



July 2016

Research Note

Derivatives Market Analysis: Interest Rate Derivatives

Twice a year, the International Swaps and Derivatives Association (ISDA) analyzes interest rate derivatives notional outstanding data reported by the Bank for International Settlements (BIS) in order to illuminate market trends. The bank's most recent analysis was released in May 2016.

The BIS publicly reported data is impacted in important ways by two key marketplace trends: clearing, which increases notionals; and compression, which reduces them. ISDA's analysis adjusts reported notional outstanding figures for these factors in order to provide a clearer estimate of derivatives market trends. For example, although public data indicates a decrease in derivatives outstanding during the second half of 2015, ISDA's analysis reveals on an adjusted basis that the size of the market increased at year-end 2015 compared to six months earlier.

It is important to note that risk metrics associated with derivatives (such as 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) cannot be conveyed through notional figures¹.

¹ Risk metrics fall outside the scope of this report. The BIS semiannual survey publishes statistics describing gross credit exposure, which is a measure of exposure to counterparty credit risk. For more information: www.bis.org

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

SUMMARY

The BIS publishes derivatives notional outstanding data on a semiannual basis. Although these statistics can provide helpful information on broad market trends, it is important to recognize the impact of two countervailing factors: clearing and compression.

Clearing increases 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 of cleared transactions².

This research calibrates for this effect to provide an estimate of total IRD notional outstanding that is currently cleared, as well as the proportion of clearable IRD notional outstanding that is cleared.

In contrast, compression has the opposite effect by acting to reduce notional outstanding through the cancelling or 'netting' of offsetting trades. The BIS figures are reported after compression has occurred, which makes it difficult to draw any conclusion about underlying derivatives market activity³.

HIGHLIGHTS

- Clearing and compression together have an important impact on IRD notional outstanding figures. After adjusting for the double counting of cleared trades in BIS statistics, ISDA estimates that 67.5% of IRD notional outstanding was cleared at the end of 2015.
- ISDA estimates that roughly 98% of IRD notional outstanding that can be cleared is being cleared. This takes into account IRD instruments that are not yet accepted for clearing, as well as the volume transacted by counterparties that are exempt from mandatory clearing.
- The BIS reported a decrease of 11.7% in IRD notional outstanding in the six months to December 31, 2015, from \$434.7 trillion to \$384 trillion. The decline was attributed to increased compression activity.
- Overall IRD notional has been reduced by roughly 67% as a result of portfolio compression.
- After adjusting for the effects of clearing and compression, underlying IRD notional outstanding increased by 2.5% over the six-month period to December 31, 2015, from \$680.2 trillion to \$697.5 trillion.

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. Other CCPs also clear IRD, but are excluded from this analysis, including the Australian Securities Exchange, Eurex, Nasdaq OMX, OTC Clearing Hong Kong, Singapore Exchange, Shanghai Clearing House and Korea Exchange

MARKET SNAPSHOT AT DECEMBER 31, 2015

Nearly 98% of what can be cleared in the IRD market is now being cleared

The first section of the report breaks down the proportion of the IRD market that is cleared, making an adjustment for the double counting of cleared trades in publicly reported data. This is illustrated in the waterfall analysis in Chart 1.

The analysis begins with the BIS notional outstanding headline figure on December 31, 2015 (item A). This figure is \$384 trillion⁴.

The second leg of the waterfall adjusts the headline figure for the double counting of cleared trades. This is achieved by subtracting total cleared volume – estimated at \$155 trillion at the end of 2015 (item B)⁵ – from reported gross notional outstanding. The difference of \$229 trillion is the adjusted gross notional outstanding figure (item C).

The proportion of cleared IRD notional outstanding can then be calculated. Dividing total cleared volume (\$155 trillion) by the adjusted notional outstanding figure (\$229 trillion) shows that approximately 67.5% of IRD notional outstanding is currently cleared.

The rest of the waterfall analysis focuses on the remainder of the IRD market. Subtracting total cleared volume from the adjusted notional outstanding figure gives the total size of the non-cleared segment. This totaled \$74 trillion at the end of 2015 (item E).

Of the \$74 trillion, approximately \$52 trillion (item F) comprises products that were not accepted for clearing at the end of 2015. These include swaptions⁶, cross-currency swaps and options⁷.

In addition to this, a certain proportion of trading activity is conducted with entities that qualify for an exemption to the clearing mandate – for instance, non-financial counterparties. ISDA estimates this portion to be approximately \$13 trillion at the end of 2015 (item G)⁸.

Subtracting non-clearable products and trades with exempted counterparties from the non-cleared IRD total results in the amount of potentially clearable IRD notional outstanding that is not yet cleared: about \$9 trillion (item H).

ISDA therefore estimates that approximately 98% of the clearable IRD market is currently cleared.

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

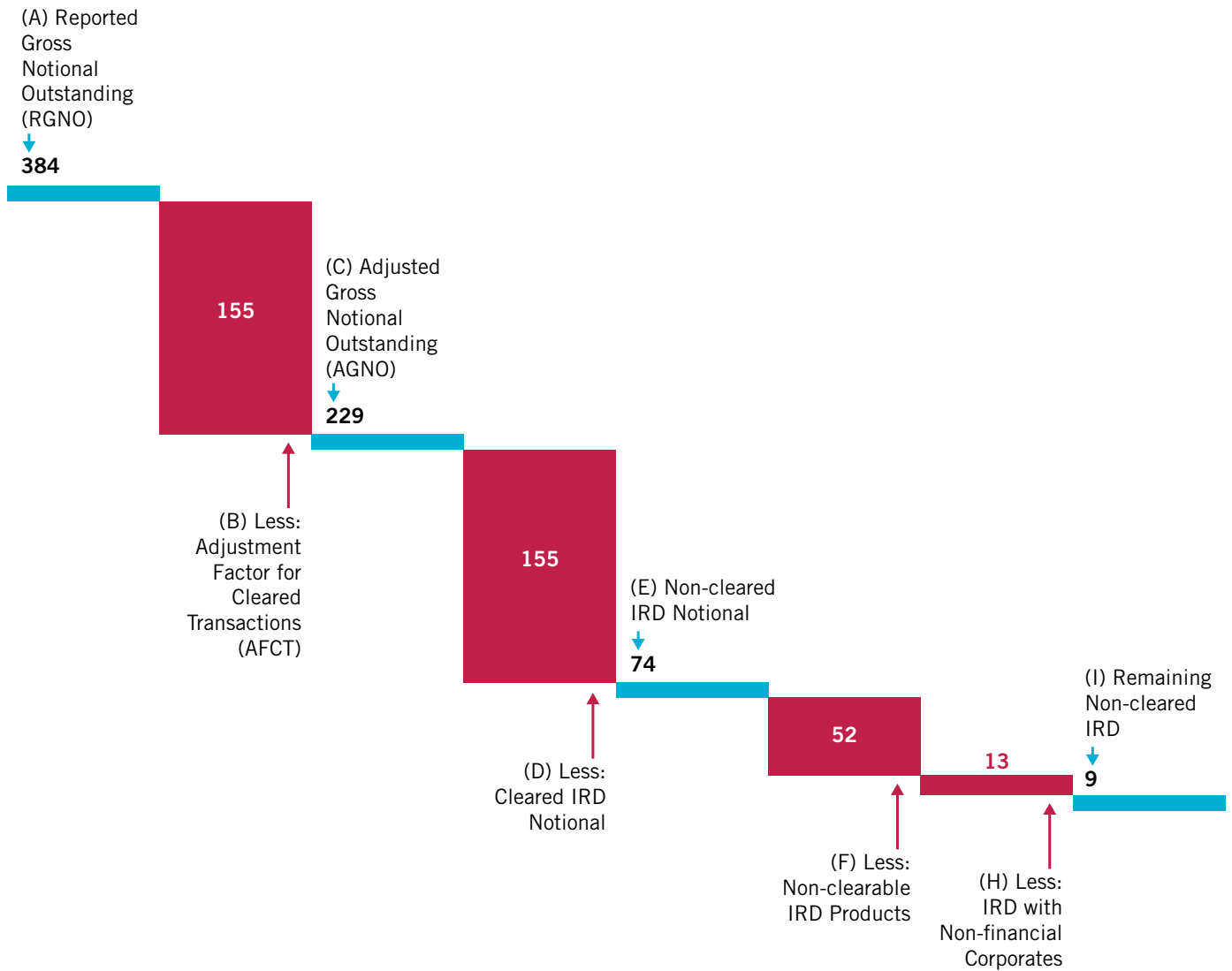
⁵ This includes \$126 billion from LCH.Clearnet, \$20 trillion from CME Group, and \$9 trillion from JSCC

⁶ CME Group launched a clearing service for swaptions in April 2016, initially for US dollar-denominated interest rate swaptions with European-style exercise

⁷ The \$52 trillion consists of swaptions (\$25.0 trillion), cross-currency swaps (\$14.8 trillion), options including callable swaps (\$9.1 trillion), and 'other' derivatives (\$2.7 trillion)

⁸ According to BIS end-December 2015 data, the notional value of IRD with non-financial corporates was \$14.7 trillion. We estimate roughly 15% of the total exempt trades are non-clearable, which are already accounted for in the waterfall analysis (item F). The remaining amount – \$13 trillion – is attributed to clearable IRD that remain non-cleared due to the exemption (item G)

Chart 1: Interest Rate Derivatives Waterfall: December 31, 2015 (US\$ trillions)



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

†The adjustment factor for cleared transactions metric includes \$126 billion from LCH.Clearnet, \$20 trillion from CME Group, and \$9 trillion from JSCC

IRD MARKET IN DECLINE?

The effects of clearing and compression distort publicly reported derivatives notional

The BIS regularly reports derivatives gross notional outstanding volume as part of its semiannual statistical release⁹. These figures represent the gross volume of all derivatives transactions that 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.

According to the latest semiannual release, the overall size of the derivatives market continued to shrink during the second half of 2015. Total notional outstanding fell by 10.9%, from \$552.9 trillion to \$492.9 trillion in the six months to December 31, 2015. IRD notional outstanding – the largest segment of derivatives activity – declined by 11.7% over the same period, from \$434.7 trillion to \$384 trillion.

Although useful, these notional outstanding figures are not adjusted for the effects of clearing and compression¹⁰. Clearing overstates the size of the market because cleared trades are reported twice in the BIS data. Conversely, compression understates market activity, as offsetting positions are cancelled out.

The following sections of the report 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

An estimated 67.5% of IRD notional outstanding is now cleared

Central clearing has become an important feature of derivatives market activity, mostly as a result of regulatory changes that introduced clearing mandates. However, Table 1 shows that cleared IRD volumes reported by three clearing houses has recently fallen. Despite this, the proportion of the IRD market that is cleared has remained relatively steady.

In order to better understand underlying trends, an adjustment is made to BIS-reported notional outstanding figures. Clearing acts to increase publicly reported notional outstanding figures, as each bilateral trade is counted as two transactions once novated to a CCP.

To eliminate this double counting, an 'adjustment factor' is required, based on CCP cleared volume data. This total fell to \$154.7 trillion at the end of 2015, versus \$174.6 trillion at the end of June 2015, a decline of 11.4%.

This **adjustment factor for cleared transactions (AFCT)** is subtracted from the BIS **reported gross notional outstanding (RGNO)** figure to arrive at an **adjusted gross notional outstanding (AGNO)** number – essentially, a notional outstanding metric that is modified to remove the double counting.

This adjustment is illustrated in Table 1. As of December 31, 2015, IRD notional outstanding adjusted for double counting totaled \$229.3 trillion, compared with a BIS reported number of \$384 trillion. This means adjusting for double counting reduces IRD notional by roughly 40%.

⁹ For more information: www.bis.org

¹⁰ 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

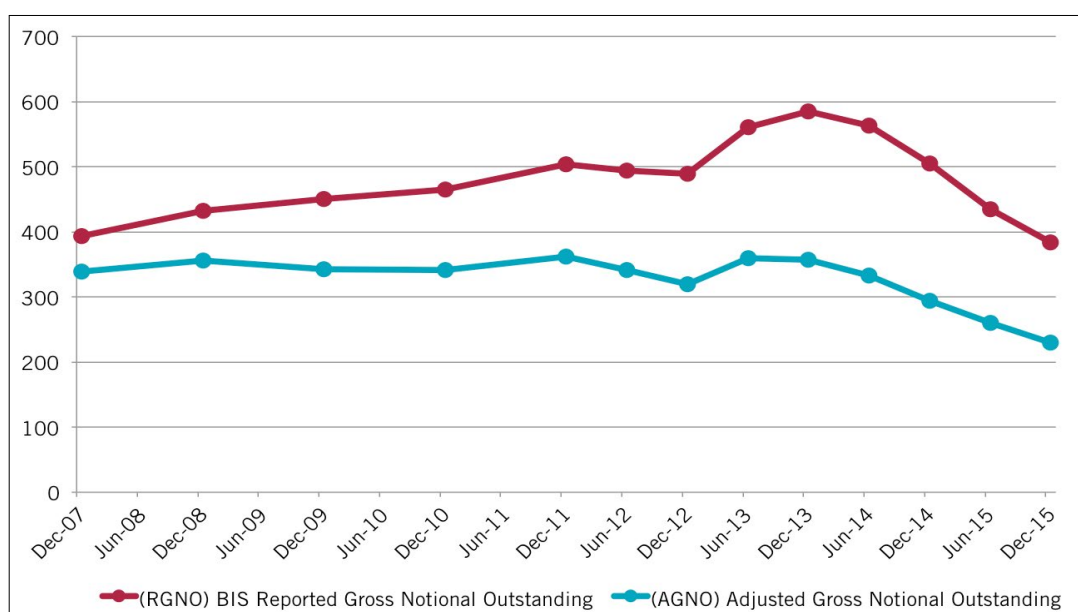
Table 1: Gross Notional Outstanding Volume: Interest Rate Derivatives (US\$ trillions)

	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Jun-12	Dec-12	Jun-13	Dec-13	Jun-14	Dec-14	Jun-15	Dec-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	384.0
(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	154.7
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	125.5
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	20.2
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	9.0
(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	229.3
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%	67.5%

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

Chart 2 compares the BIS figures (RGNO) and the adjusted notional outstanding numbers (AGNO). The chart illustrates there has been a sharper decline in the notional outstanding figures adjusted for the double counting of cleared trades (AGNO – blue line) than the BIS statistics (RGNO – red line). Since the beginning of the series, the adjusted notional metric has fallen by 32.3%, while the BIS number has dropped by 2.3%.

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



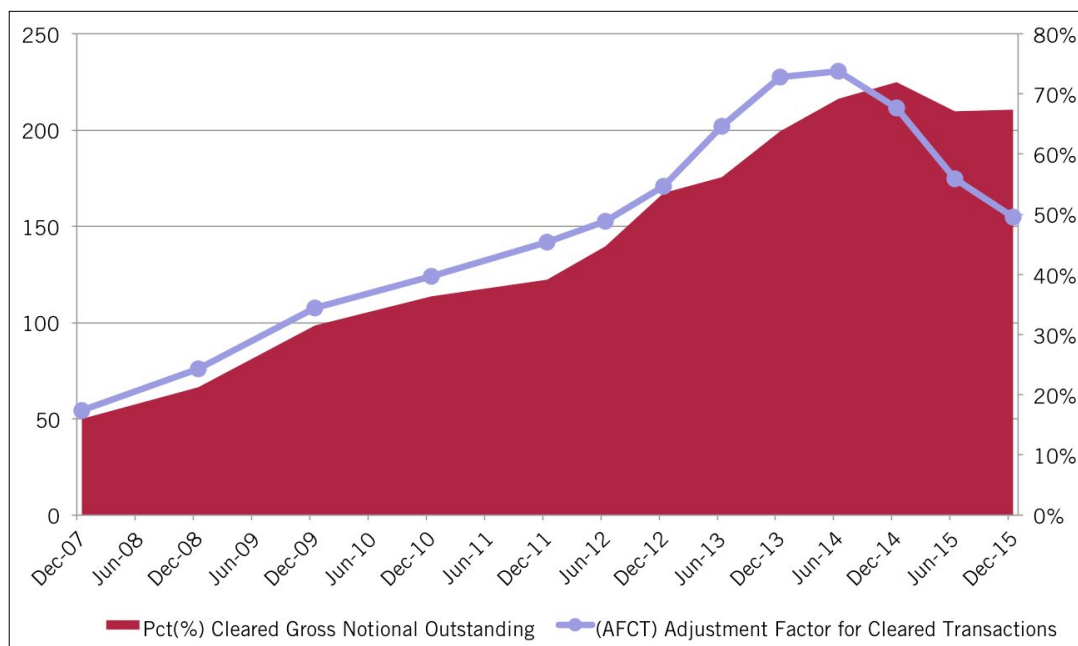
Source: BIS, CME Group, JSCC, LCH.Clearnet

The increasing volume of cleared trades over this period is illustrated by Chart 3 (red area). Approximately 67.5% of IRD notional outstanding was cleared at the end of 2015, versus 53.5% three years earlier and just 16.1% in December 2007.

Chart 3 also shows how the adjustment factor (ie, the total amount of cleared volume) has changed over time (AFCT – purple line). After climbing steadily to reach a high of \$230.5 trillion at the end of June 2014, clearing volumes have fallen to reach \$154.7 trillion at the end of 2015.

This largely reflects increased compression activity, which has reduced both cleared notional outstanding within CCPs and the overall size of the market. This is discussed in the next section.

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

Compression activity has increased rapidly over the past two years

THE EFFECT OF COMPRESSION

The previous section analyzed the effects of clearing, and showed that IRD notional outstanding shrinks significantly once adjusted for double counting. This section considers the impact of compression.

While the BIS data is not adjusted for clearing, it does reflect trade compression activity. Compression acts to reduce notional outstanding as it allows market participants to cancel or tear up offsetting transactions. This means the overall market can appear to be shrinking, even if underlying trade activity is stable or increasing.

Compression volumes have risen sharply over the past two years in response to changes in regulation and improvements in compression technology. Given the impact of new capital rules – particularly the leverage ratio under Basel III, which is based on gross notional exposures – market participants have looked to reduce the size of their balance sheets. Compression also provides legal and operational benefits that market participants have been keen to achieve¹¹.

In order to better understand underlying IRD market activity, compression volumes must be added back to the adjusted notional outstanding (AGNO) figure calculated in the last section¹².

An **adjusted compressed IRD notional outstanding (ACNO)** figure is calculated using data from TriOptima's triReduce service¹³. Chart 4 depicts how this metric has changed since December 2011 (the first period for which the terminations of compressed IRD volume became available). Over the period, total outstanding compressed volume has increased from \$136.4 trillion to \$468.2 trillion at the end of 2015, a rise of 243.2% (black line).

The adjusted compressed notional outstanding figure comprises solo and triReduce multilateral compression activity. Solo compression was estimated at \$213.8 trillion at the end of the 2015 (dotted line, Chart 4), while triReduce's figures stood at \$254.4 trillion (dashed line, Chart 4).

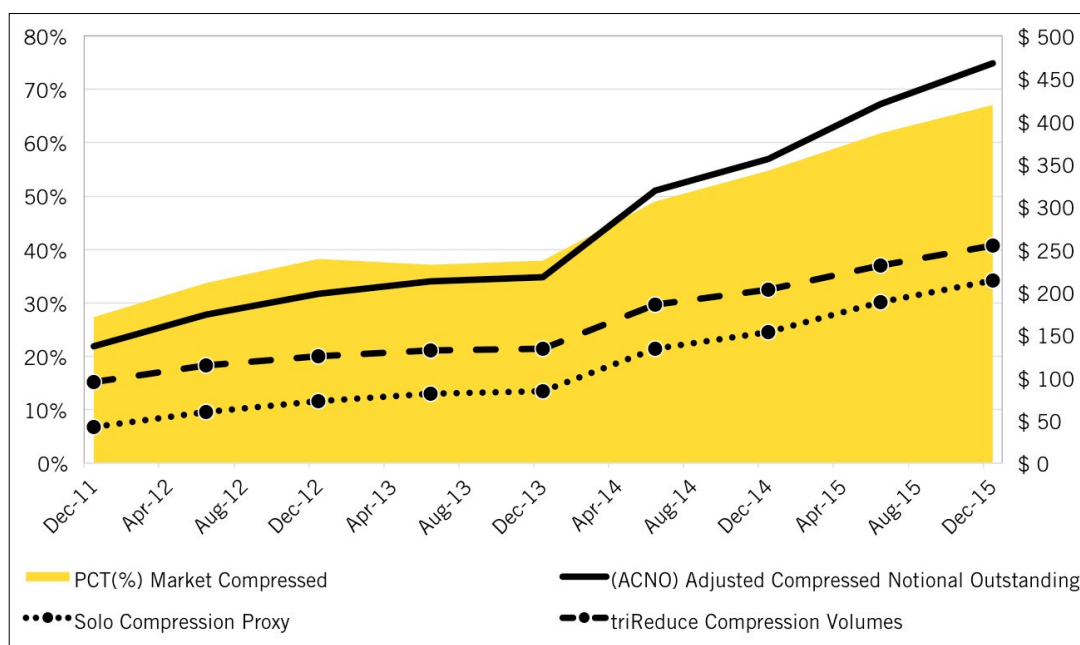
Overall, IRD notional has been reduced by roughly 67% as a result of portfolio compression.

¹¹ The act of compressing a trade decreases notional outstanding volume, as offsetting transactions are cancelled out. This administrative process does not affect the risk profile of a portfolio, only the total notional amount

¹² See adjusted compressed notional outstanding methodology in the Appendix

¹³ For more information: www.trioptima.com

Chart 4: Adjusted Compressed Notional Outstanding (ACNO) Volume (US\$ trillions) and Percentage of Market Compressed: Interest Rate Derivatives



Source: TriOptima

TYING IT ALL TOGETHER

Underlying IRD notional outstanding grew 2.5% in the six months to end-2015

Having explained the countervailing effects of clearing and compression, Chart 5 illustrates the overall effect of both factors. The chart shows:

- The size of the IRD market as per the BIS reported gross notional outstanding (blue line).
- Market size assuming no portfolio compression activity (grey line).
- The size of the market assuming no clearing activity, but including portfolio compression (red 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).

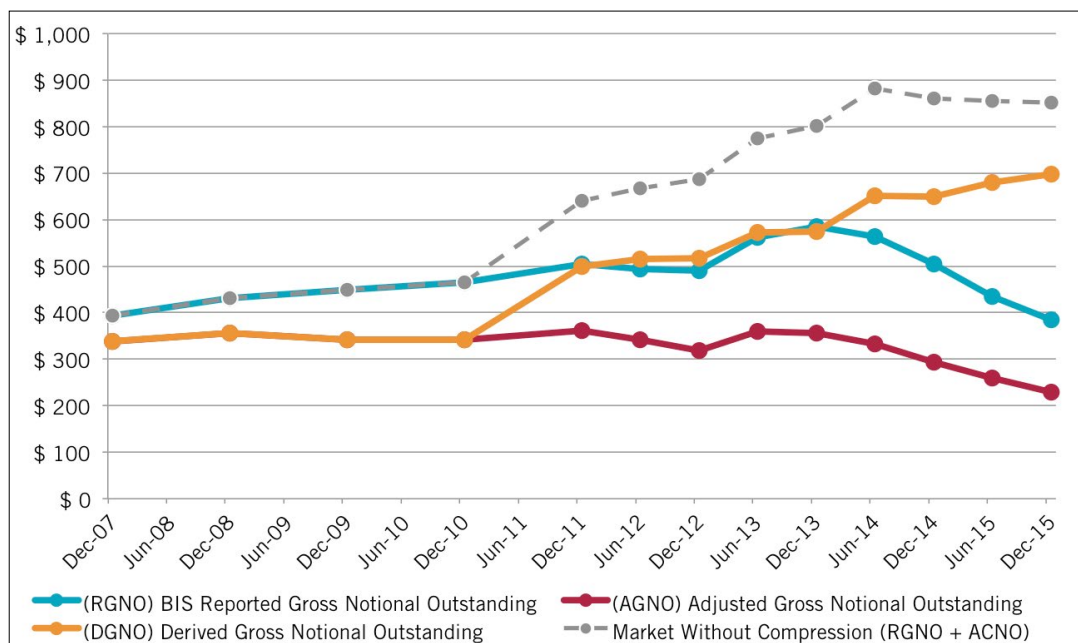
In comparing the DGNO (orange line) to the BIS numbers (blue line), several trends become clear:

- The BIS reported an 11.7% decrease in IRD gross notional outstanding figures in the six months to December 31, 2015, from \$434.7 trillion to \$384 trillion.
- After factoring out the effect of clearing and compression, gross notional volume increased 2.5%, from \$680.2 trillion to \$697.5 trillion, over the same period.

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

- IRD gross notional outstanding as reported by the BIS decreased by 23.8%.
- After factoring out the impact of clearing and compression, gross notional volume has increased by 33%.

Chart 5: Gross Notional Outstanding Volume: Interest Rate Derivatives (US\$ trillions)



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

Table 3 adjusts the BIS reported figures for the effects of clearing and compression over the past five years. The first row describes what the market would look like had portfolio compression never occurred. At the end of December 2015, interest rate derivatives gross notional outstanding would have been nearly double the BIS figures, at \$852.2 trillion.

However, the goal of this report is to adjust the BIS data for both compression and the double counting of cleared trades. To achieve that, compressed notional volume (ACNO) needs to be added to the notional outstanding metric adjusted for double counting (AGNO). The result is a derived gross notional outstanding figure (DGNO), which represents the underlying IRD market before compression and clearing occurs.

Since December 2011, the DGNO has increased about 40%. As of December 31, 2015, the metric stood at \$697.5 trillion, a 2.5% increase over the first half of 2015.

Table 3: Tying it all Together: The Derived Gross Notional Outstanding Measure (DGNO) of Market Size: 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	Dec-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	852.2
(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	384.0
(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	229.3
(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	468.2
(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	697.5

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

CONCLUSION

Underlying IRD notional outstanding grew 2.5% in the six months to end-2015

Although public data indicates a decrease in IRD notional outstanding in the second half of 2015, this analysis indicated the underlying market before clearing and compression increased by 2.5% versus six months earlier.

The effects of clearing and compression skew publicly reported derivatives notional outstanding data. Clearing acts to increase reported notional outstanding, as a single bilateral transaction is counted as two cleared trades once novated to a central counterparty. In contrast, compression reduces notional outstanding, which can make it seem like fewer trades are taking place.

After adjusting for the double counting of cleared transactions, the analysis shows 67.5% of IRD notional outstanding is currently cleared.

GLOSSARY

Reported Gross Notional Outstanding (RGNO)

This refers to BIS releases 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 AFCT metrics. The AGNO represents the state of the market before clearing occurs.

Adjusted Compressed Notional Outstanding (ACNO)

TriOptima triReduce statistics (which represent 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 trades otherwise maturing.

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.

APPENDIX

ACNO Methodology

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

Two types of compression are typically used to reduce gross notional volumes: solo and multilateral. TriOptima's triReduce CCP data represents only multilateral compression volume conducted within a clearing house. In the absence of solo compression data, CCP triReduce volumes have been doubled to account for both types of compression. The resulting figure is used to arrive at an adjusted compressed notional outstanding (ACNO) estimate¹⁴.

Growth of compressed volume stems from cleared positions, which account for roughly 84% of the triReduce total. Non-CCP compression accounts for a smaller portion, and has been declining since December 2012.

¹⁴ TriOptima triReduce outstanding compressed volume statistics are adjusted for trades otherwise maturing 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



ISDA has published other recent research papers:

- ***SwapsInfo First Quarter 2016 Review***, June 2016

<http://www2.isda.org/attachment/ODQxNg==/SwapsInfo%20First%20Quarter%202016%20Review%20.pdf>

- ***Cross-border Fragmentation of Global Interest Rate Derivatives: Second Half 2015 Update***, May 2016

<http://www2.isda.org/attachment/ODM4NQ==/Fragmentation%20FINAL1.pdf>

- ***ISDA 2015 Research Year in Review***, January 2016

<http://www2.isda.org/attachment/ODExMA==/Research%20review%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

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