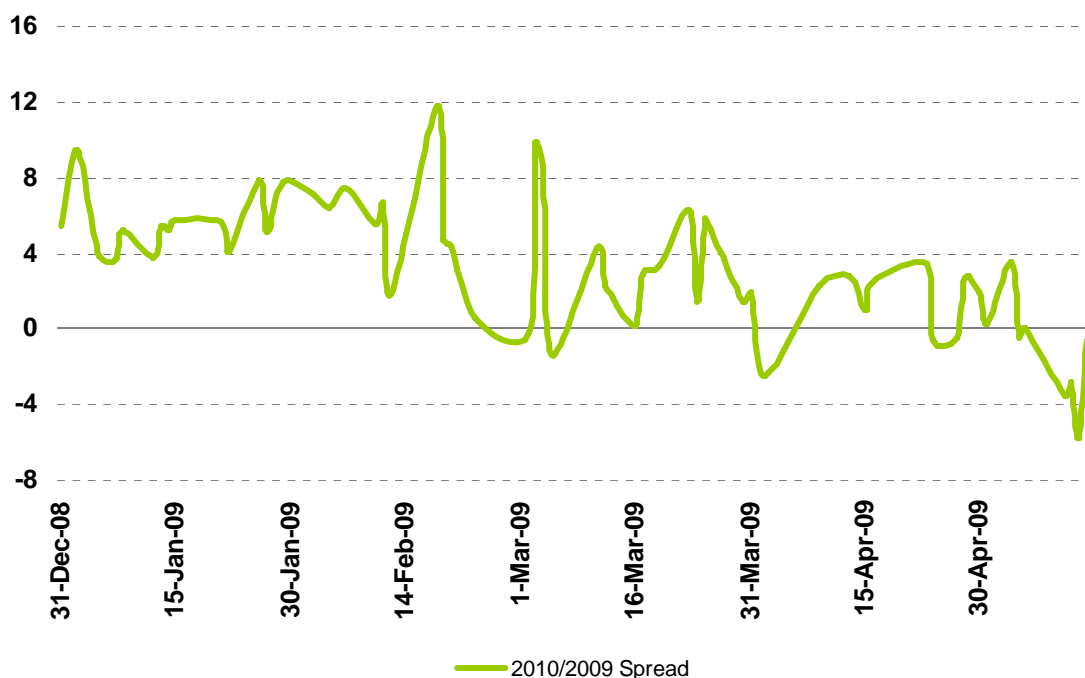
Source: DeltaNeutral, S&P. Implied yields are theoretical and illustrative only.

Calendar spreads

Tools linked to S&P 500 Dividend index can facilitate the trading of dividend flattening and steepening spread trades amongst institutional investors. Market implied dividends are driven by dividend growth expectations and the perception of risk to dividends. As a result, implied levels will incorporate a “divided risk premium”, which is compounded with increasing maturity and which will cause the dividend term structure to flatten and provide a positive “carry” when buying longer-dated dividends and selling shorter-dated dividends. By combining the buying and selling of dividends index contracts in different

maturities, investors can also take views on future dividend spreads between different years. As shown in Figure 10, the spread between 2010 and 2009 implied dividend points fluctuates over time, which provides timing opportunities on the spreads. Investors can enter the spread trade if the current implied spread level is relatively low and exit the spread trade if the current implied spread level is relatively high. For example, investor can initiate a dividend spread timing strategy by buying 2010 dividends and selling 2009 dividends, which gives exposure to the realized dividend differences between 2009 and 2010, or the actual dividend growth from 2009 to 2010.

Figure 10: Implied Dividend Spreads



Source: DeltaNeutral, S&P. Implied yields are theoretical and illustrative only.

Dividend Stripping

A portfolio manager can synthetically sell dividends using S&P 500 Dividend index linked contracts to buy more cash equities. This exercise “strips out” the dividend income stream element of his equity investment thereby maximizing the exposures to index price appreciation. This strategy can be executed when the expected capital appreciation is more than dividend income.

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