Dividend Swaps and Dividend Futures: State of Play

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Introduction

This paper aggregates regulatory swap repository data for index dividend swaps to explore the magnitude and complexity of over-the-counter equity derivatives markets and their relation to listed futures markets. The index dividend market is interesting because it is a relatively new financial innovation, grew from an OTC innovation that allowed dealers to hedge a particular risk factor, and has become standardized enough that activity in some markets has largely migrated to a listed futures contract. Even more interesting, the listed product still co-exists with a dealer market in some countries, and the listed product does not exist at all in US markets (despite an active OTC market). Our data allows us to examine and contrast the activity and notional outstanding across multiple dimensions: listed and unlisted contracts, dealer/dealer versus dealer/end-user trade and positioning, and across multiple indexes around the globe.

The type of data utilized in this analysis was not available to regulators or market participants prior to the current reporting regime and has not been analyzed before. While individual participants knew their own transactions and may have had second hand knowledge of other transactions, there were no publicly available sources of OTC transaction data for these swaps. Presently, large participants in the swaps market must register with the CFTC and report all swap transactions to a Swap Data Repository (SDR), which regulators can access.

The repositories consequently offer an unprecedented, transaction-level view of derivatives markets. The data is not just time and sales type information; it is data in the same spirit as the CFTC's Large Trader Reporting System data, which provides position-level information on participants. The aggregation of derivatives transaction data into SDRs provides a powerful tool to regulators and market participants. Confidential information from individual participants remains confidential, but regulators can present the aggregated SDR data to the public in order to promote sound risk management while preserving the liquidity and price discovery role of derivatives markets.

Given the central role of dividends in asset pricing, indicative dividend swap prices might be a powerful source of information for researchers, but the OTC nature of the market might cloud some of the conclusions. Van Binsbergen *et al.* (2013), for example, examine a rich set of indicative dividend swap prices, but they cannot provide context on the actual transactions that occur in the markets. This study fills that gap by quantifying the activity and participation in OTC dividend swap markets with regulatory reporting data.

The analysis in this paper focuses on market-facing index dividend swaps; we examine the swaps outstanding as of March 2014 and new swaps initiated during the first quarter of 2014. Our data covers transactions by over a dozen different dealers transacting in a dozen indexes across the globe. We augment this with data on listed index dividend futures on various indexes.

With respect to the size of the market, we find USD 2.5 billion in notional outstanding of market-facing OTC dividend swaps between dealers and end-users, with another USD 4.2 billion outstanding between dealers. The majority of the dealer/dealer swaps are in the S&P 500 (which has no listed futures contract), whereas the majority of transactions for non-US underlyings are between dealers and end-users. Very standardized OTC swaps and listed futures co-exist for several major indexes, but only the listed EURO STOXX 50 future clearly dominates the OTC market, with nearly 5 times the notional outstanding as the OTC swaps. Other markets feature little activity in either OTC or listed contracts. We find virtually no dealer/trading trading in the EURO STOXX market, where dealers can readily source liquidity in the listed futures.

Our examination of OTC trading activity suggests to us that expecting one end-user trade per week for EURO STOXX 50 and one end-user trade every few weeks for the S&P 500 is a reasonable rule of thumb. Other indexes feature less active trading. The OTC market is more geared to longer-term investment themes than quick turn transactions. We find evidence consistent with dealers being net short dividend swaps to end-users (particularly leveraged funds), irrespective of the index examined. Risk transfer appears largest for the EURO STOXX 50, with dealers net short nearly one billion US dollars notional to end-users.

Institutional Background

A dividend swap is a fixed/floating swap, where the floating leg cashflow is paid based on the dividends paid out on an index in a given time period, usually a year. To be more specific, cash flows associated with dividend swaps are computed according to the equation

$D_t = \sum_{i=1}^{N} d_i \frac{shares_i}{Divisor_t}$, where D_t is the number of dividend points paid by the index on date t, d_i is the cash dividend per share paid by stock *i* on date *t*, shares is the number of shares of stock *i* in the index, and $Divisor_t$ is the divisor used to compute the underlying index level. This weighting scheme therefore weights the dividend paid by a stock with the same weight the stock receives in the index. Straightforward variations on this equation are used when dividends are in different currencies, for example, or if distinctions such as declared dividends versus dividends less withholding tax are contemplated. The dividend points on the index are then summed over the observation period of the swap, which is usually a single calendar year.[1] (Special dividends are excluded.) For example, an index that is constant at 100 over the next year, with a 2% dividend yield, would pay 2 dividend points over that year.

The ex-post cashflow for the fixed leg of the swap is a contractually specified amount of dividend points multiplied by the notional amount, often called the number of index baskets. The cashflow to dividend receivers is the ex-post amount of dividend points actually paid on the index, multiplied by the notional amount (the floating leg of the swap). Hence, a market participant might refer to, for example, buying the 2017 dividends on an index (long the swap/long the floating leg) or selling the 2015 dividends on the index (short the swap/short the floating leg).

The initial growth in dividend derivatives mirrored the growth in traditional agricultural commodity derivatives. The basic story is one where hedgers generate substantial open interest in order to hedge their risk. This activity leads to liquidity in the market, which draws speculators who willingly take on the risk, leading to further liquidity gains. The bespoke product gains a large enough market and migrates to exchanges from the bilaterally negotiated space. Grain Futures Administration economists documented, after federal regulations mandated that open interest data be published, that the major driver for much

[1] EURO STOXX 50 dividend swaps are usually constructed from the listed December expiry to the following December futures/options expiry for convenience. Nikkei swaps often have a valuation date at the end of March to reflect the Japanese fiscal year.

futures contract activity was open interest from hedgers. Hoffman (1930) and Irwin (1935), for example, documented this fact for the corn and wheat futures markets, respectively. Peck (1979) extended the analysis to the post-World War II era and came to the same conclusion.

The impetus for the innovation in dividend swaps was the sale of structured equity products by sell-side institutions in the 1990s and early 2000s. The products were especially popular in Europe but also sold well in the US and elsewhere. These products offered equity-linked returns to the purchasers, but the product terminal values were usually a function of the price changes (not total returns) in the underlying basket of equities. If a bank hedged with a basket of equities, they were left with exposure to dividends, which were unknown and effectively tied up capital and risk budget. At the same time, the products embedded long-dated options, whose fair value and risk were strongly influenced by the forward price (equivalently, by the dividend assumptions). Getting the forward price wrong on an illiquid part of the curve posed a significant pricing risk, and getting the joint dynamics of stock prices and dividends wrong posed a significant challenge for ongoing risk management.

Célérier and Vallée (2013) examine a sample of 55,000 products issued in Europe for the period 2002-2008 and find that the average product maturity was 4.2 years. The average has declined in recent years as income generating products have become more popular relative to capital guaranteed products. In the 2002-2004 period, for example, the average maturity for the products in the sample was 5.0 years. It is clear that, by selling options on equities and indexes with 5 year maturities, the dividend/forward pricing assumptions made by trading desks took on a highly significant role due to the long-dated nature of the options. The structured product maturities far outstripped those of the liquid listed options and futures in the European markets.

The retail structured product market in the US and Europe experienced similar growth patterns during the early 2000s, growing in the range of 25-30% per year, and equities dominated the set of underlyings. However, products issued to European retail clients benefitted from the greater penetration and acceptance of the products. For example, Pearson and Henderson (2011) find about USD 2.5 billion of products issued in the US in 1999, whereas Célérier and Vallée (2013) document approximately Euro 20 billion of retail structured products issued in Europe in 1999. The European market was more than 10 times the size of the US market over the formative period of dividend swaps. Despite similar growth rates, European issuance totaled Euro 115 billion and US issuance totaled just USD 9.7 billion by 2005.

Japan also exhibits strong demand from retail investors for structured equity products, and the subsequent hedging produces imbalances that manifest themselves in prices. Japanese investors have strongly favored income generating products that sometimes feature contingent guarantees on principal; the products have generally left dealers long dividends. The Tokyo head of equity derivatives trading at one bank summarized the impact on pricing as follows: “Investors are selling Nikkei put options to brokers and because there are US$ 25 billion of the structured bonds in the market, the impact is like that of a big fish in a small pond – and consequently driving down derivatives prices in the dividends market.”[2]

The banks reduced some of the dividend exposure by selling dividend swaps to buy-side institutions. The product was standardized and the market grew larger, with Eurex introducing a listed futures product in 2008. The head of a European delta one trading group of a major broker-dealer described, in 2010, the

[2] “Hedging Drives Demand for Japan Dividend Futures,” Viren Vaghela, *Asia Risk*, 5 September 2012

evolution of the activity following the introduction of listed futures by noting that “a large majority” of the trades then took place in the listed market. He continued by stating that “It began initially and mainly with hedge funds, fast money and relatively sophisticated clients trading dividend futures. Then, when futures open interest grew, we began to see some more traditional clients and even some retail types.” (Quoted in Aitken (2010)) Other exchanges around the globe later introduced index and single stock dividend futures to more modest success.

There are currently no dividend futures listed in the U.S. In March 2009, the Chicago Board Options Exchange (CBOE) filed a proposed rule change with the Securities and Exchange Commission (SEC) to list and trade cash-settled options on the S&P 500 Dividend Index, and the strike prices were to be set in relation to a CBOE futures contract on the S&P 500 Dividend Index. The CBOE indicated in a follow-up that it had anticipated listing such futures around the same time as the launch of the options, but the futures did not currently exist. In response to a comment by the Commodity Futures Trading Commission (CFTC), the exchange amended the filing to remove all references to such a futures contract. CBOE launched the dividend options in March 2010 after receiving approval from the SEC to offer trading in them.[3] The options did not gain traction and have not been active.

Typical Activity and Notional Outstanding

Exhibit 1 displays the major dividend futures listed on exchanges as of March 2014. The data are displayed in ascending order of first listing date (shown in the middle column). The table shows the notional amount outstanding for each of the dividend futures contracts, alongside the notional amount outstanding for the associated equity index future on that exchange. For example, the table shows USD 9.4 billion of EURO STOXX 50 dividend futures and USD 114 billion of EURO STOXX 50 futures for the end of Q1 2014. The Nikkei 225 and FTSE 100 dividend futures are the next most important by this measure (USD 1.5 billion and USD 1.2 billion notional open interest, respectively). Other indexes show at best modest notional amounts outstanding.

Of course, we can combine the listed market statistics with the OTC market statistics to get the full picture of activity. We being by examining the transactions in OTC new swaps and move on to examine the total notional amount outstanding. In both analyses, we focus on market-facing swaps. That is, we remove transactions known to be between two affiliated firms and focus on transactions between a dealer and an end-user (e.g., a pension fund, hedge fund, insurance company, etc.) or between a dealer and another dealer. After presenting some of the headline results in this section, we describe the construction of our data in much more granular detail in the next section.

Exhibit 2 displays aggregated SDR data for the major indexes. The table shows statistics for swaps initiated during the first quarter of 2014, broken out by activity between swap dealers (labeled “SD/SD” in the table) and activity between dealers and end-users (labeled “SD/non-SD”). For the purposes of this paper, we identify dealers by the name associated with the Legal Entity Identifier attribute for a given

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[3] See Securities Exchange Act Release No. 61136 (December 10, 2009), 74 FR 66711(December 16, 2009) and references therein. See also the CBOE press release of February 17, 2010, “CBOE TO LAUNCH S&P 500 DIVIDEND INDEX OPTIONS MARCH 5” and “Dividend Futures Delayed,” *Derivatives Week*, May 3, 2010, p.5

swap. This identification is broader than the technical "Swap Dealer" registration status with the CFTC and should not be confused with that term.

As one might suspect from the data in Exhibit 1, the EURO STOXX 50 is one of the most actively traded indexes in the sample, with USD 181 million in new swaps initiated. Perhaps surprisingly, the S&P 500 is the most active, with USD 222 million initiated. The contrast between the characters of transactions for the two indexes is striking to us, however. While virtually all of the activity in EUROSTOXX OTC dividend swaps is between dealers and end-users, the S&P 500 activity is almost all between dealers. This observation holds true whether we look at the notional value of the trades or the count of the trades. The Nikkei is a distant third for activity during our sample.

The first quarter of 2014 contained approximately 60 trading days, and we observe 47 EURO STOXX 50 transactions with end-users and 10 S&P 500 transactions with end-users. Trades are not all independent of each other, for example, because two related legal entities might trade with a dealer on a given date. Or, a participant might go long dividends for a given year and short dividends in a different year; such a calendar spread would show up as two transactions here. As an indication of the market concentration, consider that we observe EURO STOXX 50 trades on 12 days in the sample, and S&P trades on just 6 days. The results suggest to us that expecting one end-user trade per week for EURO STOXX 50 and one end-user trade every few weeks for the S&P 500 is a reasonable rule of thumb.

The table displays the average tenor of the new swaps, although it is useful to unpack this result. The SPX trades, for example, show an average tenor of 3.4 years from the Jan-March 2014 observation period. Virtually all the dividend swaps reference dividends for a single calendar year, so a swap observed at the end of Q1 2014 with a tenor of 2.75 years would reference dividends paid over the year 2016. With this in mind, it is easy to understand that the majority of the SPX trades were for 2015 and 2016 dividends (15 trades and 16 trades, respectively). Similarly, the trades in other indexes were almost always for 2015 dividends and had an average tenor around 1.6 years. Hence, the typical swap traded in the entire market had a tenor around 2.5 years.

Exhibit 3 displays summary statistics for the major indexes as of the end of Q1 2014, and the results are based on the outstanding contracts at that time. Our sample based on the SDR data shows USD 6.5 billion in dividend swap notional, with roughly half of that value associated with transactions in the S&P 500 and nearly a third of the value associated with transactions in the EURO STOXX. Consistent with the transactions data in Exhibit 2, the breakout between dealer/dealer and dealer/end-user transactions is revealing. Approximately 80% of the S&P 500 notional is between dealers, whereas about 40% of EURO STOXX notional is between dealers. The tilt towards end-users is even more pronounced when measured by transaction count, consistent with more, smaller end-user transactions in EURO STOXX transactions. As with the EURO STOXX, the split between dealer/dealer swaps and dealer/end-user swaps for the Nikkei is tilted more towards end-user trades. The split for the less active FTSE 100 market is much more like the S&P 500, with two-thirds or more of the notional/trades between dealers.

As noted before, the EURO STOXX, Nikkei, and FTSE have futures markets that dealers can source for liquidity, but the S&P 500 does not. Based on the description above, it seems evident to us that the EURO STOXX and the Nikkei are viable liquidity sources for dealers, but the FTSE future is less viable, causing swap market activity to resemble that of the S&P 500 market.

The table in Exhibit 3 shows that the average tenor for S&P swaps is about 5 years, meaning that, when currently outstanding trades were put on, the reference dividends were to be paid on average, starting 4 years after the trade date. Data for the other indexes show a tenor of similar magnitude. Our data also provide information on the current distribution of notional value outstanding by dividend year (as of the end of March 2014). For the S&P 500, we find approximately 90% of the outstanding transactions are for 2014 through 2018 dividends, and over half are for dividends paid in 2016 or earlier. Other indexes display this concentration, whether represented by transaction counts or by notional amounts outstanding; the vast majority of outstanding transactions expire in 2-3 years.

Finally, Exhibit 3 also gives a measure of the concentration of dealers within the individual index products and across all of the products. The market is clearly concentrated, as the top 5 dealers have virtually of the open commitments with end-users. In the individual indexes, the share of the top 5 is easily 85% or much more. However, the share of the top 5 across all indexes is somewhat lower at 82%, highlighting the fact that some dealers capture more share in some markets than others, but the identities of those top 5 dealers are not identical in every market.

We continue to explore the distribution of notional value in Exhibit 4, which displays the aggregate data by dividend reference year. The coexistence of OTC and listed dividend instruments is interesting, and the chart breaks out OTC and listed venues for the EURO STOXX 50 and Nikkei products. The chart highlights the relative size of the EURO STOXX listed and OTC venues, with about USD 5 billion in notional outstanding for 2014 and 2015 dividends for the futures but USD 1.7 billion for OTC. In both spaces, the amounts outstanding fall off quickly as the maturity is lengthened, but the falloff is much less pronounced in the listed market. Indeed, we see a small amount of notional outstanding in the 2022 and 2023 futures, but none for the OTC product. The Nikkei data presents a similar pattern, with a somewhat higher value for the listed market across the term structure. A similar comparison for the FTSE OTC and listed market (not shown) is consistent with the conclusion drawn above that activity/liquidity in the FTSE dividend swap and futures markets is quite spotty. While listed notional is somewhat higher than OTC notional, very little is outstanding in either and it is concentrated in the first few maturities.

Comparison with Existing Estimates of Market Size

We next compare the values in our dataset with the values reported by ISDA in a recent survey (ISDA, 2014); the ISDA survey provides the only publicly available data of which we are aware on the size and breakout of the dividend swap market. The results of the ISDA survey are presented in a single table showing the notional value and transaction count of outstanding index dividend swaps as reported by G14 and non-G14 dealers at the end of 2013. Unfortunately, the ISDA survey provides no details on the construction of their data.

Nonetheless, we are able to replicate the qualitative results of the ISDA survey; we conclude that the ISDA survey includes transactions between affiliates (which we exclude in our analysis) and probably does not adjust for potential double counting of dealer/dealer transactions. We conclude that the ISDA results broadly represent the same underlying universe of transactions that the SDR data represents, although the headline numbers for ISDA's results are much larger than our headline numbers due to ISDA's methodology.

In order to be provide a detailed comparison of the two datasets, we will now much more explicit about the data that is to be reported to SDRs, and the filtering of the raw SDR data used in this study. We first consider the data to be reported to SDRs.

CFTC regulations require the largest participants in swaps markets to register with the CFTC and to report all swap transactions to an SDR. By the end of March 2014, 105 Swap Dealers and Major Swap Participants had been provisionally registered with the Commission. These registrants represent a significant global presence and we expect them to represent a very large fraction of total OTC activity, although the exact quantification is beyond the scope of this study.

Swaps reported to an SDR include transactions between affiliated entities, but we exclude these swaps when reporting the summary statistics. For example, if Dealer A – New York reports a swap with Dealer A – London, we observe it in the raw data but exclude it in our analysis. Broadly speaking, we often observe swap trades between an end-user and a dealer (say, at Branch A), and a nearly simultaneous transaction between the dealer (at Branch A) and an affiliate of the dealer (e.g., Branch B) that offsets the dealer's original transaction. Our focus is on market-facing swaps, and we consider transactions between two affiliated entities non-market-facing for the purposes of this study. We also filter out obvious transcription errors (e.g., implausibly large notional values) and duplicate records.

Keeping this filter in mind is important when comparing our aggregate data with the ISDA data. ISDA reports a notional value of USD 19.7 billion for index dividend swaps as of the end of calendar year 2013, with a count of 4,650 swaps. This breaks out into USD 10.1 billion of US and 8.0 billion of European swaps, with the remainder in Asia. Recall from Exhibit 3 that we examine only 1,500 or so swaps with a notional value of USD 6.5 billion. While the two datasets are not quite aligned in time, we would expect relatively explainable factors to rationalize the large variation between the two datasets.

We first tested if our removal of affiliate transactions can account for the discrepancies. We conclude this filter is not responsible for the difference in the two datasets. Our raw dataset including affiliate transactions has approximately 2,800 swap records, which we filtered down to 1,534. The notional size of the raw data is USD 13.4 billion (this aggregate includes data which we filtered out prior to analysis and is not completely clean). It still underestimates the ISDA data by 1800 swaps and USD 6.2 billion.

Next, we tested if the ISDA survey's adjustment for double-counting can explain the discrepancies. If a survey of dealers represents N actual transactions, and a vast majority of trades are between surveyed dealers, the unadjusted count will be closer to $2N$ than to N. Similarly, the notional value outstanding will also be nearly double if both sides of most trades report the transactions. Our test was to expand our raw dataset, which reflects one swap record per transaction, to mimic a dataset with double reporting of the transactions with dealers on both sides. We duplicated records that had a dealer on both sides and added them to the raw dataset.

We now find about 4,900 swaps with a notional value of USD 22.4 billion in this dataset, roughly matching the ISDA headline figures. Because transactions are not all dealer/dealer, the numbers are not doubled from the previous analysis, but they are close to two times as high. When we break out the US swaps and European swaps by dealer legal location, we find about USD 10 billion in US swaps, which matches the ISDA figure. For European swaps, we find a notional value of USD 13 billion, which is larger than the ISDA figure of USD 8 billion. Based on the analysis, we conclude that the ISDA survey includes swaps between affiliates, and it likely does not adjust for double-counting of reported trades.

For the purposes of this paper, we conclude that the regulatory data on dividend swaps is quite comparable to the data analyzed by ISDA, and the data appears quite comprehensive. Because regulators have access to highly granular (but confidential) data, however, we can perform analyses that are far more revealing than aggregated survey data. For example, we next turn to an examination of the net positions by market participant types in the dividend swap market.

Net Positioning by Dealers and Non-Dealers

Exhibit 5 effectively breaks out the net outstanding positions of market participants between the buy-side and the sell-side. We have manually associated counterparties for the swaps with categories similar to the categories used in the CFTC's Commitments of Traders report. We create a category for dealers, one for "real money" asset managers, and one for leveraged funds. For the EURO STOXX, we see strong evidence supporting the widespread belief that the market consists of dealers offsetting dividend risk by selling dividend swaps to the buy-side. We find that the dealers are short about USD 900 million in EURO STOXX dividends, and the buy-side is correspondingly long.

We did not have strong prior beliefs on what the positioning should look like for the S&P 500. We find much smaller net positions than in the EURO STOXX market; dealers are slightly short (less than USD 100 million) and asset managers and leveraged funds have net positions on different sides. Obviously, the aggregated net position of real money funds and leveraged funds add up to about USD 100 million net long to offset the short dealer position. The Nikkei data suggest a similar story to the other indexes: dealers are somewhat short dividend swaps (around USD 300 million) and non-dealers are correspondingly net long. Aggregated data for all other indexes suggest the same net short dealer position offset against the net long buy-side positioning.

Whereas Exhibit 5 provides detail on positioning within a given index market, Exhibit 6 provides information on the positions of non-dealers across markets. It shows that, while participants tend to concentrate in a single index at a point in time, some participants do hold positions in more than one market. In each row, the matrix displays the number of counterparties with trades in each of the most liquid indexes, and it also displays the number of those counterparties with positions in the other indexes. For example, row one of the table indicates that 21 non-dealers had S&P 500 dividend swaps outstanding; of those 21 counterparties, four also show positions in the EURO Stoxx 50, and nine show positions in the Nikkei 225.

We conclude that the participants in these markets are not completely segregated with respect to the geographies traded, but it is certainly not the case that every participant has positions in all markets at a given point in time. With respect to stability concerns, the numbers do not suggest a strong reason to worry that a disruption in a single index would necessarily be transmitted to all other indexes across the globe. Even if non-dealer participants in a given market began rapidly liquidating all positions, this would not necessarily mean that other indexes would be sharply impacted by such a “fire sale”.[4]

We caution the reader not to infer more than is warranted regarding the precise numbers in the table, however. First, the table shows a snapshot at a point in time; while we find it to be a representative point, it would not reveal if participants rotate their positions across various markets based on their relative attractiveness. Also, we note that, due to privacy restrictions, not all counterparties are identified separately. In the 199 open swaps for the EURO STOXX 50, for example, 11 of them are reported by one dealer as being with an “Undisclosed Counterparty.” The dealer also reports 6 of the 155 S&P 500 open swaps with “Undisclosed Counterparty.” Our tabulation of the data counts this “Undisclosed Counterparty” as one participant in Exhibit 6, although it could theoretically be up to 11 of them, with from 0 to 6 of them also holding S&P 500 positions. There is no way to disentangle this further here. Third, the definition of counterparty in this table is generally by LEI or equivalent indicator; because multiple LEIs might be associated with a parent or connected entities (for subsidiaries or for different funds, for example), the same “firm” might show up more than once when the data is presented in this fashion. On the other hand, the differentiation by LEI means that different funds (with different investors, leverage targets, and investment mandates) are not lumped together.

Relation of Swap Pricing to Transaction Characteristics

In this section, we estimate regressions in order to understand how dividend swap pricing is related to the characteristics of the transaction. We restrict our attention to the S&P 500 and the EURO STOXX 50 due to the small number of transactions in most indexes. The regression analysis is similar in structure to that of Fleming and Sporn (2013). After controlling for the trade size and shape of the term structure, we find that the fixed price paid in a trade involving a non-dealer is statistically significantly lower than the price paid in an otherwise equivalent trade. To the extent that non-dealers tend to be paying fixed prices and receiving floating, the model is reflecting a lower fixed price paid by non-dealers.

Exhibit 7 provides details on the regressions. The dependent variable is the fixed price of the swaps and independent variables are notional value of the swap denominated in millions USD, notional value squared, tenor of the swap in years, and an indicator whether the transaction involves a non-swap dealer (non-SD). For the S&P 500, we find that the tenor and non-SD variables are significant at the 1 percent level. The positive coefficient on the tenor variable indicates that long-dated swaps had higher fixed prices in this sample (i.e., the term structure was upward sloping). The significantly negative coefficient on the non-SD indicator suggests that, after controlling for other effects, we can isolate a small “discount” received by buy-side firms. The lack of significance for the notional value variables suggests that there is little price variation due to trade size for observed trades.

We interpret the results as supportive of the institutional structure story described earlier in the paper: dealers utilize dividend swaps to offload dividend risk to buy-side clients. Buy-side clients might get attractive prices to buy if a dealer comes to them with an axe to sell dividends (an inventory imbalance the dealer wants to reduce). Note that the regression includes both the transactions where the buy-side

[4] While dividend swaps did experience a massive sell-off in 2008, this did not appear to reflect idiosyncratic dumping of positions generating a contagion of position liquidation; rather, a variety of factors led to the sell-off.

entities pay fixed and transactions where the buy-side entities receive fixed. The result is particularly strong because we are not conditioning only on trades where the buy-side firm is paying fixed. If buy-side firms were consistently on both sides of the trades with dealers, it is unlikely that we would find this result: the coefficient on non-dealers would mix any "good deal" effect by dividend buyers with the lack of a "good deal" by dividend payers. The significant coefficient highlights the imbalanced nature of this OTC market, on average.

The extremely high adjusted R-squared (> 99%) for the S&P 500 regression suggests further analysis is necessary. Exhibit 8 displays a plot of tenor and fixed price of the S&P dividend swaps over the three month sample; it is obvious that the vast majority of the explained variation is due to the term structure variable. The S&P dividend term structure was virtually static as far as our data is concerned. Nonetheless, we are still able to isolate a significant impact of the non-SD variable after controlling for the tenor effect.

For the EURO STOXX 50, all of the explanatory variables are significant at varying significance levels. Similar to the S&P 500 OTC market, the coefficient on the tenor variable is significant and positive, but it does not dominate the regression the way it did for the S&P 500 (the regression's adjusted R-squared is 6.5%). In the EURO STOXX 50 regression, we also find some evidence that the fixed price of the swap increases with notional value of the swap until it reaches an infliction point and then decreases. The coefficients on notional value and notional value squared are both significant at 5 and 10 percent levels respectively. We view this result as interesting, but we are aware that the results might be an artifact of our small sample size. The most significant coefficient is the one associated with the indicator that a non-dealer is a party to the trade: the coefficient suggests that those trades occurred at prices 15 dividend points below an equivalent trade with a dealer.[5]

In unreported robustness tests, we have verified that the OTC pricing for EURO STOXX 50 dividend swaps is in some cases far from the equivalent dividend futures price. For example, we obtain similar results to the ones reported above if we regress the difference between the fixed price of the swap and the equivalent futures price on the non-dealer indicator. We believe this is a key clue into the co-existence of the OTC and listed futures market. Some trades in the EURO STOXX 50 OTC dividend market might represent opportunistic risk transfer between dealers and buy-side firms, and this might be reflected in the pricing discrepancies between the futures market and the OTC market.

Conclusion

One of the main strengths of bilaterally negotiated, over-the-counter derivatives – the flexibility and the bespoke character – is one of their biggest weaknesses. Asset managers are reluctant to trade products with uncertain liquidity and opaque pricing. Trade in liquid, observable, and standardized instruments is easier to justify to boards and to investors; gauging and managing risk in opaque markets can be difficult. In support of the public interest, the Commodity Futures Trading Commission (CFTC) and its predecessor agencies have been providing transparency into derivatives markets since the 1920s. This transparency has been a crucial element in promoting stability of listed derivatives markets.

[5] We attempted to estimate more complicated regressions in order to elaborate on our results, but our sample sizes are too small in this thinly traded market.

In this paper, we harness the unprecedented, transaction- and position-level view of OTC derivatives markets in Swap Data Repository (SDR) records to provide transparency on the relations among OTC index dividend swaps and listed dividend futures. We provide context on the actual trade and the participants engaged in the market for stripped dividends, which is relevant given the research on pricing data in this market. Is the market active? Is it liquid? Who participates, and what dynamics drive the participation? Van Binsbergen *et al.* (2012) and Van Binsbergen *et al.* (2013), for example, examine option implied dividends and indicative dividend swap prices, but the OTC nature of the swap market leaves the reader unable to connect the prices with much quantitative information on the actual activity in the markets. This study fills that gap by quantifying the activity and participation in OTC dividend swap markets with regulatory reporting data.

With respect to the size of the market, we find USD 2.5 billion in notional outstanding of market-facing OTC dividend swaps between dealers and end-users, with another USD 4.2 billion outstanding between dealers. The majority of the dealer/dealer swaps are in the S&P 500 (which has no listed futures contract), whereas the majority of transactions for non-US underlyings are between dealers and end-users. In markets such as the EURO STOXX, where a mature futures market exists, dealers appear to source liquidity in the futures and rarely use the interdealer market.

Our examination of OTC trading activity suggests to us that expecting one end-user trade per week for EURO STOXX 50 and one end-user trade every few weeks for the S&P 500 is a reasonable rule of thumb. Other indexes feature less active trading. The OTC market is more geared to longer-term investment themes than quick turn transactions. We find evidence consistent with dealers being net short dividend swaps to end-users (particularly leveraged funds), irrespective of the index examined. Risk transfer appears largest for the EURO STOXX 50, with dealers net short nearly one billion US dollars notional to end-users.

Our regression analysis explores the relation between trade characteristics and swap pricing, and we find that having a non-dealer counterparty to the swap is associated with a lower fixed price of the swap, on average. This is consistent with dealers providing attractive prices to some clients to buy dividends, although not all of the pricing discrepancies follow this pattern. We believe such trades are a key to understanding the co-existence of the listed futures and the OTC market for EURO STOXX dividends. We intend to explore these issues further as more data become available.

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Exhibit 1

Table: Select listed index dividend futures, March 2014

Underlying Product	**Exchange**	**First Listing Date**	**Notional Amount Outstanding, Dividend Index Future (USD Millions)**	**Notional Amount Outstanding, Equity Index Future (USD Billions)**
EURO STOXX 50	Eurex	June 2008	9,402	113.7
FTSE 100*	ICE LIFFE	May 2009	1,207	62.1
DAX	Eurex	June 2009	0	42.1
IBEX	MEFF	Oct 2009	18	10.3
CAC	NYSE EuroNext	Dec 2009	112	18.4
AEX	NYSE EuroNext	May 2010	327	7.5
Nikkei 225	Singapore Exchange	June 2010	1,283	18.6
HSI	HK Exchanges and Clearing Ltd	Nov 2010	38	14.6
HSCEI	HK Exchanges and Clearing Ltd	Nov 2010	253	12.5
FTSE MIB	Borsa Italiana IDEM	May 2013	3	9.9
Nikkei 225	Osaka Exchange	Mar 2014	257	49.1

*The FTSE 100 Dividend Index Future launched in May 2009 is based on the FTSE 100 Dividend Index - RDSA Withholding, which includes all declared dividends except for the Royal Dutch Shell A share, which is discounted to reflect tax withholding. A future based on all declared dividends was launched in July 2011.

Exhibit 2

Summary Statistics for New Dividend Swap Trades (January-March 2014)

	S&P 500	EURO STOXX 50	Nikkei 225	Other	Total
New Swaps (USD millions)	**222.4**	**181.0**	**15.8**	**22.5**	**441.7**
SD/SD	161.1	3.9	-	5.0	170.1
SD/non-SD	61.2	177.2	15.8	17.4	271.6
New Swaps (Count)	**57**	**47**	**2**	**12**	**118**
SD/SD	47	2	-	3	52
SD/non-SD	10	45	2	9	66
Original Tenor (Years)	**3.4**	**1.8**	**1.3**	**1.3**	**2.5**
SD/SD	3.2	1.7	-	2.6	3.1
SD/non-SD	4.1	1.8	1.3	0.9	2.0
Average Swap Notional (USD Million)	**3.9**	**3.9**	**7.9**	**1.9**	**3.7**
SD/SD	3.4	1.9	-	1.7	3.3
SD/non-SD	6.1	3.9	7.9	1.9	4.1

Exhibit 3

Summary Statistics for Dividend Swaps Outstanding (March 2014)

	S&P 500	EURO STOXX 50	Nikkei 225	FTSE 100	Other	Total
Open Swaps (USD millions)	**3,644**	**2,006**	**539**	**252**	**91**	**6,532**
SD/SD	2,839	829	145	182	13	4,050
SD/non-SD	804	1,177	394	70	78	2,524
Open Swaps (Count)	**979**	**302**	**192**	**27**	**34**	**1,534**
SD/SD	824	103	85	17	9	1,038
SD/non-SD	155	199	107	10	25	496
Original Tenor (Years)	**5.1**	**4.3**	**4.5**	**6.0**	**2.7**	**4.8**
SD/SD	5.2	6.1	5.7	5.9	3.5	5.3
SD/non-SD	4.5	3.4	3.6	6.2	2.4	3.8
Average Swap Notional (USD Millions)	**3.7**	**6.6**	**2.8**	**9.3**	**2.7**	**4.3**
SD/SD	3.4	8.0	1.7	10.7	1.4	3.9
SD/non-SD	5.2	5.9	3.7	7.0	3.1	5.1
Top 5 Dealer Share of SD/non-SD trades (%)	**89.2**	**86.2**	**98.9**	**100.0**	**100.0**	**82.1**

Exhibit 4

Dividend Swaps and Dividend Swap Futures Outstanding, EURO STOXX 50 and Nikkei 225

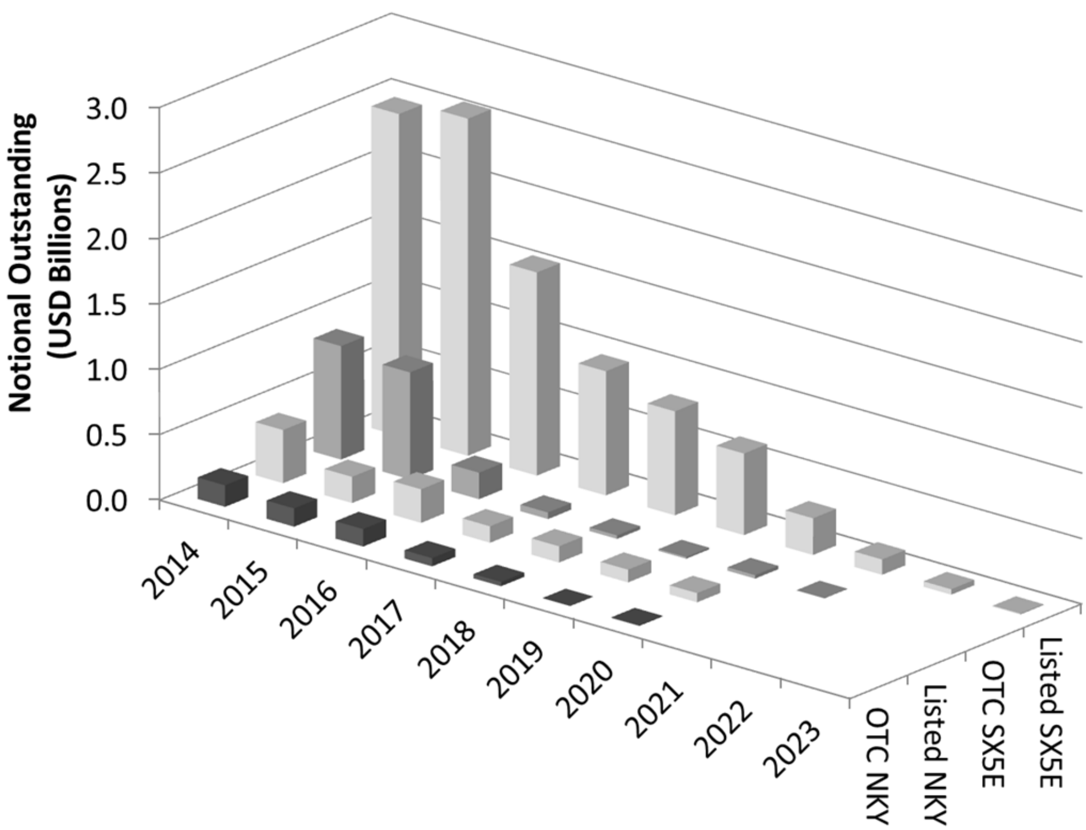

Exhibit 5

Net dividend swaps outstanding across product types

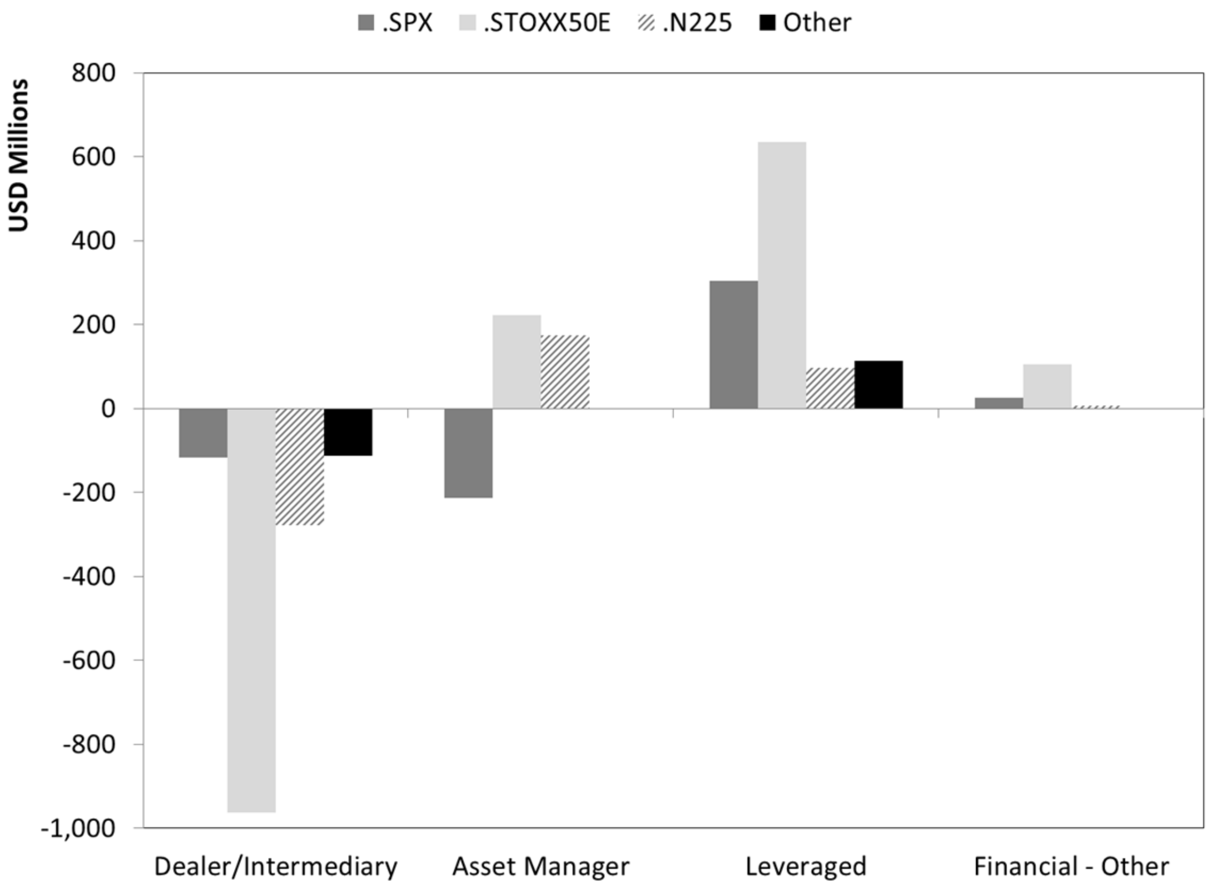

Exhibit 6

Overlap of dividend swap positioning by non-dealers

	S&P 500	EURO STOXX 50	Nikkei 225
S&P 500	21	4	9
EURO STOXX 50		43	4
Nikkei 225			25
FTSE 100			

Note: The table shows the count of entities with open swaps for a given index, along with the count of those entities in a given market also having open swaps for a different index.

Exhibit 7

Effects of market characteristics on fixed price of index dividend swaps

This exhibit shows effects of various market characteristics on the fixed price of dividend swaps. Regressions are run separately for dividend swaps with S&P 500 and EURO STOXX 50 underlying indices. The p-values are shown in parentheses below each coefficient

	UNDERLYING INDEX	
	S&P 500	EURO STOXX 50
Intercept	36.961***	99.823***
	(<.001)	(<.001)
Notional value of the swap (USD Millions)	-0.015	3.687**
	(0.793)	(0.032)
Notional value of the swap Squared (USD Millions^2)	0.001	-0.232*
	(0.854)	(0.086)
Tenor of the swap (years)	2.319***	3.555*
	(<.001)	(0.071)
Non-SD a counterparty	-0.329***	-14.867***
	(0.010)	(<.001)
Number of Swaps	75	47
Adj. R-Squared	99.2%	6.3%

Note: * indicates significance at 10% level, ** indicates significance at 5% level, *** indicates significance at 1% level. Cells containing coefficients significant at the 1% level are also shaded.

Exhibit 8

S&P 500 dividend swap transaction prices versus swap tenor