Eurex Dow Jones EURO STOXX 50® Index Dividend Futures – Pricing & Applications for the Institutional Investor

"The common perception is that a dividend is a cheque that pops out of a brown envelope sent to shareholders twice a year. This, however, is an outdated notion." Dividends – the accidental asset class, Financial Times, July 2007.

Introduction

On June 30, 2008, Eurex launched the Dow Jones EURO STOXX 50® Index Dividend Future[1]. It is the first exchange-traded derivatives contract that focuses solely on the dividend element of a widely used and traded equity index, the Dow Jones EURO STOXX 50® Index. The new contract will allow investors and traders alike to take a view on the gross cumulative cash dividends that are announced and paid by the individual constituents of the Dow Jones EURO STOXX 50® Index during an annual period. The contract will be an exchange-traded derivative equivalent of an OTC index dividend swap and will offer a multitude of applications for the institutional investor plus having the benefit of substantially reduced counterparty risk with a central Clearing House, Eurex Clearing AG.

The index dividend swap initially grew from banks' needs to manage their dividend exposure in structured products and the appetite from hedge funds to take on the exposure. With increasing volumes in equity derivatives trading globally and more liquidity in longer-dated structures, dividends have become an important factor in pricing derivatives. Especially growth in the retail structured products markets have led to long dividend exposures for banks and dealers[2]. As a result, implied dividends started trading at significant discounts because the market for dividends lacked liquidity and the participation of investors with sufficiently long investment horizon[3]. Today, it is estimated that daily dividend swap turnover is almost EUR 1 billion[4].

What is an Index Dividend Swap?

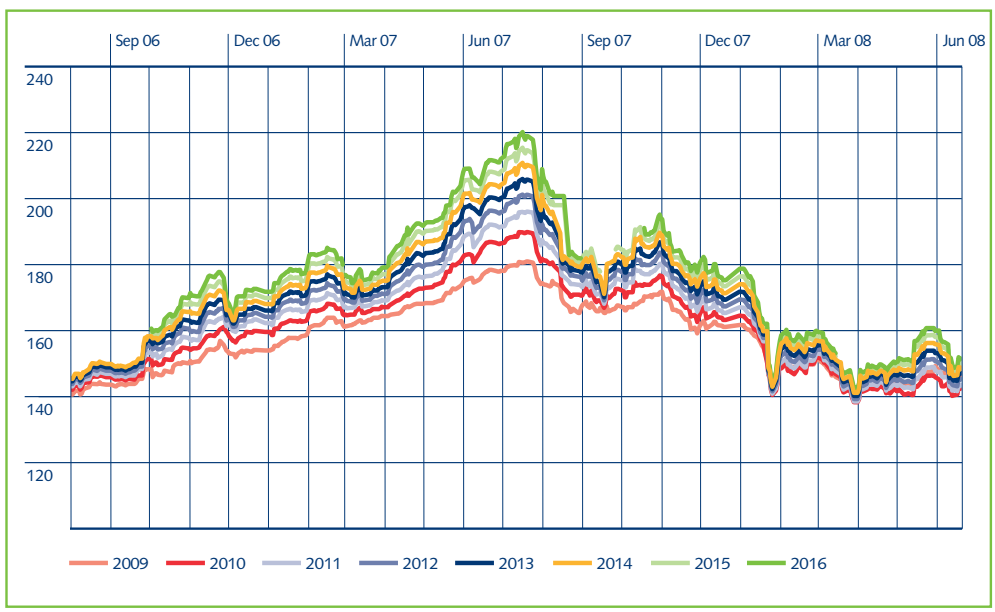
An index dividend swap is an over-the-counter derivative contract that enables investors to take a view on the cumulative dividends that will be paid by the constituents of an index in a predetermined time period. The dividend period usually is one year and in Europe it typically starts and ends on the third Friday in December when index futures contracts expire. The Dow Jones EURO STOXX 50® is the most actively traded index in Europe and the dividend swaps on its constituents make up the majority of trades in the over-the-counter market – a market in which most of trading is originated in Europe.

1 See Appendix 1 for contract specifications.
2 See Hedging the Dividend Element of European Equity Structured Products in Applications.
3 See Manley & Mueller-Glissmann (2008).
4 See Financial Times, April 21, 2008.

For example, on March 14, 2008 the quote for the December 2008 (covers the period from December 2007 to December 2008) Dow Jones EURO STOXX 50® Index dividend swap was 155.9 index points. Assuming a notional value of EUR 100,000 per index point, the cash flows will be:

In the example above the dividend buyer commits to pay the index points multiplied by the exposure per point (that is 155.9 × EUR 100,000) while the dividend seller commits to pay the realized dividend for the period at maturity multiplied by the exposure per point (that is realized Dividend × EUR 100,000).

Diagram 1: Dow Jones EURO STOXX 50® Index Dividend Swap Rates – History



Source: Barclays Capital

Pricing of a Dow Jones EURO STOXX 50® Index Dividend Swap

The implied pricing of Dow Jones EURO STOXX 50® Index dividend swaps can be calculated by using Eurex Dow Jones EURO STOXX 50® Index Options prices.

From put/call parity for dividend paying stocks we know that:

$$S - PV(Div) + P = C + PV(Stk)$$

Where:
S = stock price
PV (Div) = present value of dividend payment
P = put price
C = call price
PV (Stk) = present value of strike price

Solving for PV (Div) gives:

$$PV\ (Div) = S + P - C - PV\ (Stk)$$

A Dow Jones EURO STOXX 50® Index dividend swap is a forward contract which represents an annual dividend payout to December each year. Therefore:

$$\text{Price of Dow Jones EURO STOXX 50® Index Dividend Swap} = PV\ (Div)\ (1+r)^{T}$$

Where ^{T} is the number of days to December divided by 360.

For example, on March 14, 2008 index dividend swaps for the Dow Jones EURO STOXX 50® Index dividend swaps were:

Year	Dow Jones EURO STOXX 50® Index Dividend Swap
2008	155.90
2009	146.10
2010	146.95
2011	147.95

Source: Barclays Capital

On the same day, Eurex Dow Jones EURO STOXX 50® Index Options prices were:

Maturity	Strike	Call or Put	Price
December 2008	3600	Call	290.60
December 2008	3600	Put	349.40

Source: Eurex

Underlying Dow Jones EURO STOXX 50® Index: 3566.59

The risk free rate to December 2008 (day count is actual days/360 that is 0.778) is 4.6 percent.

Solving for $PV\ (Div)_{2008}$ gives:

$$PV\ (Div)_{2008} = 3566.59 + 349.40 - 290.60 - 3600/(1.046)^{0.778} = 149.14$$

Which implies a Dow Jones EURO STOXX 50® Index dividend swap price for December 2008 of 154.48 that is $PV\ (Div)_{2008} \times (1.046)^{0.778}$ which is very close to the market quote of 155.9. While this approach generates an implied index dividend swap price using options, many firms and analysts provide a "bottom up" valuation of index dividend swaps.

Dividends as a Diversified Asset Class to EURIBOR, Bonds and Equities

Dividends, with the growth of dividend swaps, have become considered as an asset in their own right and as such have a number of properties:

- Less volatile than equities[5] – companies can be reluctant to cut dividends.
- Low correlation to traditional asset classes of bonds and equities (see below)
- Rise with inflation[6]

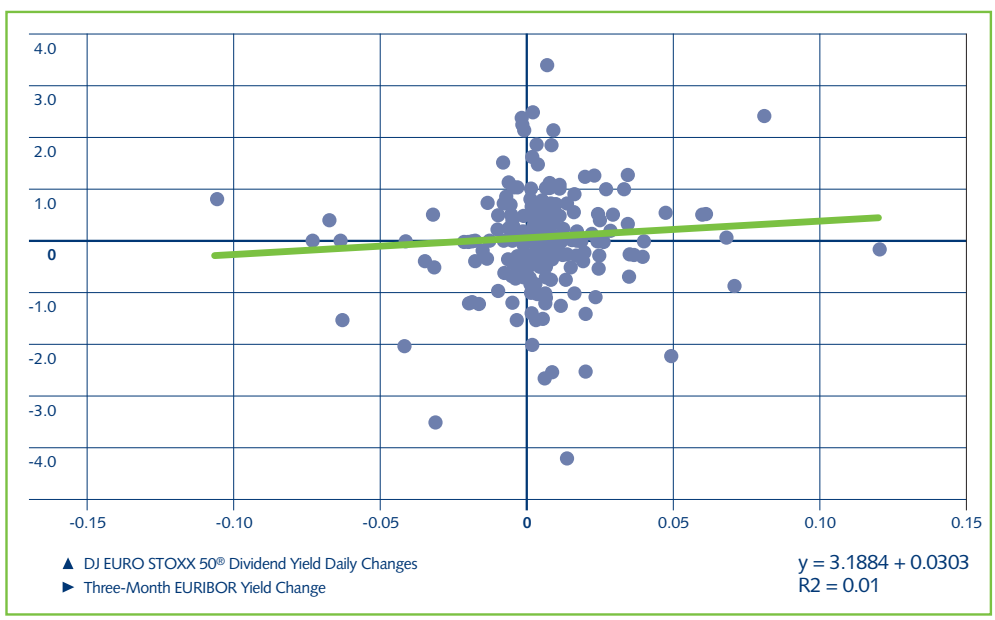
The attraction in dividends to the institutional investor lies in its low correlation to the traditional investment asset classes of bonds and equities. A study was carried out of the relationship between (daily) changes in the Dow Jones EURO STOXX 50® Index December 2008 dividend swap and the (daily) change in:

- Three-Month EURIBOR;
- Dow Jones EURO STOXX 50® Index; and a
- Generic ten-year European government bond yield

for the period from March 16, 2006 to March 14, 2008.

As the results in diagrams 2a, 2b and 2c below show, there would seem to be little relationship between dividends in terms of Dow Jones EURO STOXX 50® Index dividend swaps and EURIBOR, European equities and bonds. The R2[7] or "goodness of fit" statistic was 0.01 in all three cases showing that little correlation existed between the variables under investigation.

Diagram 2a: Relationship Between Dividends and EURIBOR



Data Source: Bloomberg and Eurex

5 A study by Barclays Capital in the S&P 500 Index and Dividends found that an investment in dividends is guaranteed to make money in five years while the study found that you are only guaranteed to make money in equities after thirteen years.

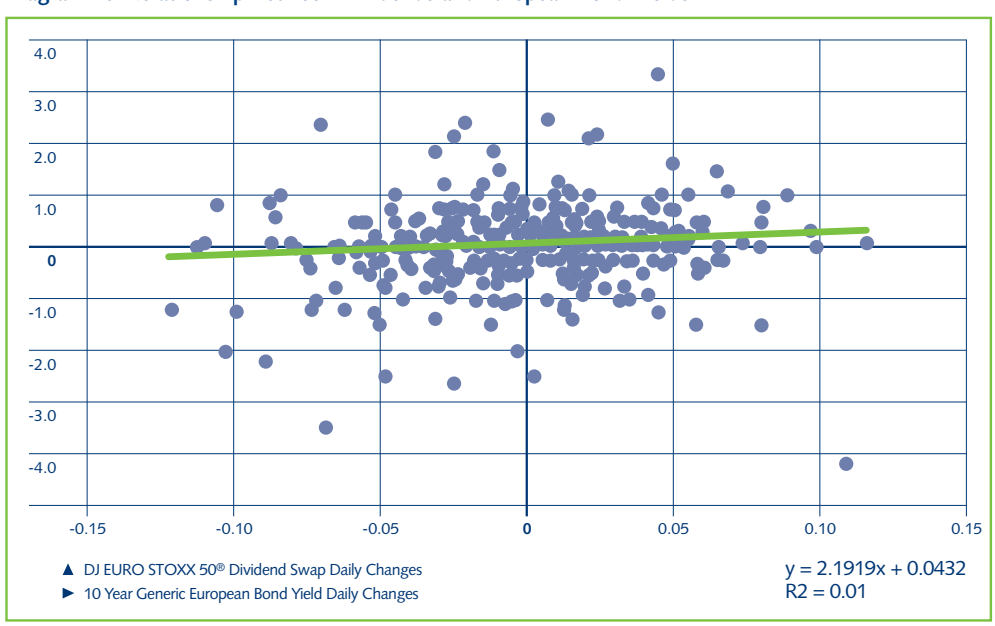
6 Another Barclays Capital study highlighted the correlation of dividends with inflation and therefore suggests another use of dividend swaps as a hedge against inflation.

7 R2 or "goodness of fit" statistic statistic measures the closeness of relationship between variables in an econometric linear regression analysis. Two variables are said to have a close statistical relationship if R2 is above 0.7. The value of R2 varies between 0 that is no correlation and 1 that is perfect correlation.

Diagram 2b: Relationship Between Dividends and Dow Jones EURO STOXX 50® Index

Data Source: Bloomberg and Eurex

Diagram 2c: Relationship Between Dividends and European Bond Yields

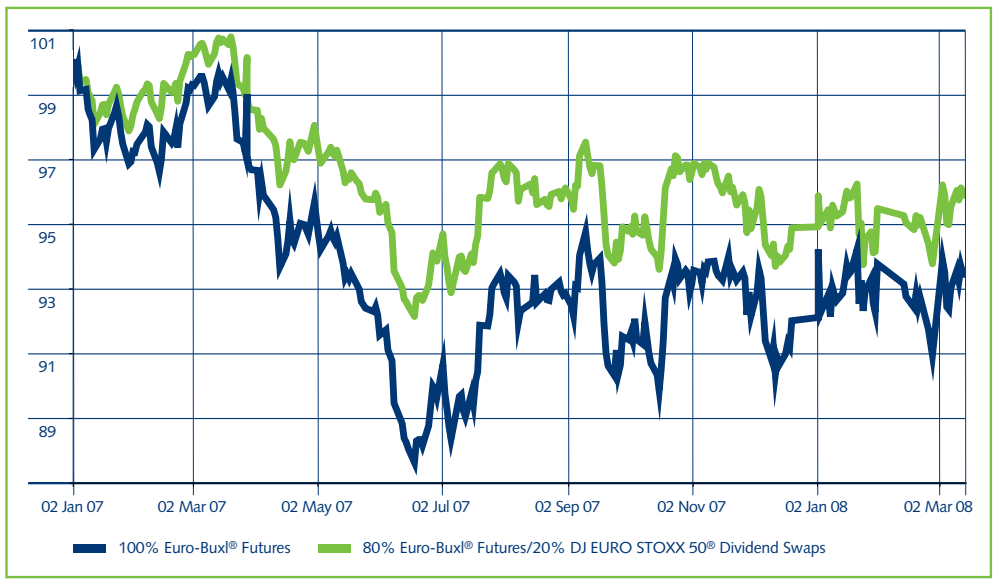


Data Source: Bloomberg and Eurex

The returns of a fixed income portfolio, replicated by a holding in Eurex Euro-Buxl® Futures – for example, a pension fund gaining cheap leveraged access to European bond "beta" to match long term liabilities[8] can be compared to holding a combined 80 percent Euro-Buxl® Futures/20 percent Dow Jones EURO STOXX 50® December 2008 dividend swap portfolio. (The combined 80%/20% portfolio is rebalanced weekly; both portfolios are indexed at 100 on January 4, 2007). The results are shown in diagram 3 below and clearly show the benefits of dividends as a diversified asset.

8 See B. Baldwin, "Using Exchange Traded Derivatives in Portable Alpha Investing", Pensions Week, December 2005 for use of Eurex exchange-traded derivative products in attaining cheap market beta exposure within a portable alpha investment portfolio.

Diagram 3: Benefits of Dividends as a Diversified Asset



Data Source: Barclays Capital and Eurex

Portfolio Overlay

The ability to buy and sell European dividends on exchange with the introduction of the Dow Jones EURO STOXX 50® Index Dividend Futures contract increases the possibilities to the fund manager in assisting changes in portfolio asset allocation efficiently and quickly whilst leaving the existing portfolio intact[9]. For example, consider the fund manager who has a EUR 100 million European government bond portfolio who has decided to switch 20 percent of his investment to European dividends. The European bond portfolio has duration of 7.5 years similar to the duration of the Eurex Euro-Bund Future cheapest to deliver bond, DBR 4.25% July 2017, of 7.14 years. The BPV (basis point value that is value of a 0.01 change in yield) of the fund managers' bond portfolio is therefore EUR 75,000[10]. The BPV of the Euro-Bund Future is 0.08214[11] or EUR 82.14 in monetary terms (the value of a 0.01 in price terms for a Euro-Bund Future is EUR 10).

The steps in a portfolio overlay strategy to switch part of an investment in European government bonds to European dividends are as follows:

1. Determine the number of Euro-Bund Futures to sell:

(EUR 75,000/82.14) × 0.20 ~ 183 Euro-Bund Futures contracts.

2. Determine the Euro-Bund/Dow Jones EURO STOXX 50® Index dividend ratio:

One method is to ratio the monetary value of an 0.01 change in yield of Euro-Bund Futures to the monetary value of an 0.01 change in implied dividend yield of the Dow Jones EURO STOXX 50® Index Dividend Futures.

The monetary value of an 0.01 change in yield of the Euro-Bund Futures is EUR 82.14.

9 See B. Baldwin, "Derivatives: Increasing the efficiency of Fund Management", Pensions World, December, 2004 for applications of exchange-traded derivatives in fund management.

10 BPV of a bond portfolio is: Duration × 0.0001 × Investment.

11 BPV of a Euro-Bund Future is BPVctd/PFctd where BPVctd is the basis point value of the cheapest to deliver bond and PFctd is the price factor of the cheapest to deliver bond.

With the December 2008 Dow Jones EURO STOXX 50® Index dividend swap at 155.9 implying an implied dividend yield of 4.37% (that is Dow Jones EURO STOXX 50® Index at 3566.59) an 0.01 change in dividend yield would imply a price change of 0.31 or EUR 31.0 in monetary value.

Therefore, this would imply a ratio of 1 Euro-Bund Future: 2.65 Dow Jones EURO STOXX 50® Index Dividend Futures.

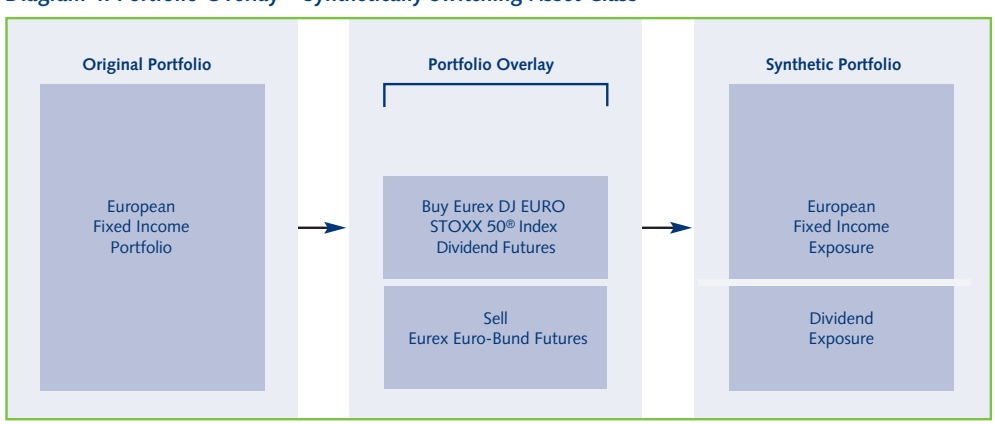
3. Calculate the number of Dow Jones EURO STOXX 50® Index Dividend Futures to buy:

Number of contracts to buy = (183) × (2.65) ~ 485 Dow Jones EURO STOXX 50® Index Dividend Futures.

Therefore, the fund manager would sell 183 Euro-Bund Futures and buy 485 Dow Jones EURO STOXX 50® Index Dividend Futures to synthetically switch 20 percent of his European government bond investment to a European dividend exposure whilst leaving his existing portfolio intact. When he considered the outperformance of European dividends to European government bonds had run its course he would unwind his futures portfolio overlay spread position and return to being fully invested in European government bonds.

Diagram 4 below graphically outlines the portfolio overlay strategy:

Diagram 4: Portfolio Overlay – Synthetically Switching Asset Class

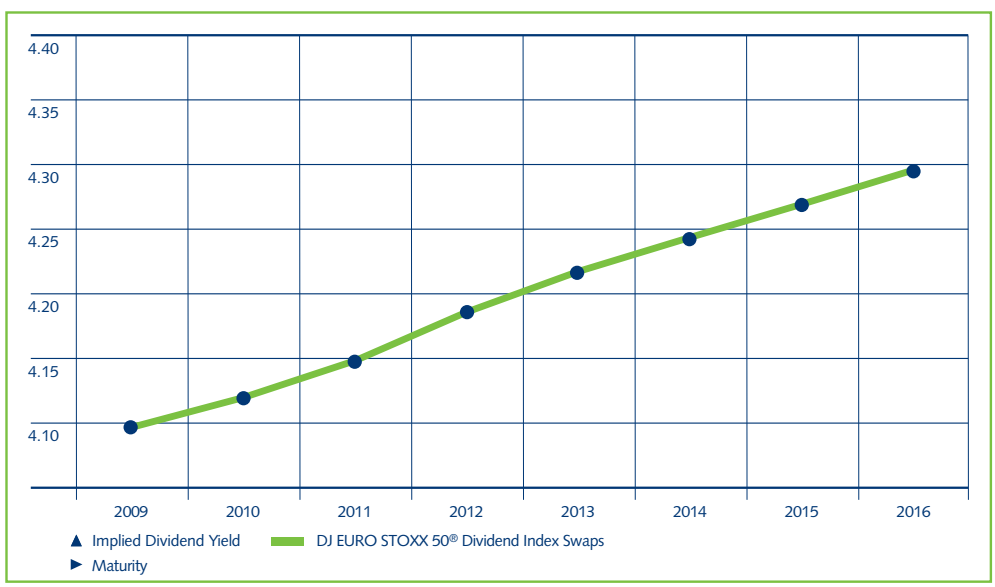


Applications

1. Relative Value – Implied Dividend Yield Spread Trading

The Dow Jones EURO STOXX 50® Index Dividend Futures contract offers a very cheap and leveraged way for trading relative value spread or barbell positions in the composite dividends of the EURO STOXX 50® Index. The Spread Margin requirement for the Dow Jones EURO STOXX 50® Index Dividend Futures is 25 percent of the initial margin requirement. As the futures price quotation is in terms of index points[12] then an implied dividend yield can be easily calculated. For example, on March 14, 2008, December 2009 Dow Jones EURO STOXX 50® Index dividend swaps were quoted at 146.1 index points with the Dow Jones EURO STOXX 50® Index at 3566.59 which generates an implied dividend yield of 4.096 percent. Diagram 5 below gives a snapshot on the dividend yield term structure implied by Dow Jones EURO STOXX 50® Index dividend swap prices on March 14, 2008. Certainly the introduction of exchange-traded index dividend futures facilitates the trading of dividend flattening and steepening spread trades amongst institutional investors and hedge funds alike. Market-implied dividends for a particular year are driven by dividend growth expectations and the perception of risk to dividends. As a result, implied levels will incorporate a "dividend risk premium" which is compounded with increasing maturity and which will cause the dividend term structure to flatten and provide a positive fundamental "carry" when buying longer dated dividends[13]. Investors can isolate exposure to a steepening of the dividend term structure by buying longer-dated dividends and selling shorter-dated dividends. Investors can profit from mispricings of the implied index dividends if they are able to forecast dividends on an index level with higher accuracy than the market[14]. Assuming stable dividend policies, growth in dividends and earnings should be closely related. However, there are additional considerations with regards to the propensity of companies to pay dividends and changes in the index composition over time.

Diagram 5: Dow Jones EURO STOXX 50® Implied Dividend Yield Term Structure (Date: March 14, 2008)



Data Source: Barclays Capital

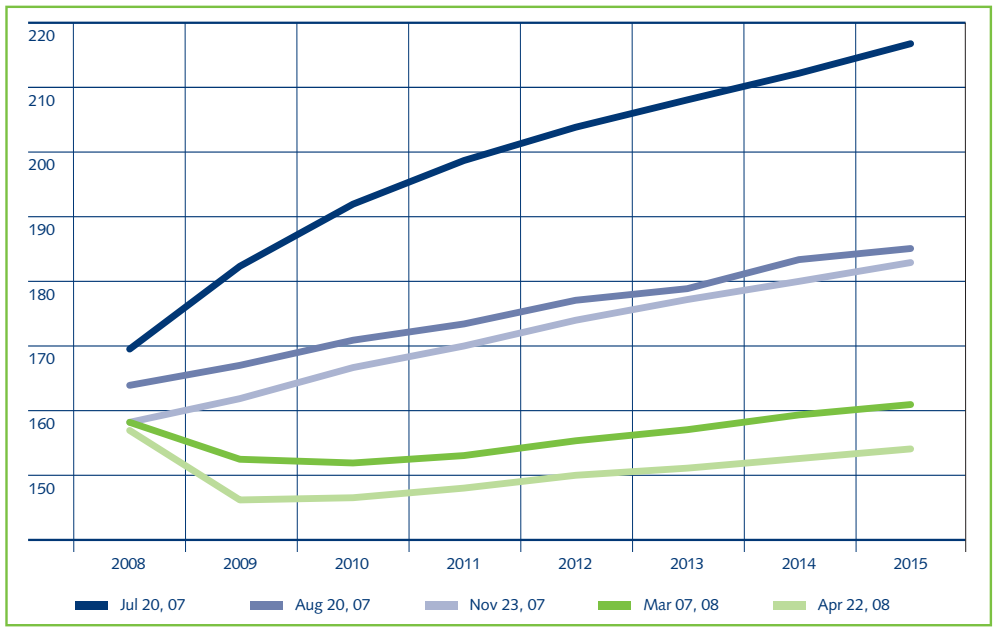
The volatility in the term structure of Dow Jones EURO STOXX 50® Index implied dividend yields and the opportunity to generate alpha is aptly outlined in a diagram in the JP Morgan paper, "Wholesale & IBs. Equity Derivatives – difficult environment ahead":

12 The calculation of dividends in index points will be, per individual constituent equal to: (gross ordinary cash dividend per share in the specified period) x (free float adjusted shares)/official index divisor. The official index divisor is that of the Dow Jones EURO STOXX 50® Index as calculated by STOXX Limited. The futures contract is based upon the STOXX calculations of constituent dividends of the Dow Jones EURO STOXX® Index. The calculation is performed on a daily basis so constituents paying multiple dividends will have the index points calculated on each ex-dividend date based on the free float adjusted shares and the official index divisor relevant on those dates.

13 See Manley & Mueller-Glissmann (2008).

14 See Manley & Mueller-Glissmann for details on how to forecast index dividends.

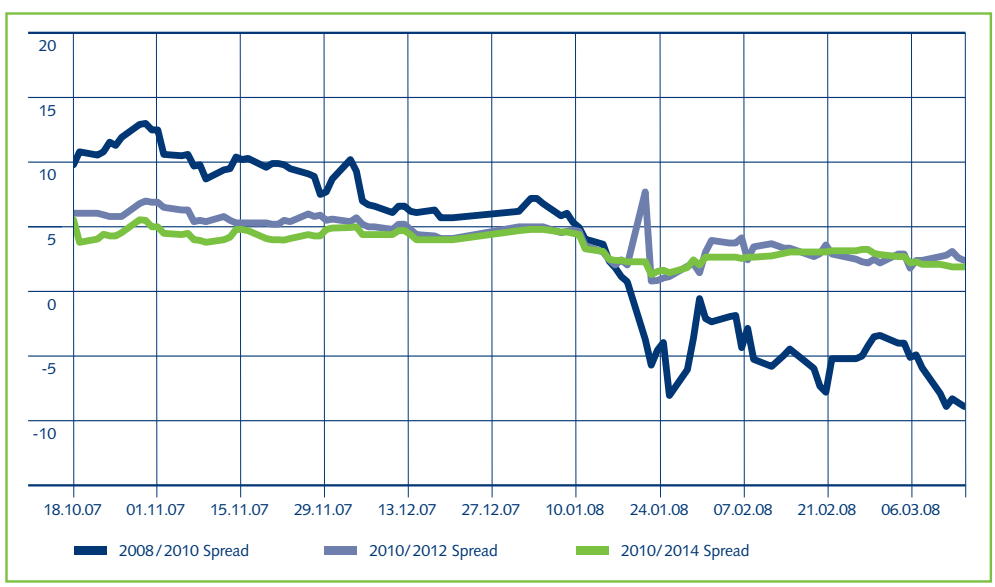
Diagram 6: Changes in Implied Dividend Term Structure – Dow Jones EURO STOXX 50® Index



Source: JP Morgan, "European Wholesale & IBs", May 2008

Diagram 7 below outlines the price history of several Dow Jones EURO STOXX 50® Index dividend swap spreads:

Diagram 7: Dow Jones EURO STOXX 50® Index Dividend Spreads



Data Source: Barclays Capital

2. Hedging the Dividend Element of European Equity Structured Products
Structured products based on the Dow Jones EURO STOXX 50® Index will normally give a retail investor upside in the index with a guarantee that the initial sum invested will be protected. Any return excludes any dividend payment. The product structurer will therefore have a long exposure to dividends[15]. This exposure can be hedged using Dow Jones EURO STOXX 50® Index Dividend Futures.

3. Maximizing Exposure to Share Price Appreciation – Dividend Stripping
A portfolio manager can synthetically sell the projected dividend stream of his European equity holding by selling Dow Jones EURO STOXX 50® Index Dividend Futures to buy more cash equities. He then sells more Dow Jones EURO STOXX 50® Index Dividend Futures on the anticipated dividend stream on the equities he has just purchased and so the procedure continues until the dividend element is completely eliminated. This exercise "strips out" the dividend income stream element of his equity investment thereby maximizing the exposure to share price appreciation.

4. Hedging and Trading European Dividend Exposure
A European equity fund manager worried that dividends will fall, can sell Dow Jones EURO STOXX 50® Index Dividend Futures to hedge his exposure. Convertible bond portfolio managers are natural users of dividend swaps to hedge their dividend exposure. Market Makers in Dow Jones EURO STOXX 50® Index Options can also use Dow Jones EURO STOXX 50® Index Dividend Futures to hedge their embedded dividend exposure. Similarly, the launch of the Dow Jones EURO STOXX 50® Index Dividend Futures allows the leveraged trading of European dividends on exchange without taking a position in shares and also gives the ability to trade European dividends against other European asset classes using Eurex benchmark equity and fixed income products.

The benefits to both banks and investors of the new index dividend contract are enhanced by the Eurex OTC Block Trade facility which links the OTC to the exchange-traded market in dividend swaps.

OTC Block Trade Facility

The Eurex OTC Block Trade facility ("BTF") is extended to Dow Jones EURO STOXX 50® Index Dividend Futures and promotes maximum liquidity and trading flexibility for a fund manager initiating portfolio overlay strategies across European asset classes. The BTF allows market participants, trading either for their own account or on behalf of customers, to enter off-exchange transactions in Eurex futures and options contracts and yet still have the transactions cleared by Eurex Clearing AG, the Eurex Clearing House – the minimum block trade limit for Dow Jones EURO STOXX 50® Index Dividend Futures, like that of Eurex Single Stock Futures contracts, is one contract[16].

[15] See Kian Abouhossein, JP Morgan, European Wholesale & IBs, May 2008, page 16, "Revenue risk from long dividends position".
[16] See **http://www.eurexchange.com/trading/wholesale/block_trades_en.html** for more details on the Eurex OTC Block Trade facility and minimum block trade limits for all Eurex contracts.

Conclusion

The introduction of the Dow Jones EURO STOXX 50® Index Dividend Futures further extends the options and possibilities to the institutional investor of trading European dividends as an asset class and increases the opportunities of generating alpha by initiating relative value dividend term structure transactions or trading dividends against other asset classes. Moreover, with the block trade limit for Dow Jones EURO STOXX 50® Index Dividend Futures being one contract it allows for maximum flexibility to the traditional fund manager and hedge fund manager alike of being able to trade off-exchange in this new product and still have the transaction cleared by the Clearing House substantially reducing counterparty risk. Activity in dividends as an asset class looks set to increase – the recent Greenwich Associates Survey on equity derivatives use in Europe showed that 19 percent of survey respondents used dividend swaps in 2007 compared to 16 percent of respondents in 2006. Also, there is a growing number of structured products and indexes related to dividends underlining the growing awareness of dividends as an asset class – Barclays Capital have recently launched a number of indexes to gain exposure to dividend streams and various structured products with related dividend pay-offs. The introduction of an exchange-traded dividend product with centralized clearing can only enhance this development and bring real benefits to institutional investors and banks in this new and exciting asset class.

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Appendix 1 – Dow Jones EURO STOXX 50® Index Dividend Futures Contract Specifications

Contract Standard

Contract	Product ID	Underlying
Dow Jones EURO STOXX 50® Index Dividend Futures	FEXD	Dow Jones EURO STOXX 50® DVP (Dividend Points)

Contract Value

EUR 100 per 1.0 index dividend points of the underlying.

Settlement

Contract is cash settled, all values payable on the first exchange day following the Final Settlement Day.

Price Quotation and Minimum Price Change

The Price Quotation is in points with one decimal place. The Minimum Price Change is 0.1 points.

Contract	Contract Value	Minimum Price Change	
		Points	Value
Dow Jones EURO STOXX 50® Index Dividend Futures	EUR 100	0.1	EUR 10

Contract Years

Seven annual contracts are to be available at any time. All contracts are based on the Dow Jones EURO STOXX 50® Index December cycle.

Last Trading Day and Final Settlement Day

Last Trading Day is the Final Settlement Day. Final Settlement Day is the third Friday of December of each maturity year if this is an exchange day; otherwise the exchange day immediately preceding that day. Close of trading in the maturing futures on the Last Trading Day is at:

Contract	Close of Trading
Dow Jones EURO STOXX 50® Index Dividend Futures	12:00 CET

Daily Settlement Price

Daily Settlement Price for the current maturity year is derived from the volume-weighted average of the prices of all transactions during the minute before 17:30 CET (reference point), provided that more than five trades transacted within this period.

Final Settlement Price

The Final Settlement Price is established by Eurex on the Final Settlement Day according to the following rules:

Contract	Product ID
Dow Jones EURO STOXX 50® Index Dividend Futures	Calculation of the Final Settlement Price is based upon the final value of the underlying Dow Jones EURO STOXX 50® DVP (Dividend Points), the Index Dividends as calculated by STOXX for that annual period. Final Settlement Price is the summation of the gross unadjusted dividends declared and paid in the contract period, on the individual constituents of the underlying Dow Jones EURO STOXX 50® Index, calculated in terms of index points. The contract period, for purposes of dividends declared and paid, will be from, but excluding, the 3rd Friday of December of the year preceding the maturity year if this is an exchange day; otherwise from and excluding the exchang day immediately preceding that day, up to and including the 3rd Friday of December of the maturity year if this is an exchange day; otherwise up to and including the exchange day immediately preceding that day. The gross ordinary dividends per share are the unadjusted cash dividends declared and paid on that individual equity constituent of the index. This amount excludes those elements of special dividends, extraordinary dividends and return of capital payments etc. where STOXX Limited makes adjustments to the underlying Dow Jones EURO STOXX 50® Index. Where STOXX has adjusted the Dow Jones EURO STOXX 50® Index for only part of a gross dividend, the unadjusted part shall be incorporated into the final settlement value of the Dividend Future.

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