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1. Introduction

The historical dichotomy between exchange-traded and over-the-counter (OTC) derivatives has often been expressed as a trade-off between liquidity and customization. Futures exchanges would offer a suite of highly-standardized contracts designed so that each contract attracted sufficient interest to trade in an anonymous, highly-liquid, and low-cost market. Derivatives dealers, on the other hand, would offer a much greater number of contracts that were customized for various clients through bespoke, less liquid, and relatively expensive transactions.[2]

The liquidity-customization dichotomy seemed less and less relevant to the interest rate swap (IRS) market, however, as it grew from its infancy in the mid-1980s into one of the world's largest markets by the time of the Dodd-Frank Act in 2010. More specifically, IRS continued to trade OTC despite the fact that the terms of most contracts were relatively standardized, that is, in requiring semiannual fixed-rate payments against quarterly payments of LIBOR over a limited set of initial tenors.[3] An argument could be made, therefore, that IRS continued to trade OTC not because of the economics of customization, but rather because OTC markets were less regulated than futures markets.[4]

Dodd-Frank, however, would change the regulatory landscape dramatically. Swap dealers would be subject to registration and supervision, which would parallel the treatment of futures commission merchants (FCMs). IRS would trade on swap execution facilities (SEFs) and be subject to reporting requirements, which would more closely resemble the trading of futures on organized exchanges. And nearly all IRS would be subject to margin requirements, with standardized IRS mandated to be cleared, which would bring risk management practices in OTC markets closer to those of futures clearinghouses.

Anticipating that Dodd-Frank would level the regulatory playing field, many market participants predicted the "futurization" of IRS, meaning that IRS contracts would be replaced by highly standardized interest rate futures contracts, and that IRS trading would migrate from bespoke OTC transactions to

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[2] See, for example, CFTC (2013), comments of Gary Gensler, p. 13; Brian Durkin, p. 36; Sally Ingberg, p. 257-262; Lance Kotschwar, re commodity derivatives, pp. 271-273; and Luke Zubrod, p. 277. See also, Duffie (2013), p. 1.

[3] This paper focuses on the standardization of payment terms. Templates for legal terms have been highly standardized since the introduction of the ISDA Master Agreement in 1985, though the agreement can be modified to suit the wishes of individual pairs of counterparties.

[4] See, for example, Parsons and Mello (2012).

anonymous trading on exchanges.[5] Furthermore, the case for IRS futurization grew even stronger with the details of Dodd Frank's implementation: margin requirements for swap positions were set with a higher "margin period of risk" than futures; the evolving bank capital regime turned out to be particularly onerous for various swap portfolios; and the costs of trading IRS exceeded the costs of trading equivalent risk positions with futures.[6] These issues attracted enough attention, in fact, for the CFTC to host a roundtable on futurization in 2013.[7]

And yet, a decade after Dodd-Frank, the market for trading interest rate risk is still dominated by the OTC IRS market. As measured by the Office of the Chief Economist of the CFTC, risk transfer through OTC U.S. dollar IRS is about $7 trillion, in terms of 5-year swap equivalents, but only about $2 trillion through U.S. Treasury and Eurodollar futures combined.[8] While there are also markets in swap futures, open interest in these markets is still relatively small.[9]

This paper uses regulatory data on U.S. dollar-denominated, fixed-for-floating IRS transactions to explore customization as an explanation for the continued dominance of the OTC market.[10] In short, the data do not support that explanation. Depending on the exact definition of standardized vs. customized contract terms, anywhere from 58% to 78% of IRS notional amount is, in fact, standardized. In the uncleared IRS market, customization does play a more significant role, with only between 32% and 41% standardized, but uncleared IRS constitute only about 4% of total notional amount.

Section 2 of this paper describes the contract terms of fixed-for-floating IRS and distinguishes between standardized and customized swaps. Section 3 describes the data used in the study and presents the results. Section 4 concludes by noting other possible explanations for the dominance of the OTC market, which might be tested by future research.

2. Standardized vs. Customized IRS

A fixed-for-floating IRS is an agreement between two counterparties in which one counterparty receives a fixed rate of interest from, and pays a floating rate of interest to, another counterparty over some time period and on some notional amount.[11] For the purpose of defining terms, Figure 1 illustrates the cash flows of a particular IRS from the perspective of the counterparty that receives the fixed rate and pays the floating rate.

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[5] See, for example, CFTC (2013), comments of George Harrington, p. 42; Jeffrey Maron, pp. 51-53; Will Rhode, pp. 56-57; John Parsons, pp. 86-87; Charles Reyl, re energy derivatives, p. 254. See also, Parsons and Mello (2012), and Duffie (2013), p. 2.

[6] See, for example, Carney (2013), Duffie (2013), p.3, and Greenwich Associates (2015).

[7] See CFTC (2013).

[8] A market with $7 trillion or $2 trillion 5-year swap equivalents has the same amount of "parallel" or "level" interest rate risk transfer as one with $7 trillion or $2 trillion notional amount of 5-year swaps. For a discussion of the metric, see Haynes *et al.* (2018). For the quantities quoted in the text, which are as of the third quarter of 2019, see Baker *et al.* (2019a), Table 3, and Baker *et al.* (2019b), Table 1.

[9] As of May 1, 2020, open interest is about $21.4 billion notional amount in Eris Swap Futures and about $10.7 billion in 5- and 10-year USD MAC Swaps. See http://www.erisfutures.com/cme/volumeopeninterest , https://www.cmegroup.com/trading/interest-rates/swap-futures/5-year-usd-mac-swap_quotes_volume_voi.html#tradeDate=20200501 , and https://www.cmegroup.com/trading/interest-rates/swap-futures/10-year-usd-mac-swap_quotes_volume_voi.html#tradeDate=20200501 .

[10] Fleming *et al.* (2012) present statistics on IRS standardization as of 2010 using data provided by MarkitSERV.

[11] For a more detailed discussion of IRS, see, for example, Tuckman and Serrat (2011), Chapter 16.

The counterparties to an IRS agree to contract terms on the *trade date*, which is depicted as year 0 in Figure 1. Interest begins to accrue on both the fixed and floating legs of the swap on the *settlement date*, which, in the example of the figure, is 1 year after the trade date. The fixed and floating payment schedules are determined separately by a *payment frequency*. In Figure 1, the fixed payments are made semiannually, while the floating payments are made quarterly.

The height of the red bars in Figure 1 represent the size of the fixed payments to the receiver of the fixed rate. If, for example, the fixed rate on the swap were 3% and the notional amount $100 million, then each (semiannual) fixed payment would be half of 3% times the notional amount, or $1.5 million. The height of the blue bars in the figure represent the size of the floating rate payments made by the receiver of fixed and, therefore, are negative. The sizes of these payments are determined by the realized path of the *floating rate index* and, as such, are not known as of the trade date. Furthermore, these floating payments are *set in advance and paid in arrears*. For concreteness, say that the floating rate index is LIBOR and that the value of LIBOR 1.25 years after the trade date is 1.6%. Then, on a notional of $100 million, the (quarterly) floating rate payment made 1.5 years after the trade date is one fourth of 1.6% times $100 million, or $400,000.

Payments on the swap continue until the *maturity date*, at which time the last payments of interest are exchanged. The difference between the maturity date and the settlement date is called the *tenor* of the swap. While the tenor of a swap changes over time, as the swap matures, the word "tenor" in this paper will refer exclusively to the *initial tenor* of the swap, that is, its tenor as of the trade date.

The swap depicted in Figure 1 is a *forward swap,* or, synonymously, a *forward-starting swap*, or a swap for *forward settlement*, which means that the settlement date is more than a few days after the trade date. By contrast, in a *spot swap*, a *spot-starting swap*, or a swap for *spot settlement*, the settlement date is just a few days after the trade date, which means that the tenor of the swap is essentially the difference between the maturity date and the trade date. Consequently, the tenor of a spot swap is also called the *maturity* of the swap.

With the above terminology defined, the discussion turns to standardization *vs.* customization. While no bright line separates standardized from customized swaps, certain contracts clearly fall on the extremes of the spectrum, and contracts between those extremes can be sensibly ranked.

The most standardized IRS are *Market Agreed Coupon* or MAC swaps. These swaps settle on one of the four *International Monetary Market* or *IMM* dates each year, which are the third Wednesday of March, June, September, and December. The initial tenor of MAC swaps are any of the following, in years: 1, 2, 3, 4, 5, 7, 9, 10, 12, 15, 20, and 30. The fixed rate of each MAC swap is before trading in that swap begins and is paid semiannually. The floating rate is LIBOR and is paid quarterly. To understand the standardization implicit in MAC swaps, consider the 5-year MAC swap that settles on December 16, 2020, which has a fixed coupon rate of 1%. Whatever the trade date, every MAC swap that settles on December 16, 2020, and matures 5 years later has exactly the same cash flows on exactly the same dates. Note too, for another perspective on MAC swap standardization, that for every IMM settlement date there exist exactly 12 distinct MAC swaps, one corresponding to each of the 12 maturity dates.

The next significant category of IRS, in descending order of standardization, will be called "standard par swaps." The "standard" part of the title means that these swaps have standard payment terms and tenors. More specifically, the floating rate is LIBOR, paid quarterly; the fixed rate is paid

semiannually; and the tenors are standard, i.e., a whole number of years, or, for swaps with tenors less than one year, a whole number of months. The "par" part of the title means that the fixed rate of the swap is set at the time of trade so that both counterparties are willing to enter into the swap without any initial payment from one to the other.[12]

Standard par swaps are not nearly as standardized as MAC swaps for two reasons. First, on a given trading day, par swaps are initiated with fixed rates that vary across all of the different par rates that prevailed at the times of the trades. Second, every new trading day, the settlement and maturity dates of new swaps of a given tenor change as well. For example, 5-year spot swaps that settle on June 1, 2020, mature on June 1, 2025, and make quarterly and semiannual payments between those dates. But the next trading day, 5-year spot swaps settle on June 2, 2020, mature on June 2, 2025, and make payments determined by those start and end dates. In short, the time-varying fixed rates and maturity dates for new swaps means that there exist a very large number of initially par swaps with distinct – though similar—cash flows and cash flow payment dates.

Within the broader category of standard par swaps, forward-starting swaps can be more or less standardized. Among the more standardized are swaps that settle and pay on IMM dates, like MAC swaps, but with fixed rates that vary within and across trading days, like standard par swaps. Among the less standardized are swaps that have standard tenors, but that settle on a wide variety of dates. These forward settlement dates may or may not have particular significance. As an example of those having particular significance, consider a corporation that decided on May 15, 2020, to issue 10-year fixed-rate debt on November 20, 2020. The most accurate way to hedge the interest-rate risk of that future issuance is to agree on May 15, 2020, to pay fixed on a 10-year IRS for settlement on November, 20, 2020. The choice of the forward settlement date here clearly does matter. On the other hand, as an example of forward settlement dates not having particular significance, consider an entity that wants exposure to interest rates, but does not want—perhaps for accounting or operational reasons—to exchange IRS payments. In this case, the entity enters into a forward-starting swap, but the exact choice of settlement date is of little importance.

This paper considers MAC swaps, spot-starting par swaps, and forward-starting swaps with IMM settlement and payment dates as standardized rather than customized. Forward-starting swaps with standard tenors but arbitrary starting dates, along the lines of the discussion in the previous paragraph, are considered as somewhere between standardized and customized. The discussion now turns to swaps that this paper considers to be customized.

Some swaps are customized in the sense of having non-standard tenors. Counterparties might customize tenors for any number of reasons, but an often-cited reason is to match the cash flows of particular bonds. Consider a corporation that wants to convert its outstanding long-term, fixed-rate bonds into floating-rate debt. It can achieve its objective by receiving fixed and paying floating in an IRS

[12] This nomenclature arose when swap cash flows were discounted along the LIBOR curve. The present value of the floating leg of the swap—with the inclusion of a fictional notional payment at maturity—was, therefore, identically equal to par, i.e., the notional amount. The rate on the fixed leg of the swap was set so that its present value—also with the inclusion of the same fictional notional payment—was also equal to par. Therefore, the net present value of the swap, the difference between the values of the two legs, was zero, and counterparties would enter into the swap without any initial payment. As swap discounting shifted away from LIBOR, the fixed rate on "par swaps" is still set so that no initial payment is required, but the two legs of the swap—while equal—are no longer also equal to par. For a more detailed explanation, see Tuckman and Serrat (2012), Chapters 16 and 17.

that matches the maturity of its outstanding bonds. But since the maturity of the bonds on a given date will generally not coincide with a standard swap tenor, the corporation may very well enter into a swap with a non-standard tenor, i.e., a customized swap.

A related example of swaps with non-standard tenors arise from *asset swaps*. Say that an asset manager wants to own a particular corporate credit, but does not want to bear the interest rate risk of owning a corporate bond. The manager can buy the corporate bond and pay fixed in a matched-maturity IRS. As in the example of the corporate issuer, the overall position is most easily managed if the asset manager enters into a swap with the same fixed payment dates as the corporate bond. In fact, both the issuer and the asset manager can simplify their overall positions even further by setting the fixed rate on the swap equal to the coupon rate on the corporate bond. In that case, their swaps will be customized not only with non-standard tenors but also with non-standard (i.e., non-par) coupons.

The third and last significant example of customized swap tenors arises from arbitrage trades in the U.S. Treasury note and bond futures markets. Traders sometimes believe that these futures contracts are under- or over-valued. The most common attempts to profit from these mispricings entail buying the futures and selling the bonds, or *vice versa*. An alternative, however, is to buy futures and pay fixed in an IRS or to sell futures and receive fixed in an IRS. In this alternative, the IRS typically has a settlement date equal to the futures contract delivery date and a maturity date equal to the maturity of the bond that is *cheapest-to-deliver* (CTD) into the futures contract.

Apart from non-standard tenors, swaps can be customized with floating-rate indexes other than LIBOR or with payment frequencies other than semiannual on the fixed side and other than quarterly on the floating side. Finally, swaps can be customized with *amortization schedules* or with *embedded options*. In an amortizing swap, the notional amount changes over time according to some predetermined schedule. In swaps with embedded options, one or both counterparties might have the right to cancel or to extend the swap within certain parameters.

3. Data and Results

This paper uses regulatory data on transactions in 2018 in U.S. dollar-denominated, fixed-for-floating IRS[13] as reported by entities under the jurisdiction of the CFTC. To decide whether a particular swap falls into a particular category of swaps, and, therefore, whether that swap is standardized or customized, tolerances need to be set around targets. For example, should the tenor of a swap that settles on May 15, 2020, and matures May 17, 2030, be considered to have a standard, 10-year tenor or a customized tenor of 10 year and 2 days? This paper allows a tolerance of 10 days in determining standard tenors and, therefore, classifies this swap as having a standard tenor. It turns out, by the way, that the results presented here are not very sensitive to this choice of tolerance.[14] In any case, a list of the detailed definitions and tolerances used in the paper is given in the Appendix.

[13] Overnight index swaps (OIS) are not included in the sample. Backward-starting swaps, those with settlement dates before trade dates, which are used to unwind and compress existing swap positions, are also not included in the sample. Finally, note that the 2018 sample period predates swaps with floating rates that reference the secured overnight financing rate (SOFR).

[14] Lowering the tolerance for all tenors from 10 days to 5 days shifts about 0.2% of notional amount from the standardized to the customized categories.

Figure 2 graphically shows the importance of standard tenors in the IRS market. The horizontal axis is measured in years, but displays ticks monthly. The data clearly show that an overwhelming fraction of all notional amount transacted is at standard tenors.

The full results of the paper are given in Table 1. Panel a) gives results for all swaps, Panel b) for cleared swaps, and Panel c) for uncleared swaps. The rows of each table list the various categories of swaps described in the previous section. The swaps included in the unshaded rows are classified as exclusively standardized. The swaps in the lightly-shaded row are considered as containing some swaps that are standardized and some that are customized. And the swaps in the shaded rows are taken as exclusively customized.

The second column in each table gives the notional amount of swaps in each category, in billions of dollars. The third column in each gives the notional amount in each category as a percentage of the notional amount of the entire group.

Following these definitions of the rows and columns, the sum of the unshaded rows in any column, that is, the sum across all exclusively standardized swaps, gives a lower bound for the standardized swaps. That sum or lower bound, plus the lightly-shaded row, which is a combination of standardized and customized swaps, gives an upper bound for standardized swaps. The sum of the shaded rows, that is, the sum across all exclusively customized swaps, gives a lower bound on the customized swaps. Finally, that lower bound on customized swaps plus the lightly-shaded row, which contains both standardized and customized swaps, gives an upper bound on customized swaps.

Turning to the overall results, the total notional amount of all transactions is $41.2 trillion, with $39.4 or 96% of that cleared and $1.8 or 4% uncleared. Focusing on the overall sample, in Panel a), the largest category of swaps are spot-starting par swaps, at 41% of the overall notional amount. The next largest categories are forward-starting swaps with standard payment terms and tenors, at about 21% of notional amount, and forward-starting swaps with IMM settlement and payment dates at about 14%.

The total notional amount of exclusively standardized swaps is $23.7 trillion, or about 58% of the overall sample. The total notional amount of swaps that might be standardized or customized is $8.5 trillion, or about 21% of the sample. Therefore, the notional amount of standardized swaps is between 58% and 78% of the sample. In other words, customization alone cannot account for most of the OTC IRS market.

One would expect customization to play a larger role among uncleared swaps. First, some IRS with non-standard and complex features might not be eligible for clearing. Second, commercial end users, who are exempt from the swaps clearing requirement, might very well prefer to customize IRS to suit their business needs. And, in fact, Table 1, Panels b) and c), show that customization is more prevalent in uncleared IRS: standardized notional comprises only between 32% and 41% of uncleared IRS, but between 59% and 80% of cleared IRS. Furthermore, Panel c) reveals that the most complex of the non-standard features, namely amortization schedules and embedded options, are particularly more prevalent among uncleared swaps, comprising 24% of uncleared swaps but only 3% of cleared swaps. While the extent of customization is significantly greater for uncleared IRS, it should be recalled that uncleared IRS notional constitutes only 4% of total notional. Hence, the greater customization of uncleared IRS has relatively little impact on the overall customization statistics presented in Panel a).

4. Conclusion

As the OTC IRS market grew in size from the mid-1980s into the 21st century, there was a narrative that futures markets were more efficient trading venues, but that OTC swaps offered customized contracts and, according to some, skirted the regulatory structure of futures markets. Those believing in the regulatory arbitrage story predicted that the Dodd-Frank Act, by leveling the regulatory playing field across swaps and futures, would result in the "futurization" of swaps.

In the decade following Dodd-Frank, however, despite implementation details that favored futures over swaps, the OTC IRS swap market has maintained its dominance. This paper, using regulatory transactions data from 2018, rebuts the customization explanation for this dominance. Between 58% and 79% of IRS trades are, in fact, standardized.

Other explanations are needed, therefore, to explain the continued dominance of OTC over futures markets.[15] One reason might be that swaps counterparties are less subject to "fellow-customer risk" than futures counterparties because of LSOC (legal separation with operational comingling) for cleared swaps and collateral segregation requirements for uncleared swaps.[16] Another reason might be that swaps users, for historical reasons, are conceptually and operationally bound to swaps. A survey in 2015, for example, found that one-third of respondents "cited unfamiliarity as their biggest impediment to trading futures."[17] And any actual migration from futures to swaps, particularly *en masse*, so as to retain the benefits of portfolio diversification, might easily entail large fixed and variable costs. In any case, an empirically validated explanation of the advantages of OTC IRS would ease any concerns that the market structure of interest-rate derivatives trading is not as efficient as it might be.

[15] Market participants might prefer uncleared OTC to futures so as to enjoy offsets across IRS and non-swap, interest rate products, like repurchase agreements. See, for example, Tuckman (2015), pp. 23-24. But with the vast majority of IRS currently cleared, this explanation cannot explain the continued dominance of cleared IRS and, therefore, of most IRS.

[16] See, for example, Smack (2014), pp. 149-150, and https://www.cmegroup.com/clearing/risk-management/lsoc-cleared-swaps-customer-protection.html .

[17] See Greenwich Associates (2015), p. 15.

Figure 1. The Terms of an Interest Rate Swap

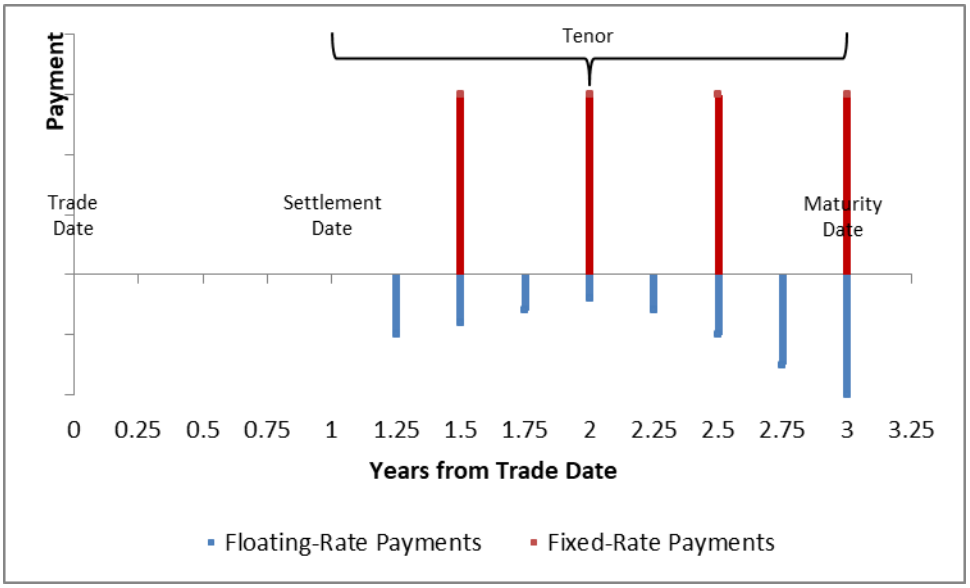

Figure 2. The Standardization of IRS Tenors. The horizontal axis measures swap tenor as of the trade date, with a tick at every month. The vertical axis shows the notional amount transacted at particular tenors. The data set comprises U.S. dollar-denominated, fixed-for-floating IRS transactions in 2018 by entities required to report to the CFTC. Notional amounts are in billions of dollars.

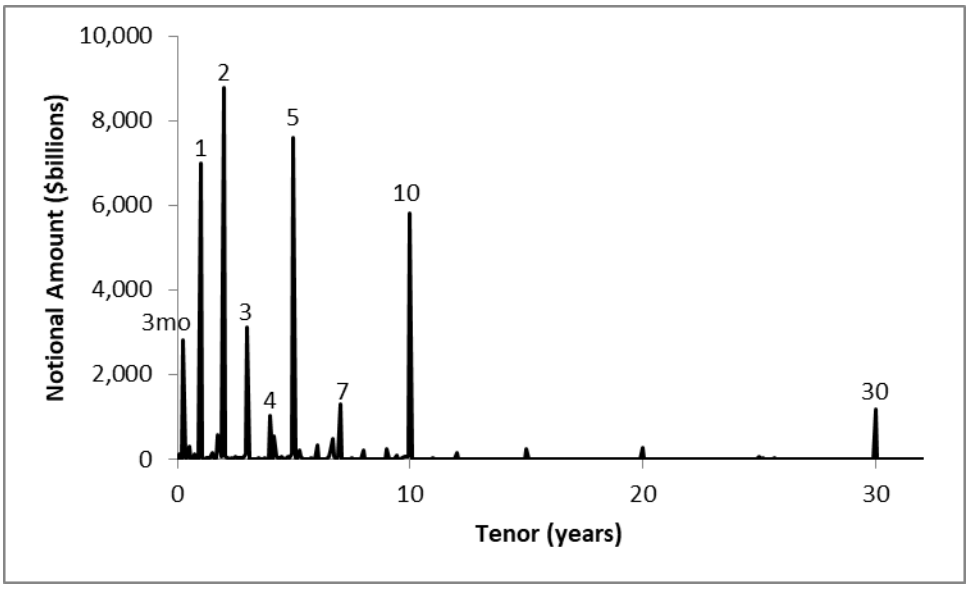

Table 1. Standardized vs. Customized IRS. The data set comprises U.S. dollar-denominated, fixed-for-floating IRS transactions in 2018 by entities required to report to the CFTC. Notional amounts are in billions of dollars.

Panel a): Total Sample (Cleared and Uncleared)

	Swap Description	Notional	% Notional
	Spot- and forward-starting, standardized		
(1)	*MAC*	913	2.2%
(2)	*Spot, standard payment terms and tenors, par coupons*	16,885	41.0%
(3)	*Fwd, IMM settlement and payment dates*	5,883	14.3%
(4)	**Subtotal: standardized swaps, lower bound [(1)+(2)+(3)]**	**23,681**	**57.5%**
(5)	*Forward, standard payment terms and tenors, various settlement dates*	8,481	20.6%
(6)	**Subtotal: standardized swaps, upper bound [(4)+(5)]**	**32,162**	**78.1%**
	Spot-starting, customized		
(7)	*Asset swap (bond maturity dates)*	229	0.6%
(8)	*Floating-rate other than 3-month LIBOR*	20	0.0%
(9)	*Payment frequency other than quarterly floating and semiannual fixed*	1,706	4.1%
(10)	*Other non-standard tenors, non-par coupons*	2,425	5.9%
	Forward-starting, customized		
(11)	*CTD maturity*	1,806	4.4%
(12)	*Asset swap (bond maturity dates)*	594	1.4%
(13)	*Standard tenor, non-standard floating rate or payment frequency*	422	1.0%
(14)	*Other non-standard tenor*	295	0.7%
(15)	*Amortizing notional or embedded options*	1,542	3.7%
(16)	**Subtotal: customized swaps, lower bound [sum of rows (7)-(15)]**	**9,039**	**21.9%**
(17)	**Subtotal: customized swaps, upper bound [(16)+(5)]**	**17,520**	**42.5%**
(18)	Total	41,201	100%

Table 1, Panel b): Cleared Swaps

	Swap Description	Notional	% Notional
	Spot- and forward-starting, standardized		
(1)	*MAC*	905	2.3%
(2)	*Spot, standard payment terms and tenors, par coupons*	16,725	42.4%
(3)	*Fwd, IMM settlement and payment dates*	5,488	13.9%
(4)	**Subtotal: standardized swaps, lower bound [(1)+(2)+(3)]**	**23,118**	**58.6%**
(5)	*Forward, standard payment terms and tenors, various settlement dates*	8,305	21.1%
(6)	**Subtotal: standardized swaps, upper bound [(4)+(5)]**	**31,423**	**79.7%**
	Spot-starting, customized		
(7)	*Asset swap (bond maturity dates)*	205	0.5%
(8)	*Floating-rate other than 3-month LIBOR*	9	0.0%
(9)	*Payment frequency other than quarterly floating and semiannual fixed*	1,530	3.9%
(10)	*Other non-standard tenors, non-par coupons*	2,310	5.9%
	Forward-starting, customized		
(11)	*CTD maturity*	1,720	4.4%
(12)	*Asset swap (bond maturity dates)*	529	1.3%
(13)	*Standard tenor, non-standard floating rate or payment frequency*	332	0.8%
(14)	*Other non-standard tenor*	250	0.6%
(15)	*Amortizing notional or embedded options*	1,109	2.8%
(16)	**Subtotal: customized swaps, lower bound [sum of rows (7)-(15)]**	**7,994**	**20.3%**
(17)	**Subtotal: customized swaps, upper bound [(16)+(5)]**	**16,299**	**41.4%**
(18)	Total	39,417	100%

Table 1, Panel c): Uncleared Swaps

	Swap Description	Notional	% Notional
	Spot- and forward-starting, standardized		
(1)	*MAC*	7	0.2%
(2)	*Spot, standard payment terms and tenors, par coupons*	160	9.0%
(3)	*Fwd, IMM settlement and payment dates*	394	22.1%
(4)	**Subtotal: standardized swaps, lower bound [(1)+(2)+(3)]**	**561**	**31.5%**
(5)	*Forward, standard payment terms and tenors, various settlement dates*	175	9.8%
(6)	**Subtotal: standardized swaps, upper bound [(4)+(5)]**	**736**	**41.3%**
	Spot-starting, customized		
(7)	*Asset swap (bond maturity dates)*	23	1.3%
(8)	*Floating-rate other than 3-month LIBOR*	10	0.6%
(9)	*Payment frequency other than quarterly floating and semiannual fixed*	177	9.9%
(10)	*Other non-standard tenors, non-par coupons*	115	6.5%
	Forward-starting, customized		
(11)	*CTD maturity*	87	4.9%
(12)	*Asset swap (bond maturity dates)*	65	3.6%
(13)	*Standard tenor, non-standard floating rate or payment frequency*	90	5.1%
(14)	*Other non-standard tenor*	45	2.5%
(15)	*Amortizing notional or embedded options*	433	24.3%
(16)	**Subtotal: customized swaps, lower bound [sum of rows (7)-(15)]**	**1,046**	**58.7%**
(17)	**Subtotal: customized swaps, upper bound [(16)+(5)]**	**1,221**	**68.5%**
(18)	Total	1,782	100%

Appendix: Detailed Definitions

Asset Swap

A swap is considered as corresponding to an asset swap if i) its maturity date is in the middle or the end of a month; and ii) if its fixed rate is greater than the high or less than the low of that day's fixed rates for swaps of that maturity.

Cheapest-to-Deliver (CTD) Maturity

The maturity of a swap is considered to be a CTD maturity if the maturity of the swap matches that of the bond that is CTD into a U.S. Treasury note or bond futures contract.

Forward-Starting Swaps

A swap is considered forward starting if its settlement date is at least 8 days after the trade date.

MAC Swaps

A swap is a MAC swap if it matches the CME's specifications for a MAC swap.

Par Swaps

The fixed rate of spot-starting swap of a particular tenor constitutes a par swap if that rate is within 5 basis points of the average of the high- and low-rates for swap of that tenor on that trading day.

Standard Tenors

A swap tenor is considered standard if it is within 10 days of a whole year or, for swaps maturing in less than a year, within 10 days of a whole month.

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