January 2016

ISDA®

Research Note

Derivatives Market Analysis: Interest Rate Derivatives

Derivatives notional outstanding figures can be a useful, broad indicator of derivatives positions, but do not reflect the amount of risk being transferred, the payments that are exchanged between parties, or the maximum loss that would be incurred should every derivatives contract be closed out.

They do shed light on changes in derivatives trends – for instance, the increasing shift to clearing, an important regulatory goal. However, publicly reported figures, such as those published by the Bank for International Settlements (BIS), do not necessarily reflect detailed variations in derivatives market activity. That's because these notional outstanding numbers do not fully take account of the opposing influence of clearing and compression. Clearing acts to increase reported notional outstanding, as a single bilateral transaction is counted as two cleared trades once novated to a central counterparty (CCP). In contrast, compression reduces notional outstanding, which can make it seem like fewer trades are taking place.

This report adjusts for these two effects to give an estimate of underlying interest rate derivatives (IRD) activity. The results are provided as gross notional volume statistics, rather than current market values or counterparty credit exposures (which are measures also reported by the BIS).

The research finds that underlying IRD activity has increased, although a strong uptick in compression volumes has resulted in a decline in publicly reported notional outstanding figures. The analysis also shows the majority of clearable IRD notional is now being cleared.

SUMMARY

More than two thirds of IRD notional outstanding has now been cleared

The BIS publishes derivatives notional outstanding data on a semiannual basis. These statistics are commonly used to describe the size of the derivatives market and trends in derivative use[1]. However, two factors act to distort this data: clearing and compression.

Clearing inflates notional outstanding, as a single bilateral trade is reported as two separate transactions within the BIS statistics (one between party A and the clearing house and one between party B and the clearing house). The BIS semiannual notional outstanding data is not adjusted for this double counting[2].

Compression has the opposite effect, acting to reduce notional outstanding by cancelling offsetting trades. The BIS figures are reported after compression, which makes it difficult to draw any conclusion about underlying derivatives market trading activity.

This research uses publicly reported notional outstanding figures to provide an estimate of IRD market activity before compression and amended for the double counting of cleared trades[3].

The report also provides a snapshot of the proportion of IRD notional outstanding that is currently cleared.

HIGHLIGHTS OF THE REPORT INCLUDE:

- Approximately 67.1% of IRD notional outstanding was cleared at end-June 2015. This proportion has fallen slightly from a high of 72.0% six months earlier due to an increase in CCP portfolio compression activity.
- Roughly 95% of clearable IRD notional outstanding is already being cleared. Other IRD products may be cleared over time.
- The BIS reported a decrease of 14.0% in IRD notional outstanding in the six months to June 30, 2015, from $505.4 trillion to $434.7 trillion.
- Adjusting for the effects of clearing and compression, underlying IRD notional outstanding increased by 4.7% over the same period.
- Overall IRD notional has been reduced by roughly 62% as a result of portfolio compression.
- Cleared and compressed volumes are likely to increase further in response to regulatory change (such as new clearing mandates and the implementation of the leverage ratio under Basel III).

[1] Notional outstanding does not reflect the amount of risk that is being transferred between counterparties or the maximum loss should all outstanding derivatives contracts be terminated. Instead, the notional amount is a reference point for the calculation of contractual payments (not the amount that is actually paid from one counterparty to another). As the BIS states in its commentary to the end-June 2015 figures: "The gross market value of outstanding derivatives contracts…provides a more meaningful measure of amounts at risk than notional amounts". Market values decreased from $20.9 trillion to $15.5 trillion between end-December 2014 and end-June 2015 (BIS, November 2015, page 2)

[2] See OTC derivatives statistics at end-June 2013, BIS, November 2013, footnote 3, page 7, for an explanation of the BIS methodology (*https://www.bis.org/publ/otc_hy1311.pdf*)

[3] ISDA used data from the BIS, the Depository Trust & Clearing Corporation (DTCC), LCH.Clearnet's SwapClear, CME Group, Japan Securities Clearing Corporation (JSCC) and TriOptima. The following CCPs also clear IRD, but are excluded from this analysis: Eurex, Nasdaq OMX, OTC Clearing Hong Kong, Singapore Exchange, Shanghai Clearing House and Korea Exchange

MARKET SNAPSHOT AT JUNE 30, 2015

Most of what can be cleared in the IRD market is now being cleared

In this section, we calculate the proportion of IRD notional outstanding that is cleared. This is illustrated in the waterfall analysis in Chart 1.

We begin with the notional amount outstanding for interest rate derivatives on June 30, 2015 (item A), as reported by the BIS. This figure is $435 trillion[4].

This amount is then adjusted for the double counting of cleared trades. This is achieved by calculating total cleared volume on June 30, 2015 (item B), and subtracting that from the reported gross notional outstanding. The resulting figure of $260 trillion is the adjusted gross notional outstanding figure (item C).

Comparing total cleared notional of $175 trillion with the adjusted notional figure of $260 trillion enables us to determine the proportion of the market that is currently cleared: approximately 67.1% of IRD notional outstanding.

The remaining sections of the waterfall analysis focus on the non-cleared segments of the IRD market. Subtracting total cleared notional volume from the adjusted notional figure gives us the size of the non-cleared portion of the IRD market. This totals $86 trillion (item E).

Of the $86 trillion in non-cleared IRD, about $65 trillion[5] (item F) consists of swaptions, cross-currency swaps, options, and 'other' derivatives.

Swaps denominated in major currencies, as well as those denominated in many emerging currencies, are clearable. But there are still a handful of currencies that are non-clearable. According to DTCC statistics, about $2 trillion in notional outstanding fell into this category (item G)[6].

Another non-cleared market segment includes IRD transactions with non-financial counterparties that are not required to clear. We estimate this to be approximately $9 trillion at mid-year 2015 (item H)[7].

After removing these market segments, we arrive at an estimate of the amount of IRD transactions that are in largely clearable product categories but are not cleared: about $9 trillion (item I).

The waterfall therefore indicates approximately 95% or more of clearable IRD notional outstanding is currently cleared.

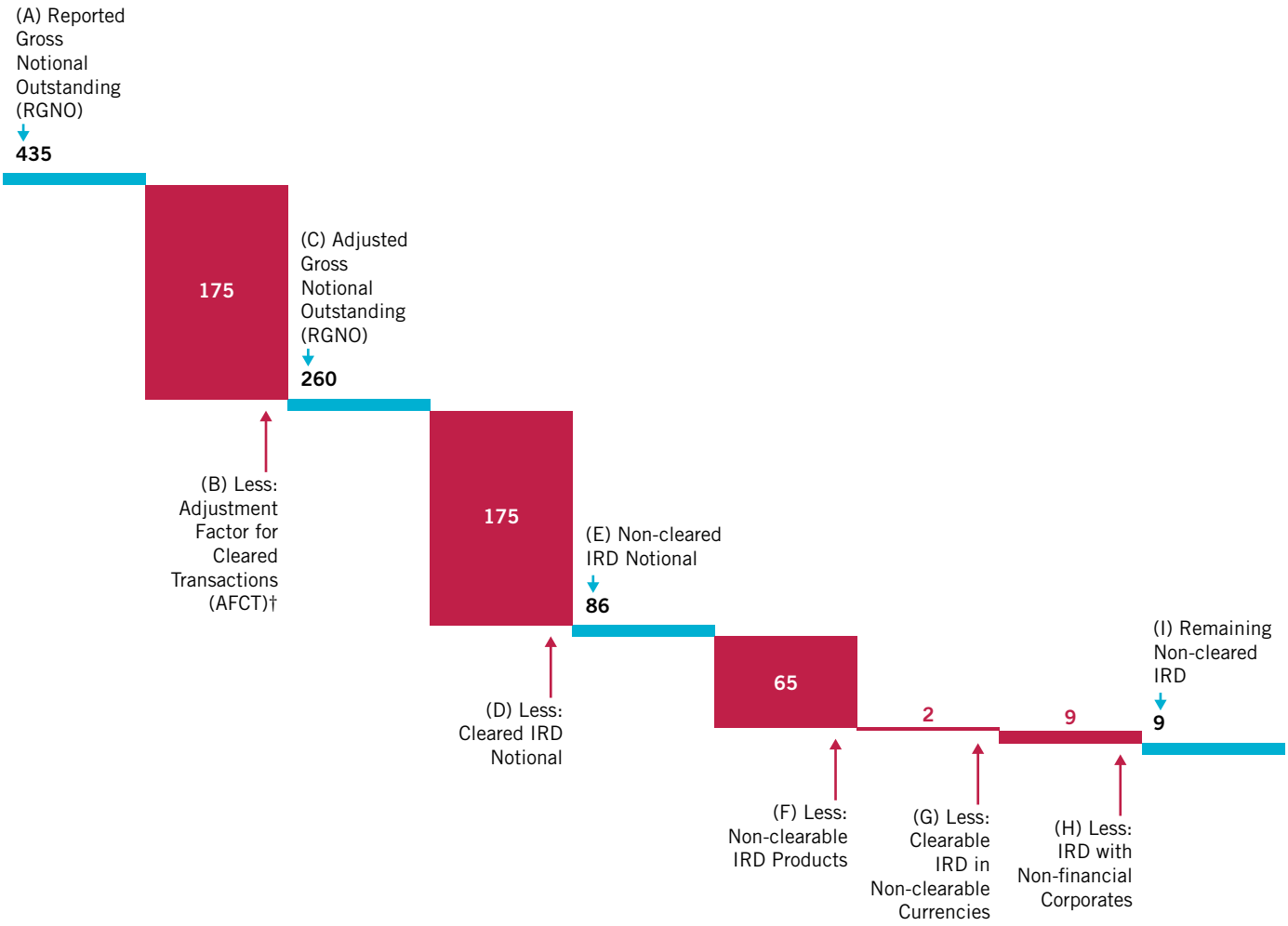
[4] All figures are rounded to whole numbers for the purposes of the waterfall analysis

[5] The $65 trillion consists of swaptions ($26.5 trillion), cross-currency swaps ($25.9 trillion), options ($8.9 trillion), and 'other' swaps ($3.5 trillion)

[6] The DTCC database provides volume statistics for IRD denominated in: USD, EUR, JPY, GBP, AUD, CAD, CHF, NZD, SEK, ZAR, MXN, SGD, KRW, PLN, HKD, BRL, NOK, HUF, CZK and CNY. All other currencies are aggregated as 'other' ($2.3 trillion) and are mostly non-clearable. It should be noted, however, that the DTCC's 'other' category contains DKK, which is clearable

[7] According to BIS end-June 2015 data, the notional value of IRD with non-financial corporates was $13.9 trillion. Assuming this figure breaks down into the same percentage between clearable and non-clearable (roughly 33%, or 86/260), about $9.3 trillion would consist of clearable products that are exempt from the clearing mandate, and $4.6 trillion would comprise non-clearable products

Chart 1: Interest Rate Derivatives Waterfall: June 30, 2015 (US$ trillions)



Source: BIS, CME Group, JSCC, LCH.Clearnet, TriOptima

† The adjustment factor for cleared transactions metric includes $141 billion from LCH.Clearnet, $24 trillion from CME Group, and $9 trillion from JSCC

A SHRINKING MARKET?

BIS semiannual figures are not adjusted for the effects of clearing and compression

The BIS regularly reports derivatives gross notional outstanding volume as part of its semiannual statistical release[8]. These figures represent the gross volume of all derivatives deals, legacy and new, which are concluded and not yet settled by the reporting date. The metric is intended to provide a measure of market size and a reference from which contractual payments are determined in derivatives markets.

Total outstanding volume was $552.9 trillion at the end of June 2015, a decrease of 12.1% compared with six months earlier, according to the BIS. Interest rate derivatives, which account for the majority (roughly 79%) of derivatives activity, totaled $434.7 trillion, a decrease of 14.0% over the same period.

Although useful, the gross notional outstanding volume metric is not adjusted for the effects of clearing and compression[9]. Clearing overstates the size of the market because cleared trades are reported twice in the BIS semiannual statistics. Conversely, compression understates underlying market activity, because offsetting tickets are torn up.

In the next sections, we analyze how these two opposing forces affect the IRD market in order to arrive at an estimate of underlying market size before clearing and compression occur.

THE EFFECT OF CLEARING

Cleared trades are counted twice in publicly reported figures, which pushes notional outstanding higher

A rise in the use of clearing houses – in response to clearing mandates for certain products in some jurisdictions, but also due to risk, capital and operational efficiency reasons – has pushed publicly reported notional outstanding higher than it otherwise would have been. That's because each bilateral transaction is subsequently reported as two trades once novated to a CCP.

Table 1 describes BIS **reported gross notional outstanding volume (RGNO)** of IRD from December 2007. According to the most recent BIS figures, this amount fell to $434.7 trillion in June 2015 from $505.4 trillion in December 2014, a 14.0% decrease.

In order to remove the double counting of cleared trades, an adjustment is made to the RGNO, based on CCP cleared volume data. This **adjustment factor for cleared transactions (AFCT)** totaled $174.6 trillion on June 30, 2015.

To determine an **adjusted gross notional outstanding (AGNO)** figure – that is, one where the double-counted cleared trades have been removed – the adjustment factor (AFCT) is subtracted from the BIS reported figure (RGNO). The resulting AGNO is $260.1 trillion as of June 30, 2015. In other words, adjusting for double counting reduces IRD notional outstanding by roughly 40%.

[8] For more information: www.bis.org

[9] As the BIS writes: "Changes in outstanding notionals…do not necessarily reflect changes in market activity or in the risk that is actually held. Dealers often enter into derivatives contracts to offset existing exposures. The move towards central clearing tends to further inflate outstanding notionals; after novation to the central counterparty (CCP), a single trade between two dealers becomes two outstanding contracts of each dealer with the CCP. Trade compression – a process of tearing up trades to eliminate economically redundant derivatives positions – has reversed this trend, helping to sharply undercut the value of outstanding notional OTC derivatives positions in recent years." *BIS Quarterly Review*, December 2015, page 24

Table 1: Gross Notional Outstanding Volume: Interest Rate Derivatives (US$ trillions)

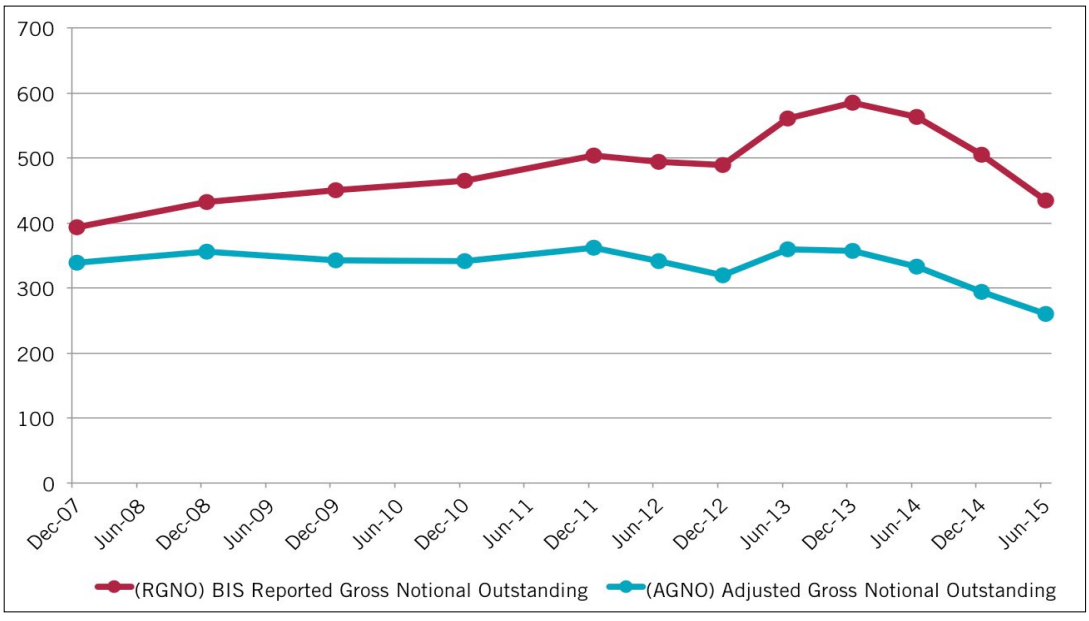
Notional Outstanding - US$ trillion	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Jun-12	Dec-12	Jun-13	Dec-13	Jun-14	Dec-14	Jun-15
(RGNO) BIS Reported Gross Notional Outstanding	393.1	432.1	449.9	465.3	504.1	494.4	489.7	561.3	584.4	563.3	505.4	434.7
(AFCT) Adjustment Factor for Cleared Transactions	54.4	75.8	107.7	124.2	141.9	152.8	170.7	201.9	227.7	230.5	211.5	174.6
LCH.Clearnet (Single-counted) Gross Notional Outstanding	54.4	75.8	107.7	124.2	141.9	152.8	170.7	195.5	213.0	206.8	179.6	141.2
CME Gross Notional Outstanding	N/A	N/A	N/A	N/A	0.1	0.3	0.6	3.0	9.1	15.6	22.8	24.0
JSCC Gross Notional Outstanding	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.4	5.6	8.1	9.1	9.4
(AGNO) Adjusted Gross Notional Outstanding	338.7	356.3	342.2	341.1	362.2	341.6	319.0	359.4	356.7	332.8	293.9	260.1
Pct (%) Cleared Gross Notional Outstanding	16.1%	21.3%	31.5%	36.4%	39.2%	44.7%	53.5%	56.2%	63.8%	69.3%	72.0%	67.1%

Source: BIS, CME Group, JSCC, LCH.Clearnet

Chart 2 compares reported (RGNO) and adjusted (AGNO) IRD notional outstanding volumes. Between December 2007 and June 2015, the RGNO (red line) increased by 10.6%, from $393.1 trillion to $434.7 trillion.

The trend differs when we adjust for the double counting of cleared trades. Over the same period, the AGNO (blue line) fell from $338.7 trillion to $260.1 trillion, a decline of 23.2%.

Chart 2: Gross Notional Outstanding Volume: Interest Rate Derivatives (US$ trillions)



Source: BIS, CME Group, JSCC, LCH.Clearnet

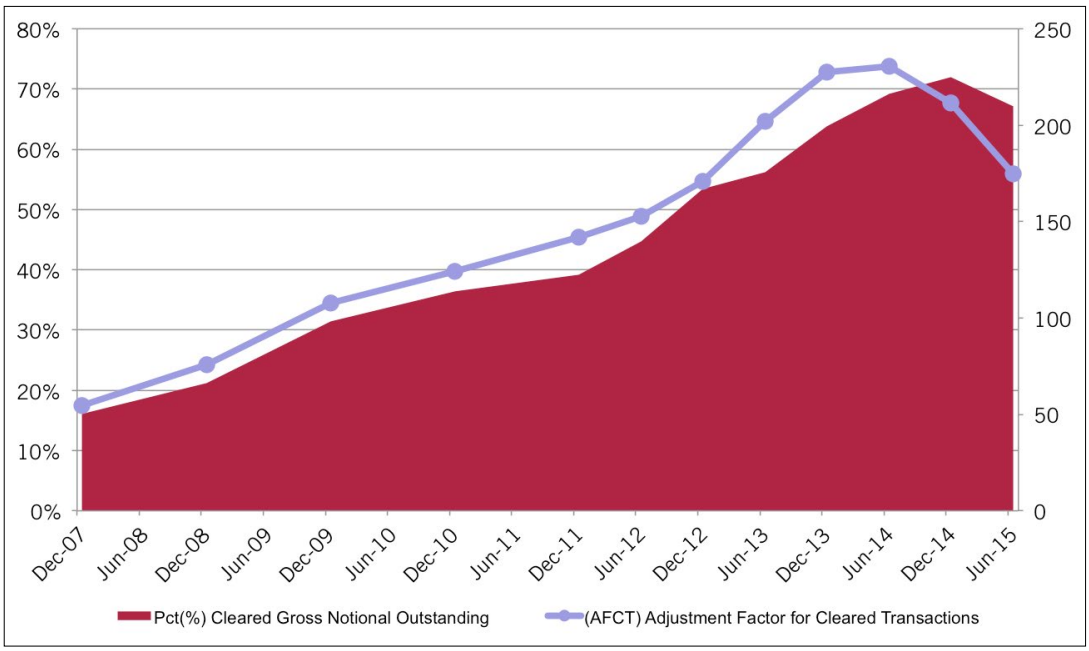
To provide additional context to the AGNO metric, the red area in Chart 3 is used to describe the evolution of clearing. In December 2007, roughly 16.1% of IRD notional outstanding was cleared. A milestone was reached by December 2012, when more than half of the market (53.5%) was cleared.

The percentage of cleared notional outstanding reached 72.0% by December 2014. However, it fell to 67.1% by June 2015 as CCP notional volumes declined, largely as a result of a significant increase in CCP compression (see next section).

Chart 3 overlays the AFCT metric (purple line) with the percentage of cleared notional outstanding (red area). As the chart shows, the AFCT line dips below the percentage of cleared notional as more trades are being compressed, causing the broader market to shrink.

Between December 2014 and June 2015, cleared notional outstanding volumes reported by CCPs fell 17.4% from $211.5 trillion to $174.6 trillion.

Chart 3: Comparing the Percentage of Cleared Gross Notional Outstanding to the Adjustment Factor for Cleared Transactions (AFCT): Interest Rate Derivatives (US$ trillions)



Source: CME Group, JSCC, LCH.Clearnet

THE EFFECT OF COMPRESSION

Compression understates underlying market activity, because offsetting trades are cancelled out

The previous section analyzed the effects of clearing. After adjusting for the double counting of cleared transactions, the size of the market has shrunk, as reflected in Chart 2. In this section, we investigate the countervailing effect of compression.

While the BIS data is not adjusted for clearing, it does reflect trade compression activity, which has increased markedly over the past year as market participants seek to reduce the size of their balance sheets. The act of compressing trades decreases notional outstanding volume, as offsetting transactions are cancelled out, or netted. This administrative process does not affect the risk profile of a portfolio, only the total notional amount.

Generally speaking, portfolio compression can make it seem like the overall market is shrinking, even if underlying trade activity has increased. In fact, the BIS primarily attributes the decline in IRD notional volume in its June 30, 2015 figures to increased compression[10].

In order to better understand the underlying IRD market, compressed volume must be added back to the AGNO figure calculated in the previous section.

TriOptima's triReduce data is used as a proxy to evaluate the level of IRD portfolio compression[11]. CCP compressed figures have been adjusted for double counting and are combined with non-CCP compressions.

As discussed in the recent ISDA report *The Impact of Compression on the Interest Rate Derivatives Market* (July 2015)[12], two types of compression, solo and multilateral, are typically used to reduce gross notional volumes. TriOptima's triReduce CCP data represents only multilateral compression volume conducted within a clearing house. In the absence of solo compression data, we double CCP triReduce volumes to account for both types of compression. The resulting figure is used to arrive at an **adjusted compressed notional outstanding (ACNO)** estimate[13].

Given the impact of new capital rules – particularly the leverage ratio under Basel III, which is based on gross notional exposures – it is not surprising to see an uptick in compression volume in recent years, as the need to reduce gross notionals is critical.

Table 2 compares ACNO volumes from December 2011 (the first period for which the terminations of compressed IRD volume is available) to June 2015. Total outstanding compressed volume has more than tripled over that period, growing from $136.4 trillion at the beginning of the series to $420.1 trillion most recently.

Growth of compressed volume stems from cleared positions, which account for roughly 82% of the triReduce total. Non-CCP compression accounts for a smaller portion, and has been declining since December 2012, falling 19% over the period.

[10] *BIS Quarterly Review*, December 2015, pages 24-25: https://www.bis.org/publ/qtrpdf/r_qt1512b.pdf

[11] For more information: www.trioptima.com

[12] *The Impact of Compression on the Interest Rate Derivatives Market*, July 2015: http://www2.isda.org/attachment/Nzc1OA==/Compression%20Report%20July%202015%20FINAL.pdf

[13] TriOptima triReduce outstanding compressed volume statistics are adjusted for terminated compressions in order to arrive at an ACNO metric that can be compared to the AGNO statistic. Similarly adjusted CCP data was not available for this study

Table 2: Adjusted Compressed Notional Outstanding (ACNO) Volume: Interest Rate Derivatives (US$ trillions)

Notional Outstanding - US$ trillion	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Jun-12	Dec-12	Jun-13	Dec-13	Jun-14	Dec-14	Jun-15
(ACNO) Adjusted Compressed Notional Outstanding	N/A	N/A	N/A	N/A	136.4	173.9	197.8	212.7	218.0	319.1	356.1	420.1
Solo Compression Proxy	N/A	N/A	N/A	N/A	41.7	60.1	72.6	80.9	83.9	134.2	153.4	188.6
triReduce Compression Volumes•	N/A	N/A	N/A	N/A	94.7	113.8	125.2	131.8	134.1	184.9	202.6	231.4
Adjusted CCP Compression	N/A	N/A	N/A	N/A	41.7	60.1	72.6	80.9	83.9	134.2	153.4	188.6
Non-CCP Compression	N/A	N/A	N/A	N/A	52.9	53.7	52.6	50.9	50.3	50.7	49.2	42.8

*Solo Compression Proxy equals the triReduce CCP figure in a given period

Source: BIS, CME Group, JSCC, LCH.Clearnet, TriOptima

TYING IT ALL TOGETHER

Adjusted for clearing and compression, IRD notional outstanding increased by 4.7% in the six months to June 30, 2015

Chart 4 illustrates the effects of both clearing and compression. The chart shows:

- The size of the IRD market as per the BIS reported notional outstanding (red line).
- Market size assuming no portfolio compression activity (grey line).
- The size of the market assuming no clearing activity, but including portfolio compression (blue line).
- Market size after factoring out the impact of clearing and compression, which we refer to as the **derived gross notional outstanding,** or **DGNO** (orange line).

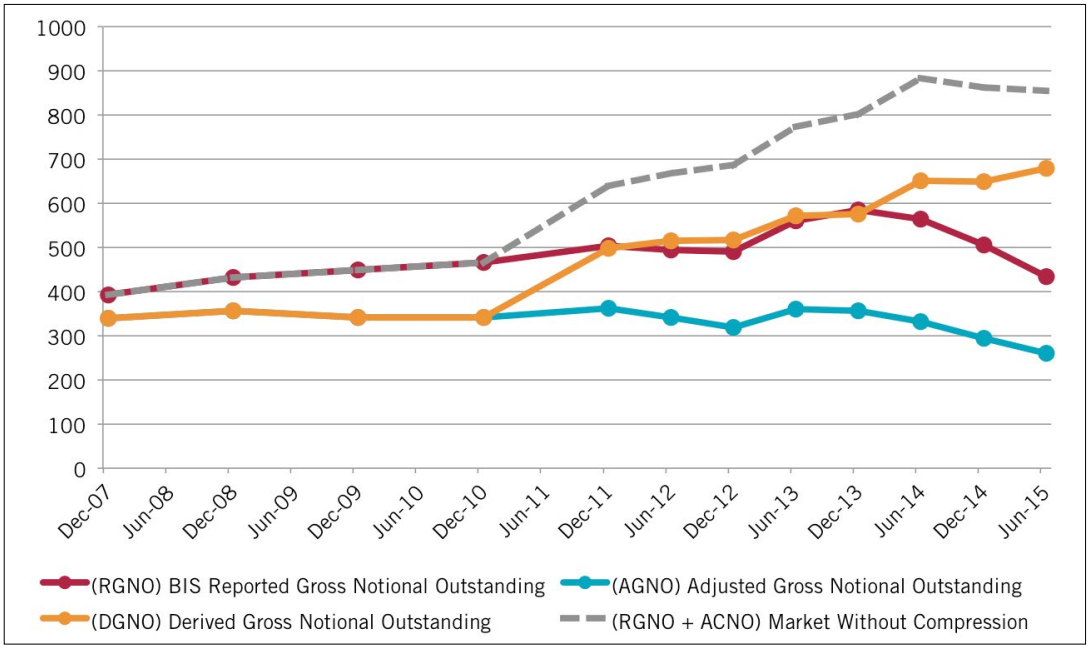
In comparing the DGNO (orange line) to the RGNO (red line), several trends become clear:

- The BIS reported a 14.0% decrease in IRD notional outstanding figures in the six months to June 30, 2015, from $505.4 trillion to $434.7 trillion.
- After factoring out the effect of clearing and compression, notional volume increased by 4.7%, from $650.0 trillion to $680.2 trillion, over the same period.

Comparing the two time series over a longer period (December 2011 to June 2015) reveals that:

- IRD notional outstanding as reported by the BIS decreased by 13.8%.
- After factoring out the impact of clearing and compression, IRD notional has increased by 33.5%.

Chart 4: Gross Notional Outstanding Volume: Interest Rate Derivatives (US$ trillions)



Source: BIS, CME Group, JSCC, LCH.Clearnet, TriOptima

Table 3 shows the effects of both clearing and compression since December 2011. The first row of the table describes what the market would look like had no portfolio compression occurred. Taking the BIS reported notional and adding back compressed volumes reveals an $854.8 trillion market in June 2015.

Since our goal is to adjust the BIS reported numbers to estimate the size of the IRD market before clearing and compression, we must first compare the RGNO figure with the one adjusted for clearing (AGNO).

When we add compressed volume to the AGNO, we are able to gain a clearer view of the underlying IRD market – the DGNO. This derived figure represents the notional outstanding of the IRD market before the effects of clearing and compression. In the six months to end-June 2015, this figure rose by 4.7% to $680.2 trillion. Over the full series, estimated IRD DGNO increased by 33.5%.

Table 3: Tying it all Together: The Derived Gross Notional Outstanding Measure (DGNO) of Market Size: Interest Rate Derivatives (US$ trillions)

	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Jun-12	Dec-12	Jun-13	Dec-13	Jun-14	Dec-14	Jun-15
(RGNO + ACNO) Market Without Compression	393.1	432.1	449.9	465.3	640.5	668.3	687.5	774.0	802.4	882.4	861.5	854.8
(RGNO) BIS Reported Gross Notional Outstanding	393.1	432.1	449.9	465.3	504.1	494.4	489.7	561.3	584.4	563.3	505.4	434.7
(AGNO) Adjusted Gross Notional Outstanding	338.7	356.3	342.2	341.1	362.2	341.6	319.0	359.4	356.7	332.8	293.9	260.1
(ACNO) Adjusted Compressed Notional Outstanding	N/A	N/A	N/A	N/A	136.4	173.9	197.8	212.7	218.0	319.1	356.1	420.1
(DGNO) Derived Gross Notional Outstanding	338.7	356.3	342.2	341.1	498.6	515.5	516.8	572.1	574.7	651.9	650.0	680.2

Source: BIS, CME Group, JSCC, LCH.Clearnet, TriOptima

CONCLUSION

Compression and clearing volumes are likely to increase in response to regulatory change

In total, approximately 67.1% of overall IRD notional outstanding has been cleared so far.

While some types of IRD products are not yet clearable, this is expected to change as clearing houses enhance their product offerings and new clearing mandates come into force. However, a portion of the IRD market will always be non-clearable, reflecting the fact that some products are not suitable for clearing and some counterparties are exempt from the clearing mandate.

The report also adjusts publicly reported IRD notional outstanding figures to derive a picture of underlying market activity before clearing and compression. By amending BIS semiannual notional outstanding figures, the analysis shows underlying IRD notional outstanding grew from $650 trillion to $680.2 trillion in the six months to June 30, 2015. That compares to a decline in BIS figures from $505.4 trillion to $434.7 trillion over the same period.

The difference is primarily due to an increase in compression activity. Overall IRD notional outstanding has been reduced by approximately 62% as a result of compression so far. Given the impact of new regulations, we expect cleared and compressed volumes to continue to increase in future periods.

GLOSSARY

Reported Gross Notional Outstanding (RGNO)
This refers to BIS statistics describing the notional value of all deals concluded and not yet settled on the reporting date as part of its semiannual statistical release.

Derived Gross Notional Outstanding (DGNO)
This reflects interest rate derivatives notional outstanding before clearing and compression effects. The DGNO is calculated by adding the AGNO and ACNO figures.

Adjustment Factor for Cleared Transactions (AFCT)
Clearing house data is aggregated to determine the level of interest rate derivatives outstanding that has been cleared. This aggregation produces a metric that adjusts for the double counting of cleared notional outstanding volume reported by the BIS.

Adjusted Gross Notional Outstanding (AGNO)
The AGNO metric reflects the difference between the RGNO and AFTC metrics. The AGNO represents the state of the market before clearing occurs.

Adjusted Compressed Notional Outstanding (ACNO)
TriOptima triReduce statistics (which represents multilateral compression) and a proxy of CCP solo compression are used to evaluate the level of IRD outstanding compression volume. These figures have been adjusted for terminated trades.

Pct (%) Cleared Gross Notional Outstanding:
This metric is defined as the AGNO, or the state of the market before clearing occurs, divided by the AFCT, or the level of IRD outstanding that has been cleared.

ISDA®

ISDA has published other recent research papers:

- ***SwapsInfo Third Quarter 2015 Review,*** November 2015:

  http://www2.isda.org/attachment/ODAyMQ==/ISDA%20SwapsInfo%20Q3%202015%20Review%20FINAL1.pdf

- ***Cross-Border Fragmentation of Global Interest Rate Derivatives: The New Normal?,*** October 2015:

  http://www2.isda.org/attachment/Nzk2NA==/Market%20fragmentation%20Oct15%20FINAL.pdf

- ***The Impact of Compression on the Interest Rate Derivatives Market,*** July 2015:

  http://www2.isda.org/attachment/Nzc1OA==/Compression Report July 2015 FINAL.pdf

For more on ISDA Research, please contact:
Audrey Costabile Blater, PhD
Director of Research, ISDA
acostabile@isda.org

ABOUT ISDA

Since 1985, ISDA has worked to make the global derivatives markets safer and more efficient. Today, ISDA has over 850 member institutions from 68 countries. These members comprise a broad range of derivatives market participants, including corporations, investment managers, government and supranational entities, insurance companies, energy and commodities firms, and international and regional banks. In addition to market participants, members also include key components of the derivatives market infrastructure, such as exchanges, intermediaries, clearing houses and repositories, as well as law firms, accounting firms and other service providers. Information about ISDA and its activities is available on the Association's website: www.isda.org.