Federal Reserve Bank of New York
Staff Reports

An Analysis of OTC Interest Rate Derivatives Transactions: Implications for Public Reporting

Michael Fleming
John Jackson
Ada Li
Asani Sarkar
Patricia Zobel

Staff Report No. 557
March 2012
Revised October 2012

An Analysis of OTC Interest Rate Derivatives Transactions: Implications for Public Reporting

Michael Fleming, John Jackson, Ada Li, Asani Sarkar, and Patricia Zobel

Federal Reserve Bank of New York Staff Reports, no. 557
March 2012; revised October 2012
JEL classification: G12, G13, G18

Abstract

This paper examines the over-the-counter (OTC) interest rate derivatives (IRD) market in order to inform the design of post-trade price reporting. Our analysis uses a novel transaction-level data set to examine trading activity, the composition of market participants, levels of product standardization, and market-making behavior. We find that trading activity in the IRD market is dispersed across a broad array of product types, currency denominations, and maturities, leading to more than 10,500 observed unique product combinations. While a select group of standard instruments trade with relative frequency and may provide timely and pertinent price information for market participants, many other IRD instruments trade infrequently and with diverse contract terms, limiting the impact on price formation from the reporting of those transactions. Nonetheless, we find evidence of dealers hedging rapidly after large interest rate swap trades, suggesting that, for this product, a price-reporting regime could be designed in a manner that does not disrupt market-making activity.

Key words: interest rate derivatives, price reporting, public transparency, standardization

---

Fleming, Li, Sarkar, Zobel: Federal Reserve Bank of New York. Jackson: Bank of England, on secondment to the Federal Reserve Bank of New York. Address correspondence to Patricia Zobel or Ada Li (email: patricia.zobel@ny.frb.org, ada.li@ny.frb.org). The authors thank Casidhe Horan and Sha Lu for invaluable contributions as research analysts and Sheila Leavitt for her research on select sections of the paper. They also thank Kathryn Chen for her work on the development of this project and her thoughtful comments, George Pullen and his team from the Commodity Futures Trading Commission for their advice on data cleaning steps, and Katrina Bell for her help with data explanations and interpretations. They are grateful to members of the OTC Derivatives Supervisors Group and the following individuals for input and comments: Michael Ball, Steven Block, Laura Braverman, Andrew Cohen, Ellen Correia Golay, Jeanmarie Davis, Erik Heitfield, Frank Keane, Suzette McGann, Patricia Mosser, Wendy Ng, Johanna Schwab, and Janine Tramontana.

An Analysis of OTC Interest Rate Derivatives Transactions: Implications for Public Reporting

Table of Contents

I. Introduction and Executive Summary

The over-the-counter (OTC) derivatives markets provide a venue for market participants to transact in flexible and customizable contracts for hedging risk and taking positions on future price movements. In recent years, supervisors have become more concerned about the ability of firms to adequately manage the risks related to derivatives exposures and the associated implications for financial stability.[1] Across major financial centers, lawmakers and regulators are drafting and implementing new rules governing derivatives trading that would require increased use of centralized market infrastructure for trading and counterparty risk management, greater transparency of trading information and more robust risk management practices.

One major component of the OTC derivatives regulatory reform efforts is the introduction of transaction reporting requirements. In early 2010, the OTC Derivatives Supervisors Group[2] (ODSG), an international body of supervisors with oversight of major OTC derivatives dealers, called for greater post-trade transparency. In response, major derivatives dealers (the G14 dealers)[3] provided the ODSG with access to three months of OTC derivatives transactions data to analyze the implications of enhanced transparency for financial stability. This paper examines the transactions data from the OTC interest rate derivatives (IRD) market to inform the debate about post-trade transparency rules and to serve as a resource for other policymakers who are considering introducing public reporting to the IRD market.[4] This paper may also provide insight for policymakers pursuing a range of other regulatory initiatives planned for OTC derivatives markets.

The lack of comprehensive transaction data has been a barrier to understanding how the OTC derivatives markets operate.[5] This paper attempts to fill the gap by presenting summary statistics on the aggregate IRD dataset and deeper analysis of the most actively traded products and currencies, for a three month period between June and August 2010.

The OTC IRD market is broad in scope with a wide range of products, currencies, and maturities traded. Our dataset includes transactions in eight different product types, 28 currencies and maturities ranging from less than one month to 55 years.[6] We observe an average of 2,500 price forming transactions per day during our sample period, dispersed across an array of product combinations. Average trade sizes were large, at around $270 million, and roughly $683 billion in notional value was traded on a daily basis. Most of our analysis focuses on interest rate swaps (IRS), overnight indexed swaps (OIS), and forward rate agreements (FRAs) traded in US dollar, euro, sterling and yen, which collectively represented 68% of IRD transactions in our data set.

Our analysis includes only electronically matched transactions that represented new economic activity during the sample period. We also find a high volume of administrative activity in the IRD data (representing close to two thirds of the observations), which largely comprised transactions used to manage the stock of outstanding contracts. If the administrative activity were included in IRD statistics, it could meaningfully inflate volume figures and create an impression of higher activity levels. Putting the size of the OTC IRD market in the context of exchange-traded IRD activity, we found that the vast majority of IRS trading occurs in the OTC market. In contrast, short-dated interest rate derivatives, with the exception of some euro-denominated products, traded much more frequently on exchanges.

---

[1] See the US Treasury's roadmap for regulatory reform in the OTC derivatives market released in May 2009: http://www.treasury.gov/press-center/press-releases/Pages/tg129.aspx

[2] For more information please see http://www.newyorkfed.org/markets/otc_derivatives_supervisors_group.html.

[3] During the period covered by this study, the G14 dealers included Bank of America-Merrill Lynch, Barclays Capital, BNP Paribas, Citi, Credit Suisse, Deutsche Bank AG, Goldman Sachs & Co., HSBC Group, J.P. Morgan, Morgan Stanley, The Royal Bank of Scotland Group, Société Générale, UBS AG, and Wachovia Bank N.A.

[4] A similar analysis was performed for the credit derivatives market, the findings of which were released in September 2011: http://www.newyorkfed.org/research/staff_reports/sr517.html

[5] The Bank for International Settlements produces aggregate statistics on amounts outstanding in IRD markets on a semi-annual basis (http://www.bis.org/statistics/derstats.htm), and publishes an IRD turnover survey every three years (http://www.bis.org/publ/rpfxf10t.htm).

[6] The dataset includes all transactions that were electronically matched by MarkitSERV and that occurred between June 1, 2010 and August 31, 2010 where a G14-dealer was on at least one side of the transaction. The data excludes transactions that were manually matched, transactions between two non-G14 firms and transactions for products which are not supported for electronic confirmation.

We examined the number and nature of market participants to better understand the distribution of trading activity. In our dataset, there were roughly 300 unique participants. We found activity to be dispersed among these participants based on two widely used statistical metrics. In addition, most non-G14 participants had trading relationships with several G14 dealers within each product market, suggesting that they have the opportunity to receive prices from multiple liquidity providers.

Assessing the level of product standardization can provide insight into the relevance of reported prices. A higher degree of product standardization contributes to greater comparability of information on quoted and traded prices. In IRD, reference rate indices were almost uniform for contracts in major currencies and products, and floating rate resets and payment frequencies often followed customary practices by currency. The IRD market also displayed a concentration of trade activity in particular tenors, with almost 60% of the transactions in the top products and currencies occurring in a small number of benchmark instruments, suggesting that price reporting may provide market participants with a useful data set for the more standard portions of the market.

The frequency of trading activity affects the reliability of price reporting as a timely source of information for prospective investors trying to execute transactions in similar instruments. Even the most commonly traded instruments in our data set were not traded with a high degree of frequency. In fact, no single instrument in the IRS data set traded more than 150 times per day, on average, and the most frequently traded instruments in OIS and FRA only traded an average of 25 and four times per day, respectively.

Activity outside of relatively standardized contracts was highly dispersed and traded even less frequently. We found over 10,500 combinations of product, currency, tenor and forward tenor traded during our three month sample, with roughly 4,300 combinations traded only once. We also found a meaningful degree of customization in contract terms, particularly in payment frequencies and floating rate tenors. Because of the unique and disparate characteristics of some of these transactions, the publicly reported prices may provide limited pricing information for market participants.

Our analysis has implications for the design of large trade reporting rules. Most post-trade reporting regimes allow for reduced reporting requirements[7] for large transactions since immediate reporting of trade sizes has the potential to disrupt market functioning, deter market-making activity and increase trading costs. IRD trade sizes are inversely related to tenor, meaning that long maturity swaps trade in significantly smaller sizes. Accordingly, for purposes of identifying large trade thresholds, we found strong justification for grouping trades by tenor, and suggest one method for grouping around benchmark tenors.

We also examined the trading activity of dealers in the period after they executed a large IRS trade with a customer, and found significant evidence of dealers conducting offsetting transactions in IRS within 30 minutes. This implies that dealers can offset at least some degree of their IRS exposure within a relatively short time after a large trade. Thus, with adequate protections that allow delayed reporting or masking of trade sizes, price reporting may not significantly impede market-making activity in IRS. Further study is necessary to determine if this finding holds for less actively-traded IRD products.

The remainder of the paper is structured as follows: We provide a background on the IRD markets in Section II, a description of the IRD data set in Section III and an overview of trading activity in Section IV. Sections V to IX focus on specific features of the IRD market with particular relevance to trade-level public reporting, and Section X presents our conclusions.

II. Background on the IRD Market

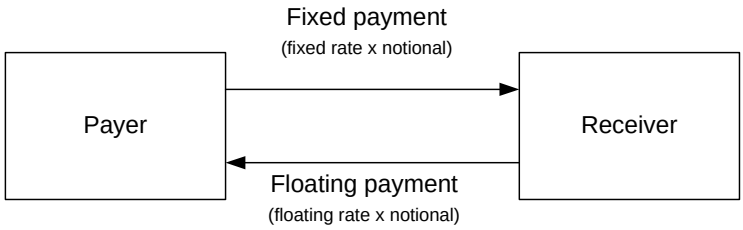
A derivative is a financial instrument whose value depends upon that of another asset. A derivative may be used as a tool to either take a position on the underlying asset or to transfer or hedge risk. Derivatives can either be traded on organized exchanges or negotiated privately between two parties. Privately negotiated trades, known as over-the-counter or OTC trades, allow parties to customize features of the derivative to

[7] For example, trades reported at a time delay or with the trade sizes masked.

serve the specific needs of the users. OTC trading can be conducted through voice execution or an electronic trading platform, with dealers typically making the market for customers. By contrast, exchange-traded contracts are more standardized and there is often an order book system that matches bids and offers.

An interest rate derivative (IRD) is an agreement to exchange payments based on different rates over a specified period of time. In its most common form, the single currency interest rate swap, parties agree to exchange payments periodically based on a **fixed interest rate** agreed upon at the outset of the transaction and a **floating interest rate** based on a specified reference index.[8] The **floating rate reset dates** and the payment intervals for the contract are also determined at the outset. The **notional amount** of the contract is used only to calculate the periodic payments due between parties and is not exchanged. As an example, US dollar interest rate swaps typically reference the 3-month LIBOR index, and participants usually pay the floating payments at 3-month intervals and fixed payments at 6-month intervals over the life of the contract.

Figure 1: Single-Currency Interest Rate Swap



The floating rate is generally indexed to an interbank lending rate.

Reset dates are set in advance to calculate the payments between the parties. On payment dates, the difference between the floating rate coupon and the fixed rate coupon payments is exchanged.

Market participants often employ interest rate derivatives for one of two reasons, either (a) to hedge interest rate risk; or (b) to take a position on the future path of interest rates. Numerous varieties of OTC interest rate derivatives have been developed to meet specific needs. Categorical differences generally reflect variation in the types of rates exchanged or the presence of contingent agreements (options). Following are the product categories in our dataset:

- **Basis swap**: A swap in which periodic payments are exchanged based on two floating rate indices, both denominated in the same currency.
- **Caps/Floors:** A series of options on a floating rate in which payments are made to the purchaser only if the reference rate exceeds an agreed upon strike rate for a cap, or falls below the strike rate for a floor, on specified dates.
- **Cross currency basis swap**: A swap in which periodic payments are exchanged based on two floating rate indices that are denominated in different currencies; notional amounts are exchanged on the effective date and the maturity date.
- **Forward rate agreements (FRA)**: A swap that starts at a future specified date, generally with one exchange of payments on the start date based on the present value of the difference between the agreed fixed rate and the observed floating rate on that day.
- **Inflation swaps:** A swap where the floating rate reference index is a specified inflation rate index and the fixed rate is agreed between the parties. Typically, one net cash flow is exchanged between the parties at maturity. This type of swap is also known as a zero-coupon inflation swap.

[8] The fixed and floating rates are usually set at the inception of the trade such that the net present value of the swap is zero.

- **Overnight indexed swaps (OIS):** A swap where the floating rate reference index is the overnight interbank rate and the fixed rate is agreed between the parties. Typically, one net cash flow is exchanged between the parties at maturity.
- **Single-currency interest rate swap (IRS):** A swap in which periodic payments are exchanged based on a fixed rate that is agreed upon at execution and a specified floating rate index.
- **Swaption:** An option that provides one party with the right, but not the obligation, to enter into an interest rate swap at an agreed upon fixed rate at a specified future date (the exercise date).[9]

Within product types, OTC interest rate derivatives can be customized to suit the needs of customers. Following are common contract features that can be customized:[10]

- **Tenor**: The time between the start date and maturity date of the swap contract. Swap tenors can range from a few days to many years in length. We refer to the tenor as the **accrual tenor** in our analysis to distinguish it from forward or option tenors.
- **Forward start**: A transaction has a forward start if it has an effective date that is weeks, months or years after trade execution.[11] Throughout the paper, we will refer to the **forward tenor** as the length of time between trade execution and effective date.
- **Floating rate reset dates**: The dates at which the floating rate reference indices are observed in order to determine the floating rate payment amount. These are generally every three or six months for swaps.
- **Payment frequency:** The frequency of payments for the fixed and floating rates is specified at the execution of the contract. For swaps where payment dates occur less frequently than floating rate reset dates, the floating interest rate may be compounded until the next payment date.
- **Break dates:** Set dates at which parties can terminate IRD contracts at current market value. This is typically used as a mechanism for parties to mitigate counterparty risk associated with accumulated mark-to-market balances on long-dated swaps.

Exchange-traded interest rate derivatives are generally highly-standardized products with fixed terms for most of the contract features. The OTC products in our dataset allow for customization of contract terms, but are still considered fairly standard because their structures provide for relatively straightforward risk modeling. More exotic structures generally entail a combination of several simple interest rate product structures, or additional embedded options where the interplay of the risks becomes more complex. The market for such products is less liquid because they are more tailored and because hedging the risks and the unwinding of positions can be costlier. Exotic product structures are estimated to make up around 2% of the OTC interest rate derivatives market,[12] and are not included in our dataset because they are not eligible for electronic matching.

III. Description of Data Set

The IRD dataset was provided by MarkitSERV, the predominant trade matching and post-trade processing platform for IRD transactions. It comprises three months of electronically matched IRD transactions occurring between June 1 and August 31, 2010, in which a G14 dealer was on at least one side of the transaction. This was a period when policy rates were low across major currencies, which may have influenced the level of activity, particularly in shorter-dated IRD products.

[9] The party may also have the right to settle in cash for an amount equal to the market value of the swap on exercise date.
[10] This list does not include option features or other characteristics that can be adjusted, like holiday calendars, day counts, addition of fixed payments, fees, etc.
[11] For our analysis, any swaps with effective dates more than five days after the trade date were considered forward starting swaps. Those with effective days within five days of trade execution were considered spot-traded transactions.
[12] Estimate derived from TriOptima's monthly reports on G14 dealers' self-reported interest rate derivatives positions.

Data provided by G14 dealers on a monthly basis suggests the MarkitSERV dataset represents roughly 80% of their IRD transactions over the period.[13] Our dataset also does not include transactions that took place between two non-G14 parties,[14] transactions in products that are not supported for electronic confirmation, or transactions in supported products that were manually matched. The omissions in our dataset may introduce some bias. Specifically, our total trading activity and number of market participants is understated by some degree, which influences results more for those products and currencies that have a lower proportion of G14 participation or a higher level of manually matched activity.

Prior to submitting the data, MarkitSERV applied an anonymous mapping for counterparties. Each unique firm was assigned an identifier code. Aside from labeling whether an anonymous participant was a G14 dealer, the institution type for all other firms was not provided. These other participants may have been customers of G14 dealers (e.g. commercial banks, hedge funds, insurance companies, etc.) or other non-G14 dealers. Data on individual parties to each transaction were aggregated up to the parent-entity level. Additionally, trades and trade sizes were aggregated at the execution level, rather than at the allocated level.

The data were separated into three components based on the transaction type assigned to each data entry: price-forming transactions, non-price-forming transactions, and excluded transactions. (The box on page 8 describes the non-price forming and excluded transactions.) The definition of price-forming transactions was based on an assessment of whether the transaction was executed at a negotiated market price. New transactions, as well as amendments, terminations and assignments of existing transactions with fees exchanged between the parties, were classified as price-forming. Transactions that appeared to represent administrative activity, including transactions generated by a third party,[15] transactions without a negotiated price, and duplicative transactions, were classified as non-price-forming or excluded transactions.[16]

The analyses in the following sections of this paper are based on the dataset of price-forming transactions. We narrowed our focus to reflect transactions pertinent to price reporting. Transactions that either do not have a market price, or have prices that are not negotiated, have less relevance for price transparency.

IV. Market Overview and Trading Activity

The price-forming data comprised around 167,000 transactions, representing $45 trillion in notional volume across eight derivatives products, 28 currencies, and tenors from one week to 55 years in length. In aggregate, there was an average of 2,500 transactions per day. Notional trade sizes were typically large, and the daily average value of trading was sizeable at $683 billion.[17] These figures understate the IRD market's activity to some degree since our dataset omits some types of activity, as noted above.

[13] G14 dealers provide the ODSG with monthly metrics on the percentage of total transaction volume that is electronically confirmed, manually confirmed, and not eligible for electronic confirmation. Data reported to the ODSG by G14 dealers indicate that for the period of June to August 2010, 22% of G14 IRD transactions were not electronically confirmed, suggesting that the MarkitSERV data set represents roughly 78% of G14 IRD transactions over the period. The data represent sides of trades, rather than individual trades. The double counting has some potential to affect the proportionality, thus these figures are estimates.

[14] By notional volume traded, it is estimated that new non-G14 activity represented about 11% of total IRD notional activity in MarkitSERV.

[15] Among this activity are portfolio compressions or FRA switches, which are regularly scheduled portfolio maintenance processes in which dealers manage their outstanding IRD transactions. As part of the process, the service vendor will, on a batch basis, automatically create or terminate transactions between participating dealers. The prices that correspond to these transactions are not bilaterally negotiated but rather determined by the service provider, and are often based on an estimated mid-market price.

[16] Non price-forming transactions included any transactions related to portfolio compression, FRA switch activity, and amendments, terminations and novations without an associated fee. Excluded transactions were either non-electronically matched transactions submitted to MarkitWire or otherwise duplicative activity such as allocations that was already represented in price-forming data.

[17] We used month-end conversion rates for each currency to convert to USD equivalents.

Table 1. Overview of Price-Forming Data by Product Type								
Product Type	Number of Transactions	Daily Average Transactions	% Transactions	Notional Volume ($ Bil.)	Daily Average Volume ($ Bil.)	% Notional	Number of Currencies	% of Trades in G4 Currencies
IRS	127,228	1,928	76%	15,536	235	34%	28	78%
OIS	13,141	199	8%	17,540	266	39%	12	83%
Swaption	12,011	182	7%	2,547	39	6%	19	94%
FRA	5,974	91	4%	6,482	98	14%	18	66%
Basis Swap	3,211	49	2%	2,393	36	5%	7	95%
Inflation Swap	2,494	38	1%	44	1	0%	4	99%
Cross Currency Basis Swap	2,068	31	1%	282	4	1%	18	73%
Cap-Floor	719	11	0%	297	4	1%	11	93%
TOTAL	**166,846**	**2,528**	**100%**	**45,122**	**684**	**100%**	**28**	**78%**

Single currency interest rate swaps (IRS) represented the bulk of activity, trading nearly 2,000 times per day and making up 76% of all transactions.[18] On average, $235 billion in notional IRS was traded per day, representing 34% of total traded IRD volume. The next most frequently traded products were OIS, swaptions, and FRAs, collectively representing about 20% of total transactions. Basis swaps, inflation swaps, cross currency basis swaps and caps/floors each traded less than 50 times per day and collectively represented around 5% of total transactions. FRAs and OIS combined represented 12% of the total transaction volume, but 53% of the notional value traded in our data set. As further discussed in Section VIII, the proportionally larger notional size of FRA and OIS transactions can be attributed to the relatively short tenor of these contract types.

Table 2 shows activity by transaction type. New transactions made up 92% of transactions and 95% of volume in the price forming data set. Almost half of the transactions occurred between two G14 dealers. One quarter of trades had a forward start, but these made up nearly 62% of traded volume because forward trading was more common in the short tenor products (which had larger trade sizes).

Table 2. Characteristics of Price-Forming Transactions (All Products and Currencies Included)				
	Number of Transactions	% Transactions	Notional Volume ($ Bil.)	% Notional
Transaction Type				
New	154,318	92%	42,957	95%
Termination	7,941	5%	1,635	4%
Assignment	4,587	3%	530	1%
Counterparties				
Between G14 Dealers	76,830	46%	22,068	49%
Between G14 & Other	90,016	54%	23,053	51%
Spot vs. Forward				
Spot	124,451	75%	17,208	38%
Forward	42,395	25%	27,913	62%

[18] The original dataset for IRS included swaps that resulted from swaptions that were physically exercised during the period. For the purposes of our analysis, we excluded these transactions since the activity did not constitute a new price forming transaction. We also excluded new transactions with effective dates prior to June 1, 2010.

Non-Price-Forming and Excluded Transactions

Following are summary statistics on transactions in the non-price-forming and excluded datasets. They illustrate a striking feature of the IRD market, namely that the number and volume of administrative transactions and otherwise non-price-forming trades (about 319,000 trades and $66 trillion) are greater than the number and volume of transactions that are considered new economic activity (roughly 167,000 trades and $45 trillion in notional). This highlights the importance of designing reporting requirements with a precise definition of price forming trades so as to avoid introducing a significant amount of "noise" into data on market prices. It also illustrates how inclusion of some transaction types in raw turnover data may mischaracterize the size of the market by inflating the number and volume of transactions.

Overview of Non-Price-Forming and Excluded Data

	Number of Transactions	Daily Average Transactions	Notional Volume ($ Bil.)	Daily Average Volume ($ Bil.)
Non-Price-Forming and Excluded Transaction Types				
Compression	55,856	846	5,599	85
FRA Switches	60,266	913	17,374	263
Amendments, Cancellations & Novations[19]	57,183	866	11,464	174
Novations to Clearing	93,032	1,410	22,780	345
Prime Brokered Trades	14,698	223	2,574	39
Allocated Trades	21,007	318	1,144	17
Internal Trades	16,803	255	4,719	71
TOTAL	**318,845**	**4,831**	**65,654**	**995**

In order to deepen our analysis and create a comparable set of statistics, we focus on activity in three of the most frequently traded swap products (IRS, OIS and FRA) and the four major (or "G4") currency denominations (US dollar, euro, yen and sterling) which, in aggregate, represented 68% of total transactions and 82% of total notional volume.[20] We excluded swaptions from this analysis despite their relatively high activity levels because the options component makes the interest rate sensitivity and other risk characteristics of swaptions less directly comparable to the other swaps products. Yen activity in the OIS and FRA markets was extremely low, and therefore these transactions were excluded from our analysis of the most active products and currencies.

[19] Amendments, cancellations and novations were counted as non-price forming or excluded if the transactions did not have any associated fees or in the case of novations, if the original transaction was already represented in the price-forming data.

[20] In addition, in the appendix, we undertake a detailed analysis of a single market (inflation swaps) in a single currency (US dollar) in order to explore price transparency at a more granular level.

Table 3 displays activity in the top products and currencies in further detail. By number of transactions, dollar denominated contracts made up the largest share of IRS and FRA trading (32% and 30% of all trading respectively). Euro denominated trades made up the largest share of OIS trading (50% of all transactions).

Table 3. Detail of Top Products in G4 Currencies

Products	Number of Transactions	% Transactions	Daily Average Transactions	Notional Volume ($ Bil.)	% Notional	Daily Average Volume ($ Bil)
Interest Rate Swaps						
USD	40,169	32%	609	5,647	36%	86
EUR	32,966	26%	499	5,214	34%	79
GBP	11,063	9%	168	1,020	7%	15
YEN	14,655	12%	222	2,255	15%	34
All other currencies	28,375	22%	430	1,400	9%	21
Total IRS	**127,228**	**100%**	**1,928**	**15,536**	**100%**	**235**
Overnight Index Swaps						
USD	2,013	15%	31	1,989	11%	30
EUR	6,622	50%	100	9,510	54%	144
GBP	2,059	16%	31	5,243	30%	79
YEN	163	1%	2	146	1%	2
All other currencies	2,284	17%	35	650	4%	10
Total OIS	**13,141**	**100%**	**199**	**17,540**	**100%**	**266**
Forward Rate Agreements						
USD	1,814	30%	27	1,790	28%	27
EUR	1,238	21%	19	3,024	47%	46
GBP	836	14%	13	945	15%	14
YEN	26	0%	0	38	1%	1
All other currencies	2,060	34%	31	684	11%	10
Total FRA	**5,974**	**100%**	**91**	**6,482**	**100%**	**98**
All Other Products						
USD	7,678	37%	116	1,700	31%	26
EUR	4,081	20%	62	1,144	21%	17
GBP	3,141	15%	48	482	9%	7
YEN	4,165	20%	63	2,048	37%	31
All other currencies	1,438	7%	22	191	3%	3
Total Other Products	**20,503**	**100%**	**311**	**5,564**	**100%**	**84**

A Comparison of OTC Traded and Exchange-traded IRD

We compared OTC traded volume in our data to the average daily trading volume of exchange-traded IRD activity in 2010 to help place our OTC sample in the context of the broader IRD market. For IRS, only US and London based exchanges offered listed versions of swaps for their currency markets, although exposure to long-dated interest rates can be achieved with government bond futures. For short term swaps, FRAs are comparable with exchange-traded Eurodollar and Euribor futures, which are based on interbank rate indices. Federal funds futures, 3-month OIS and Eonia futures are most similar to OTC traded OIS as they reference the daily overnight lending rates within each currency market.

Our calculations on publicly available data from global derivatives exchanges show that trading in swap futures is considerably less active than trading in IRS, the most directly comparable OTC product. In 2010, daily average notional trading volume on the CME for US dollar swaps futures contracts was approximately $600 million. Exchange trading in products similar to IRS in the other G4 currencies was even less active. By contrast, on a notional basis, trading in government bond futures appears more active than OTC IRS. Both US and German government bond futures had average daily volumes exceeding $220 billion. Exchange-traded UK and Japanese government bond futures had lower average daily volumes of $17 billion and $57 billion respectively. OTC average daily volumes traded for IRS in US dollar, euro, sterling and yen were at $86, $79, $15 and $34 billion, respectively.

At shorter maturities, trading volumes for futures contracts that are equivalent to FRAs are an order of magnitude higher than volumes seen in the OTC market. For example, in 2010, Euribor futures contracts traded on NYSE Liffe and Eurex aggregated to an average daily volume of $1.2 trillion in notional dollar terms, while Eurodollar contracts traded on the CME had a daily volume of roughly $2 trillion. By comparison, the average daily volume in OTC traded FRAs was $50 billion for euro denominated contracts and $30 billion for dollar denominated deals.

For products indexed to overnight interbank rates, trading volumes were more active on futures exchanges in the US, largely reflecting the success of the federal funds futures product. In the US, federal funds futures and 3-month OIS futures (tied to the federal funds rate) had average daily volumes of $252 billion and $7 million, respectively, while volumes in dollar OIS traded OTC were $30 billion. In contrast, in Europe, the OTC OIS products had markedly higher volumes than exchange-traded products. Eonia futures had an average daily volume of roughly $440 million compared to the $144 billion average daily volume in OTC euro-denominated OIS.

A comparison of trading volumes in the OTC and exchange-traded IRD markets shows significant differences between short-dated and long-dated derivatives products. At the long end of the curve, the vast majority of trading in LIBOR-based swap products occurs in the OTC market, although exchange-traded government bond futures do offer a heavily traded alternative means of acquiring long-term interest rate exposure. At the short end of the curve, trading is much more active on-exchange, with the exception of the euro OIS market. The absence of a liquid exchange-traded OIS product in euro may explain why we observe more OTC trading of euro-denominated OIS relative to dollar-denominated OIS in our dataset.

V. Market Composition and Trading Relationships

The structure of trading relationships may be a useful indicator of the competitiveness of pricing in the IRD market to the extent that customers may receive better pricing when they are able to transact with a range of dealers. Using common calculations, we find that trading activity was dispersed among participants in the top three products and G4 currencies. Further, even though a G14 dealer was on one side of every transaction, we found no evidence of market share domination by a small number of participants. Nearly all non-G14 market participants traded with more than one G14 dealer and most with several dealers for the same product.

Given the breadth of products and currencies traded in the IRD market, we find a modestly sized group of entities transacting in IRD on a daily basis. In our price-forming data, there were 306 unique participants in total, and an average of 127 unique entities trading per day. On a daily basis, there were 100 unique entities trading in IRS, on average, 25 in FRAs and 42 in OIS.[21] The firms in our data were aggregated up

[21] The fact that the sum of these numbers is more than the overall entities transacting in IRD reflects participants that were active in multiple products.

to the level of the global parent.[22] We note that our data findings probably understate participation to some degree, as trading activity between two non-G14 participants and manually confirmed transactions were absent from our dataset.

Using both a Herfindahl-Hirschman Index (HHI)[23] calculation and a four firm concentration ratio applied at the product and currency level, we found that trading activity is broadly distributed across market participants. We did not find meaningful differences in concentration between tenor groups of the same products. Between currency denominations, we found activity to be less dispersed in sterling and in yen, as might be expected in markets with less trading activity.

Table 4. Market Share Concentration for Payer Transactions (based on trade count)

	HHI				4-Firm Concentration			
	USD	**EUR**	**GBP**	**JPY**	**USD**	**EUR**	**GBP**	**JPY**
IRS	475	483	550	625	32	34	35	39
OIS	620	419	722		43	29	46	
FRA	695	578	907		42	37	50	

Our analysis suggests that non-G14 entities in the most active products and currencies typically transact with multiple dealers, and that more active participants have a larger number of dealer relationships. Non-G14 market participants trading between two and five times a day had an average of ten G14 dealer relationships for IRS during our sample period. Almost a third of non-G14 firms traded once a week or less. These firms had an average of two G14 dealer relationships for IRS. Overall, 43 participants traded with only one G14 dealer during our sample period.[24] Our data suggests that most market participants have the opportunity to obtain prices from multiple dealers.

Table 5. Mean Number of G14 Dealer Relationships

Transaction Activity	# of market participants	IRS	OIS	FRA
6 trades per day or more	44	12	9	9
2- 5 trades per day	63	10	5	4
1 trade per day or less	76	5	3	2
1 trade per week or less	75	2	2	2

VI. Product Standardization

The economic characteristics of traded contracts can be highly variable in OTC derivatives markets. The extent to which IRD products are standardized affects how useful post-trade reporting may be for price discovery purposes. Where the contractual terms of a transaction are broadly comparable to other similar transactions, the reported price provides more useful information to market participants. Our findings may somewhat overstate the overall level of standardization in the IRD market since our dataset only covers electronically confirmed transactions and more complex contractual structures are typically matched manually.

[22] International subsidiaries of a firm were reflected as the same entity. In addition, multiple customer sub-accounts within a firm were also counted as the same entity.

[23] The HHI is calculated by taking the sum of the squares of market shares of each market participant. In a market with ten firms having equal levels of activity, the HHI would be 1,000. With 20 firms having equal levels of activity, the HHI is 500.

[24] In general, these participants only transacted a handful of times in our 13 week sample and hence it is likely the observed number of dealers with which they transacted gives a misleadingly low estimate of their access to trading relationships.

In order to assess the degree of standardization in contract terms, we examined the floating rate reference index, floating rate reset dates and payment frequency in the top three product types,[25] as well as the presence of termination clauses in IRS.

IRS displayed high degrees of standardization with respect to floating rate reference indices, but had more variability in other terms. For sterling, dollar and yen, LIBOR was the predominant underlying reference index, while EURIBOR was almost uniformly referenced in euro contracts. In terms of floating rate reset dates, nearly all dollar IRS referenced 3-month rates, while euro, sterling and yen contracts most frequently referenced 6-month rates. Nonetheless, about 12-13% of euro and sterling contracts were tied to 3-month rates, reflecting demand for the shorter floating rate in those currencies.

IRS payment schedules displayed less consistency. Some IRS had floating rates that reset more frequently than payments occurred. This was most prevalent in sterling, where roughly 7% of the transactions had floating rates that compounded until a final one-time payment at maturity. These zero coupon sterling swaps typically had longer-dated tenors, with some maturing in 50 years. Fixed rates most frequently paid every 6 months for dollar, yen and sterling IRS, and yearly for euro IRS. However, there was some non-conformity in sterling and dollar trades, where roughly 15% and 9% of contracts had different fixed rate payment schedules.

Additionally, over 40% of the G4 IRS transactions in our data set allowed for termination of the swap on specified dates. These break dates were more prevalent for longer term contracts, and typically represent a mechanism to mitigate the counterparty risk associated with accumulated mark-to-market exposure. In G4 currencies, 92% of IRS contracts with tenors greater than 10 years had break clauses.

In the shorter-dated OIS and FRA products, key contract terms were fairly standardized. OIS uniformly referenced benchmark overnight interbank indices in the respective currencies, with the overnight rate accruing until payment. Most OIS paid at maturity, but for contracts with maturities greater than a year, 97% had payment intervals of one year. FRAs uniformly referenced the predominant term interbank markets in the respective currencies, with floating rate reset dates reflecting the accrual tenor of the swap.

Table 6. Standardization for IRD Contract Terms in Top Products and G4 Currencies

Products	Floating Rate Reference Indices	Floating Rate Reset			% with 6-Month Floating Rate Payment	% with 6-Month Fixed Rate Payment
Interest Rate Swaps		3-Month	6-Month	Other		
USD	LIBOR (100%)	98%	0%	2%	2%	91%
EUR	EURIBOR (100%)	13%	85%	2%	85%	0%
GBP	LIBOR (100%)	12%	87%	1%	84%	85%
YEN	LIBOR (99.5%), TIBOR (0.5%)	2%	97%	1%	98%	98%
Overnight Index Swaps						
USD	Federal Funds (100%)					
EUR	EONIA (100%)					
GBP	SONIA (100%)					
Forward Rate Agreements		3-Month	6-Month	Other		
USD	LIBOR (100%)	89%	6%	5%		
EUR	EURIBOR (100%)	63%	25%	12%		
GBP	LIBOR (100%)	72%	24%	3%		

The high degree of standardization in reference rate indices across IRS, OIS and FRAs is helpful for providing comparability among IRD trades. Nonetheless, we found variability in other terms that may be pertinent to IRS pricing, such as floating rate reset dates and payment frequency, suggesting a meaningful level of demand for products tailored to specific hedging or investment needs.

[25] In addition to the terms discussed in this paper, other terms in IRD contracts, such as collateral agreements, can influence prices for customers.

VII. Trading Patterns Across Tenors

The dispersion of trading activity can affect the utility of reported trades for market participants. Investors seeking to evaluate prices will find information on instruments traded at similar points on the yield curve or in similar forward tenors to be most useful. Conversely, instruments traded at disparate points on the yield curve or in varying forward tenors might not reveal information that is sufficiently precise to enable the observer to use them as context for new trade execution, even if the other contract terms are similar. Trading patterns in the IRD data set showed that, for the major products, a significant proportion of activity was concentrated in a small group of the most commonly traded tenors. In IRS, OIS and FRA, almost 60% of the trade activity in the top currencies occurred in a select group of instruments. However, beyond these most commonly traded points on the curve, there was a wide degree of dispersion in trading activity, reflecting the large universe of potential choices for currency, accrual tenor and forward tenor in the IRD market.

Interest Rate Swaps: IRS displayed elevated activity at tenors reflecting liquid sovereign issuance points. Spot trading in 2-, 3-, 5-, 10- and 30-year swaps represented around 57% of the G4 IRS activity and 46% of the notional volume. Nonetheless, we noted that even in the most commonly traded tenors, the number of transactions per day was not high by the standards of many other markets. For dollar-denominated IRS, we found 390 trades per day, on average, in the five most frequently traded tenors, followed by 264 trades per day for euro and 116 trades per day for sterling.

Outside of the standard tenors, the IRS data showed a wide dispersion in activity. IRS accrual tenors ranged from 3 months to 55 years in length and more than 14% of transactions in the top four currencies were traded on a forward basis, with forward tenors ranging from one week to 47 years in length. We attempted to measure the number of unique IRS tenors by identifying standard years and quarters, and grouping the remaining tenors by week. Even with this grouping, there were over 4,300 combinations of currency, accrual tenor and forward tenor traded in G4 currencies over the three months covered by our data set.

Overnight Indexed Swaps: OIS activity was concentrated around tenors demarcated by central bank intermeeting dates, money market futures dates (IMM dates) and select round calendar dates.[26] Roughly 58% of activity in dollar, euro and sterling occurred either in spot trading of 3-, 6-, and 12-month tenors, or in forward trading of contracts tied to central bank intermeeting periods or IMM futures expiry dates.[27] Each central bank period or IMM futures date by currency reflects a unique instrument in or analysis, and these made up 70 of the 82 commonly traded tenors in OIS. The absolute level of OIS activity in these standard tenors was low. Euro-denominated OIS trades across these tenors occurred just 56 times a day on average. For dollar and sterling OIS, activity was even lower with just 17 and 20 transactions a day, respectively.

Outside of the standard tenors, we observed more dispersed trading activity. Most OIS activity occurred in tenors of less than two years, although we observed tenors out to 15 years in length. To measure the approximate number of OIS tenors, we identified contracts corresponding to IMM or central bank dates and contracts with identifiable round tenors and grouped the remaining tenors by week. Even with this grouping, we identified over 680 accrual tenor and forward tenor combinations, of which 411 had accrual tenors of less than two years.

Forward Rate Agreements: For FRAs, three month accrual tenors were most commonly traded at dates either corresponding to IMM futures dates or in select round forward tenors, which together represented 62% of activity in the top three currencies. FRAs in common tenors traded just 37 times per day on average across the three most active currencies. Although we observed fewer unique accrual tenors in this

[26] OIS and FRAs are frequently used to take views on short-term interest rates or as hedges to futures contracts, thus, the tenors of the contracts will correspond to central bank meeting effective dates when monetary policy decisions are implemented, or to IMM dates in the futures markets.

[27] For purposes of our analysis, we categorized OIS contracts that started and ended on central bank rate effective dates as "central bank" trades and contracts associated with two IMM futures expiry dates as "IMM futures" trades.

product, the dispersion in forward tenors resulted in identification of over 400 accrual and forward tenor pairs, reflecting the high proportion of forward trading (94% of transactions) in this market.

Table 7. Trading Patterns in Top Traded Products and G4 Currencies

	Currency	Unique Accrual Tenors	Unique Forward Tenors	Date Pair Combinations	Commonly Traded Tenors	Total Commonly Traded Tenors	% of Activity in Commonly Traded Tenors	Average Daily Transactions in Commonly Traded Tenors
IRS								
	USD	472	440	1,618	2-yr, 3-yr, 5-yr,	5	64%	390
	EUR	421	344	1,366	10-yr and 30-yr Spot	5	53%	264
	JPY	404	244	970		5	51%	85
	GBP	96	111	377		5	52%	116
Total		**1,393**	**1,139**	**4,331**		**20**	**57%**	**855**
OIS								
	USD	70	57	173	IMM Futures Dates, Central Bank	20	56%	17
	EUR	114	60	359	Intermeeting Periods, 3-month, 6-month,	33	56%	56
	GBP	69	45	148	and 1-year Spot Tenors	26	64%	20
Total		**253**	**162**	**680**		**79**	**57%**	**93**
FRA								
	USD	8	63	136	IMM Futures Dates, 3-Month FRAs traded 1-week,	23	73%	20
	EUR	7	53	162	2-weeks, 1-month, 2-months, 3-months,	16	52%	10
	GBP	6	46	104	and 6-months Forward	15	52%	7
Total		**21**	**162**	**402**		**54**	**62%**	**37**

Our analysis reveals that IRD activity in major currencies and products is clustered around a select group of instruments; though even within this group, we found trade frequency in individual instruments to be low. The rest of the trading in these currencies and products was dispersed across a very wide range of possible accrual and forward tenors. The additional 24 currencies and five products in the broader IRD dataset widen the pool of potential combinations and compound the extent of dispersion.

A simplified analysis of accrual and forward tenors in all currencies and products suggests that there are over 10,500 combinations of product, currency, accrual tenor and forward tenor in our data set. Of these, there are 4,343 combinations that traded only once during the three months studied. Combined with the low trading frequency observed in the IRD market, this dispersion of trading activity across tenors suggests that the quantity of up-to-date and comparable transaction data available to a participant for evaluating swap contract pricing may be low. We caveat that these findings reflect trading activity at the time of our sample. The introduction of price reporting and the implementation of other emerging regulations could change the way that IRD are traded, potentially leading to an increased level of activity in more standard tenors.

VIII. Notional Trade Sizes

The design of post-trade transparency rules should balance the benefits of increased transparency against the risk of impairing market liquidity. In most financial markets in which public reporting rules are in place, large size transactions have reduced reporting provisions like trade size masking or delayed public reporting. This "protection" is offered because liquidity, particularly for larger transactions, is often provided to customers by market makers who hold the resulting positions until they are able to offset the risk at a reasonable price. If details of a large trade are rapidly made public, participants that are not involved in the trade may anticipate the dealer seeking to offset its position and may execute trades to profit from such knowledge, potentially increasing the costs of market making. This risk of being "front run" might in turn make dealers reluctant to provide liquidity for large trades, or more inclined to widen bid-ask spreads to reflect the increased cost of hedging.

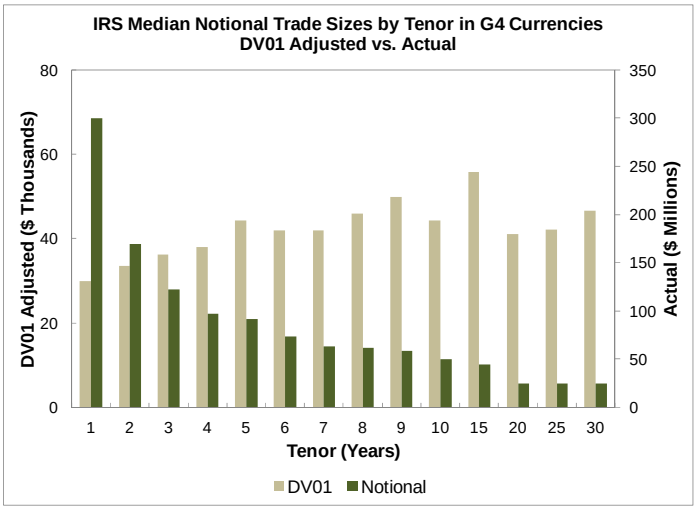
In order to reduce adverse effects on market liquidity, regulators must specify what will be considered a large trade. In theory, large trade thresholds should depend on the market liquidity, so that the trades receiving protection are those that cannot be immediately offset at a reasonable cost. In practice, market liquidity is not directly observable, so a proxy needs to be used to define large trades. Observed trade sizes may be useful in this regard, because trade sizes generally reflect the liquidity conditions of a particular market.

In defining large trade sizes, regulators must specify the breadth of products over which a single large trade threshold will apply. In markets where trade sizes are relatively homogeneous across products, a single large trade threshold could result in a consistent application of the large trade protections. However, in markets where trade sizes vary widely and relate strongly and consistently to particular attributes of the trade, breaking trades into groups to calculate large trade thresholds may be appropriate. Given the heterogeneity of IRD transactions, we suggest one way that policymakers can consider grouping of IRD transactions to set large trade thresholds.

a) The relationship between tenor and trade sizes

We found that the notional size of an IRS trade is strongly related to the accrual tenor of the swap contract, with trade sizes decreasing as the length of the accrual tenor increases. This inverse relationship may reflect the higher interest rate sensitivity of longer-dated swap transactions.

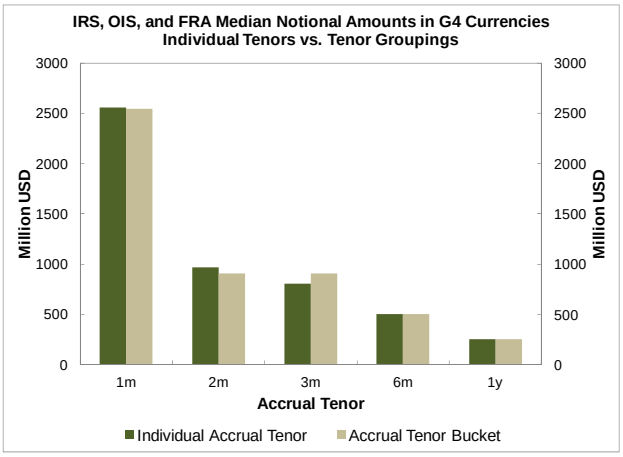
One measure of the interest rate sensitivity of a swap is the "dollar value of a basis point" or DV01. The DV01 measures the change in the present value of a swap that would result from a one basis point parallel shift in the swaps yield curve. The graph below shows that, on a DV01 basis, median notional trade sizes in G4 currencies for IRS are roughly constant across maturities, within a range of $30,000-$50,000.

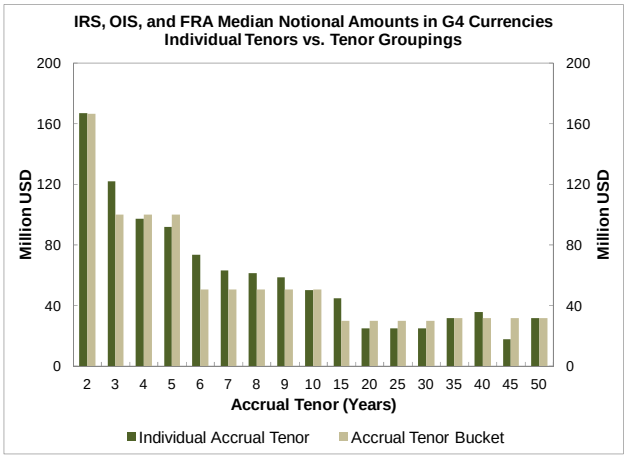


Since there is a strong relationship between tenor and trade size, we explored potential groupings of trades by tenor for the purpose of creating large trade rules. In this process, we tried to find a balance between creating rules with a high degree of responsiveness to the structural tenor effects, while limiting the number of groups to minimize complexity. To do this, we used regression models to test the significance of different tenor groupings at explaining the variance in trade sizes. A further discussion of the regression tests involved in determining the effects of tenor on trade sizes is in a separate box below.

Our results indicated that, at least for the top products in the G4 currencies, setting different large trade thresholds for nine unique tenor groupings would strike a good balance between simplicity and precision. Our analysis showed that relatively granular grouping in shorter tenors was warranted, with five groupings for tenors up to and including two years (0-1 month, 1-3 month, 3-6 month, 6-12 month and 1-2 year buckets). Beyond tenors of two years, only four groupings were necessary to fairly reflect the differences in

notional trade sizes across the trading curve: 2-5 years, 5-10 years, 10-30 years and over 30 years.[28] The graphs below illustrate how the notional distribution of each tenor grouping is representative of the notional distributions of the underlying individual tenors.





Testing for the Relationship between Tenor and Trade Sizes

We used an ordinary least squares regression analysis to create meaningful groups of tenors, by identifying tenor groups with similar trade sizes. For purposes of this analysis, we combined IRS, OIS, and FRA transactions in the top currencies, with trade sizes converted to dollars (trade sizes appeared to be broadly similar across these product types and currencies). Our starting point for devising potential groupings of swaps was to create a set of tenor buckets, with each bucket ending at a frequently traded tenor point. For short-dated products, four common accrual tenors stood out: 1, 3, 6 and 12 months. Similarly, for longer-dated IRS trades, 2, 5, 10 and 30 years represented benchmark points on the curve. Using these points, we grouped all trades into nine distinct buckets. We then used a regression analysis to quantify how well grouping transactions into these buckets explained notional trade sizes. This formed a benchmark against which we compared a range of other groupings.

We found that adding more groupings had little discernable effect on the explanatory power of the regression. In our original regression, around 32% of the variability in trade size could be explained by the use of nine tenor groups. The addition of more groups at active trading points, up to a regression with 20 buckets, had negligible effect on the explanatory power of our regression model.[29] By contrast when we reduced the number of buckets at the short end of the trading curve (by merging the 0-1 month and 1-3 month buckets into a 0-3 month bucket), the explanatory power of our regression declined to 24%. Our results indicated that at least for the top products in the top currencies, nine unique tenor groupings based on the benchmark points on the curve struck a good balance between simplicity and precision.

[28] The upper bound of each of the tenor groupings is included within the grouping itself. For example, the 0-1 month bucket includes transactions with tenors up to, and including one month.
[29] The adjusted R-squared for the 20 tenor groupings was 31.9%, compared to the nine tenor bucket adjusted R-squared of 31.8%.

b) Notional trade size distributions

Looking at US dollar-equivalent trade sizes by tenor buckets, we note that the notional distributions within each group are positively skewed. Overall, we find that notional transaction sizes in IRD are large, reflecting the wholesale nature of the IRD market. Median trade sizes in accrual tenors up to five years are greater than $100 million, and even the longest dated instruments have median trade sizes in excess of $30 million. For every grouping, the mean notional sizes are higher than the median, reflecting the very large sizes of some trades that skew the distribution to the right.

Table 8. Notional Trade Sizes for IRS, OIS and FRA in G4 Currencies (USD millions)

Tenor Group [29]	Median	Mean	75th Percentile	95th Percentile	99th Percentile
0-1 month	2,544	3,779	3,904	12,175	26,348
1-3 month	903	1,185	1,307	3,778	6,942
3-6 month	500	694	801	2,039	4,255
6-12 month	254	492	500	1,579	3,731
1-2 year	167	259	288	770	1,685
2-5 year	100	141	150	416	965
5-10 year	51	88	100	257	605
10-30 year	30	56	60	183	420
> 30 year	32	50	61	141	449

Table 9 shows the mean, median and right tailed distribution of trade sizes in US dollar equivalents, for all IRD products in the G4 currencies. The level and distribution of trade sizes is not significantly altered by the inclusion of the additional product types. This suggests that the tenor groupings might be applied across all IRD products in the major currencies for large trade thresholds, however further study of individual products would be needed.

Table 9. Notional Trade Sizes of All Products in G4 Currencies (USD millions)

Tenor Group	Median	Mean	75th Percentile	95th Percentile	99th Percentile
0-1 month	2,554	3,882	3,878	12,768	28,545
1-3 months	1,000	1,334	1,500	4,654	9,432
3-6 months	500	712	894	2,172	4,469
6-12 months	279	547	589	1,915	4,000
1-2 years	176	273	302	842	1,915
2-5 years	100	142	154	450	1,000
5-10 years	51	94	100	300	638
10-30 years	30	56	64	192	425
> 30 years	14	33	39	128	364

Table 10 shows that trade sizes in non-G4 currencies are much smaller than trade sizes in G4 currencies. We observe the same pattern of positive skew and declining trade sizes across the tenor curve.

[30] The tenor groups are inclusive of the upper bound within the group. For example, tenors up to and including 1 month are in the 0-1 month bucket.

Table 10. Notional Trade Sizes of All Products in Non-G4 Currencies (USD millions)					
Tenor Group	**Median**	**Mean**	**75th Percentile**	**95th Percentile**	**99th Percentile**
0-1 month	896	1,406	1,419	6,275	10,757
1-3 months	271	390	475	1,004	2,077
3-6 months	148	226	292	671	974
6-12 months	74	111	134	314	672
1-2 years	37	68	75	190	336
2-5 years	22	36	45	112	200
5-10 years	13	22	26	71	134
10-30 years	18	25	27	74	127
> 30 years[30]	8	44	137	137	137

Our analyses of notional size distributions suggest that the design of large trade thresholds should incorporate tenor at a minimum, and that rules should apply to the G4 and non-G4 currencies as distinct groups. We found little structural differentiation in trade sizes among the top product types in major currencies. Further study may be necessary to determine if other less frequently traded products display different notional trade sizes.

IX. Market-Making Activity

Preserving the ability of a dealer to hedge large positions that it acquires through liquidity provision to customers has been cited as a major reason to allow reduced reporting requirements for large transactions. In this section, we examine the trading patterns of G14 dealers in the IRS market to understand how they offset the risks that they assume when entering into large transactions with other market participants, and thus, how their market-making activity may be affected by the introduction of post-trade public reporting rules. We find that G14 dealers appear to be able to offset a significant portion of large trades within a short time frame, suggesting that introducing a public reporting regime may be minimally disruptive to IRS trading activity as long as sufficient protections are in place for large transactions.

Anecdotal evidence from IRS dealers suggests that, following a large trade with a customer, a dealer's first priority is to offset the interest rate risk it has taken on through the transaction. This can be accomplished with an offsetting OTC swap trade, an exchange-traded bond future or through outright sales or purchases of government bonds.[32] Even where bonds or futures are used as an initial hedge, dealers will eventually need to offset their positions in the IRS market to avoid exposure to the spread between government bond rates and swap rates.

Dealers can offset their swaps positions by transacting with other dealers in the interdealer market or by finding a customer with interest in an opposing transaction. As shown in our earlier analysis of trading patterns, there are a multitude of currency, forward tenor and accrual tenor combinations in IRS which make the economics of each transaction distinct. Thus, for dealers, finding the same product combination in the opposite direction for an equivalently large size in a timely manner can be difficult. Ideally, dealers would look to offset a position with transactions at the same maturity; however an offsetting trade at a different maturity can also provide a meaningful offset of risk. Dealers suggested that they are less likely to view products with a different interest rate basis (i.e., differing floating rate indices, such as 3-month LIBOR and 6-month LIBOR) as an appropriate hedge.

[31] There were only seven transactions in the >30 year tenor group for all products in non-G4 currencies, thus the trade size for the 75th, 95th and 99th percentile reflect two of the population's largest trades

[32] The US Treasury market is typically used for hedging of duration risk for dollar denominated swaps. Eurodollar futures can also be used, typically for the short end of the curve. For the euro and sterling markets, dealers report using the medium to long-term government bond futures at the most liquid trading points.

We examined dealers' IRS trading activity in the minutes and hours after they engaged in a large trade with a non-G14 participant in order to find evidence of a discernable tendency to offset trades. The analysis of large trades and a dealer's subsequent activity focused on spot-traded IRS transactions of maturities between two and 30 years in the G4 currencies. Our methodology for isolating relevant large trades and characterizing subsequent trading activity is outlined in a separate box on page 20.

We found strong evidence that dealers offset a portion of the risk that is assumed in large IRS trades with non-G14 participants. This was visible both in the number of trades undertaken and in the aggregate DV01 of subsequent trading. Calculations on our dataset showed that dealers offset roughly 60% of the DV01 of the large trade within 30 minutes. The actual proportion of risk offset, on average, may be somewhat higher or lower given that our estimate excludes transactions outside of the price-forming data set and trades in other markets. Moreover, the average likely masks considerable variation over time and across dealers, with the proportion offset varying based on market conditions and differing risk tolerances.

Table 11. Dealer Trading Activity in the 30 Minutes After a Large Spot IRS Trade

Currency	Mean Number of Large Trades Per Day	Mean Number of Subsequent Trades in the Same Direction	Mean Number of Subsequent Trades in the Opposite Direction	Mean Offsetting Ratio [32]
US Dollar	3.8	1.7	2.2	0.5
Euro	3.2	2.0	2.7	0.7
Sterling	0.7	0.9	1.6	0.6
Yen	1.5	1.9	2.6	0.7

Table 12 shows that for euro, yen and sterling trades, there was no meaningful increase in the offsetting ratio over longer time periods following the initial trade. By contrast, in US dollar denominated swaps, offsetting trades appeared to happen over a slightly longer time period, with increased offsetting activity observed over the following few hours. This may be because there are more liquid alternative markets for the immediate offset of US dollar denominated interest rate risk, decreasing the urgency of finding an offset in the IRS market.

Table 12. Comparison of Mean Offsetting Ratios at Different Time Horizons

Currency	30 Minutes	1 Hour	4 Hours	8 Hours
US Dollar	0.5	0.5	0.7	0.7
Euro	0.7	0.7	0.6	0.5
Sterling	0.6	0.6	0.5	0.5
Yen	0.7	0.6	0.4	0.3

We also looked at the offsetting activity in more granular tenor groupings and found the same pattern of offsetting behavior within the first 30 minutes. However, the effects observed were of a lower magnitude and statistical significance as compared to offsetting observed across the entire 2-30 year curve. This appears to support anecdotal evidence that while much offsetting is achieved with trades at the same, or similar tenors, dealers are willing to look for opportunities to rebalance their position across the entire yield curve.

[33] Mean Offsetting Ratio = (Total DV01 Traded in Opposite Direction - Total DV01 Traded in Same Direction)/Large Trade DV01 Amount. Trade sizes were adjusted to DV01terms for comparability across the trading curve.

Our findings suggest that introducing a public reporting regime may not disrupt hedging activity in IRS as long as there are meaningful protections that delay reporting or mask trade sizes after the execution of a large trade.[34] Our analysis was performed only for IRS activity in the top traded currencies. Therefore, these findings may not be representative of offsetting activity in other IRD products and currencies, where trading activity is much less frequent.

Methodology for Identifying Large IRS Trades and Subsequent Offsetting Activity

Selecting large trades: We chose a 95th percentile trade size as the threshold to identify large transactions between dealers and non-G14 participants, as this seemed to be a level at which subsequent offsetting activity might be more clearly observable. We calculated the 95th percentile trade size according to currency and tenor, with tenors grouped into 2-5 year, 5-10 year and 10-30 year buckets. We excluded from our analysis all IRS trades of tenors less than two years, because short-dated swaps can be similar to other OTC or exchange-traded IRD products, and hence there is an increased chance that offsetting is achieved in different product types.

Isolating trades that represented new large trade activity: Most dealers have multiple IRS customer trades per day in each of the G4 currencies and may have more than one large trade per day. To isolate large trade activity that caused the dealer to take on interest rate risk that did not offset previous trading activity, we discarded from our large trade sample those trades that were not directionally aligned with the dealer's overall swap position in the same currency and on the same day as of the time of the trade. We calculated this overall position by summing the notional size in DV01 terms of all swap trades made by a dealer in the same currency on that day up to the point of the large trade.

Analyzing offsetting activity: We identified all IRS trades made by the dealer in the same currency across the 2-30 year tenor curve within a defined time horizon following the large trade (our time horizons ranged from within 30 minutes to 8 hours), noting whether each transaction was in the same or opposite direction relative to the large trade, and the size of the transaction in DV01 terms relative to the size of the large trade

X. Conclusions

This paper characterizes trading activity in the OTC IRD market with a focus on analysis that will inform the debate about post-trade reporting rules and shed light on their likely impact on the IRD market. Aggregate data on the IRD market shows that it is characterized by low levels of trading activity spread across a wide range of products and currencies.

Commonly used statistical measures of market share concentration suggest that trading activity is broadly dispersed among market participants in the top products and G4 currencies. In addition, nearly all non-G14 market participants traded with more than one G14 dealer and most traded with several dealers for the same product. Our finding suggests that market participants have the opportunity to compare prices from multiple liquidity providers in the top products and currencies.

For each major product type and currency, there was significant use of common contract terms and a clustering of activity around a select group of tenors. Floating rate reference indices in IRD were highly standardized, and other features (such as payment frequency) generally had a high proportion of trading with standard terms. In addition, we found that roughly 60% of trading in the top products and currencies occurred in a select group of tenors.

Nonetheless, we show that the IRD market is characterized by heterogeneity in some contract terms and a wide dispersion of trading activity. Across all products and currencies, there were over 10,500 different combinations of currency and tenor traded, with roughly 4,300 of those trading only once. In addition, we

[34] This appears to highlight a significant contrast to the CDS market, where earlier published analysis found little evidence of large customer trades being offset through subsequent trading on the same or next day (See pages 16-18 of the paper produced for CDS: http://www.newyorkfed.org/research/staff_reports/sr517.pdf).

found meaningful levels of customization in some contract terms. For many of these instruments, pre-trade quoted prices will likely continue to be the most meaningful source of information for prospective investors.

Both tenor and currency were substantively related to the notional trade size of IRD transactions, making it appropriate to group transactions based on both features for the application of large trade thresholds. We find that IRS dealers are able to undertake a statistically significant amount of opposite-direction trading in the same product and currency with 30 minutes after the execution of a large size customer transaction. We caveat these findings with the fact that our analysis could not be extended to other IRD product markets, thus our conclusions on a dealers' ability to offset large trades are confined only to the most actively traded currencies in the IRS market.

In conclusion, our analysis suggests that the high degree of standardization and clustering of trade activity in some IRD instruments may result in timely and pertinent price information for market participants under a post-trade reporting regime. However, for many IRD instruments, the exceptionally low trading frequency, customized contract terms, and high degree of trade dispersion may limit the impact on price formation from the reporting of these trades.

In terms of developing large trade protections, we found it beneficial to group transactions based on tenor and currency. And, as long as adequate trade size masking or reporting delays are in place for large trades in the IRS market, our findings suggest that reporting may not significantly disrupt dealer hedging activity. These suggest that a post-trade reporting regime could be implemented in a manner that does not meaningfully impair market-making activity, even if at this point, the level of trading in many instruments is too low and widely distributed to significantly enhance price discovery. Emerging regulations may also change the way that trading occurs in this market, so there is the potential for trading to move into more standardized tenors, or for liquidity to increase in specific product markets.