

Compressing OTC Markets

Summary

In the years following the financial crisis of 2007-2008, several initiatives were launched targeting the size and opacity of over-the-counter (OTC) markets. The new regulatory environment resulted in additional costs for market participants, stoking demand for new post-trade services. One such service is portfolio compression, a mechanism through which transactions among two or more counterparties are replaced with substantially similar transactions of decreased notional value, thereby reducing risk, cost, and inefficiency. In other words, portfolio compression is a multilateral netting operation through which participants can reduce their bilateral exposures while maintaining the same net balance. Compression opportunities exist, then, when markets exhibit excess notional, or the difference between the total outstanding gross notional observed and the minimum aggregate amount required to satisfy every participant's net position. Applying our framework to data on European OTC derivatives markets, we find that 75 percent of the market notional is eligible for compression. Further, we find that even the most conservative approach eliminates more than 85 percent of the market excess on average. While portfolio compression is currently valued primarily by individuals seeking to alleviate regulatory constraints, the service could perhaps also serve as a public risk management tool to effectively reduce both expected and realized losses.

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In September 2009, the G-20 summit gathered the leaders of the world in Pittsburgh, Pennsylvania to address the causes and consequences of the Global Financial Crisis. In their final statement letter, they committed to “make sure our regulatory system for banks and other financial firms reins in the excesses that led to the crisis.”¹ Echoing this pledge, several financial regulatory reforms were launched.² In particular, a number of micro- and macro-prudential initiatives specifically targeted the size and opacity of over-the-counter (OTC) derivatives markets by means of mandatory clearing, standardized activity reports, and increased capital requirements. The resulting costs on market participants drove an important demand for post-trade services to accommodate the new regulatory environment.

Amid novel post-trade techniques, portfolio compression is “a mechanism whereby substantially similar transactions among two or more counterparties are terminated and replaced with a smaller number of transactions of decreased notional value in an effort to reduce the risk, cost, and inefficiency of maintaining unnecessary transactions on the counterparties’ books.”³ Over the last decade, compression has stood out as the “greatest source of improvement in OTC derivatives exposure efficiency”⁴ and has been widely adopted by banks. The following mind-boggling statistics bear testimony to this trend:

- The International Swaps and Derivatives Association (ISDA) attributes a reduction of 67% in total gross notional of Interest Rate Swaps to the compression of participants’ portfolios.⁵
- TriOptima, the leading firm in compression services, declares having eliminated more than one quadrillion USD in notional since its founding in the mid-2000s.⁶

- The Bank for International Settlements (BIS) attributes the reduction of Credit Default Swap notionals to a sixth of the levels exhibited a decade ago to an extensive use of portfolio compression after the crisis.⁷

In general, portfolio compression can be seen as a multilateral netting operation through which participants can reduce their bilateral exposures (counterparty risk) while maintaining the same net balance (market risk). Figure 1 illustrates the process. Two features make portfolio compression unique vis-à-vis other netting operations. First, portfolio compression reduces the actual gross positions of each participant involved by contractually tearing up redundant obligations. Second, portfolio compression exploits multilateral netting opportunities without *necessarily* requiring the participation of a Central Clearing Counterparty (CCP).

In practice, multilateral netting opportunities are identified by collecting information across multiple portfolios. This condition is of obvious concern when JP Morgan and Goldman Sachs need to share both their positions towards Société Générale. Dedicated third-party services can therefore facilitate multilateral compression while limiting information disclosure among participants. Compression services such as TriOptima, Quantile or LMRKTS privately collect portfolio data provided by their client market participants, reconstruct the web of obligations, identify optimal compression

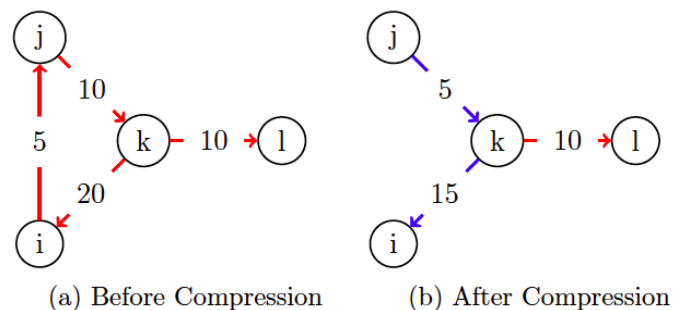


Figure 1. A graphical example of portfolio compression. Panel (a) exhibits a market consisting of 4 institutions (i, j, k, l) with short and long positions on the same asset with different notional values. The aggregate gross notional of the market is 45. Panel (b) shows a compression solution to the market: by terminating the contracts between i, j and k and generating two new contracts, the net position of each firm is unchanged while the gross positions of i, j and k have been reduced by 5. In aggregate, market size has been reduced by 15 units.

¹ Art. 16 of the Leader’s Statement of the G20 Pittsburgh Summit
² Examples of such reforms include the Dodd-Frank Wall Street Reform and Consumer Protection Act in the U.S. and the European Market Infrastructure Regulation (EMIR) in the European Union.
³ CFTC Regulation 23.500(h)
⁴ Duffie, D., 2017. Financial regulatory reform after the crisis: An assessment. *Management Science*.
⁵ ISDA, 2016, Derivatives Market Analysis: Interest Rate Derivatives, *Research Note*.
⁶ See <https://www.trioptima.com/trireduce/>

⁷ Schimpf, A., 2015. Outstanding OTC derivatives positions dwindle as compression gains further traction. *BIS Quarterly Review*.

solutions satisfying each client's own tolerances and, finally, provide individual portfolio modification instructions to each client independently.

The first compression services were originally introduced in the early 2000s. Yet, in the pre-crisis era, compression services were allegedly seen as *good housekeeping* but not critical for risk management, and attraction to this service was rather limited. The compression market took off with the default of Lehman Brothers in September 2008 and the subsequent set of post-crisis regulatory reforms. The deep and unexpected losses experienced during the crisis forced financial firms to re-evaluate the importance of managing counterparty and operational risks.⁸ Adding to those concerns, new rules related to clearing, capital and margin increased the overall costs of holding large OTC derivatives exposures. As a result, portfolio compression enjoyed a new interpretation: market participants could exploit multilateral netting opportunities to achieve significant capital and collateral savings while maintaining their capital structure and market balances. From this perspective, portfolio compression became a system-wide deleveraging operation which relies on information sharing and coordination rather than capital injection or forced asset sales.

So far, regulators and policymakers have, in general, been supportive of the adoption of compression. Both the Dodd-Frank Act and EMIR include references to the execution of portfolio compression.⁹ From a macro-prudential perspective, the basic intuition is that compression should decrease systemic risk through the elimination of redundant obligations. However, a few caveats exist. First, the reduction of size is achieved by a reconfiguration of the market's underlying network of exposures. While efficient at eliminating market redundancy, some reconfigurations may also alter the stability profile of the market structure by, for example, concentrating risk in some segments of the market. At the moment, there is little evidence that compression providers, to the extent that they can, internalize such externalities in their models. More in general, the current private functioning of the service based on proprietary

⁸ The Economist, *Credit Derivatives: The Great Untangling*, Nov 6th 2008.

⁹ Under the CFTC rule §23.503 for the US and the Article 14 of EMIR for the EU

algorithms limits our understanding of the potential stability implications for markets.

Second, current reporting frameworks do not reveal the magnitude of compression that is taking place in different markets. For example, they do not allow for computing how much of the recent size reduction of some OTC derivatives markets is precisely attributable to compression.¹⁰ This creates uncertainty about how to interpret statistics on gross positions with respect to their implications for liquidity. Observed changes in gross positions can originate from both trading activities and compression activities. While a decrease in trading activity could signal a reduction of market liquidity, a reduction of gross positions due to the elimination of redundant obligations should increase inventory capacities for dealer. Able to free space in their books and relax their capital constraints, dealers may then be able to take on more trades, thus leading to an overall increase of market liquidity.

To date there has been limited academic and policy research on the mechanics of portfolio compression and its potential impact on OTC derivatives markets. In a recent paper, we study both theoretically and empirically the market conditions that enable large compression levels.¹¹ In particular, we account for a range of constraints on the impact of compression over trading relationships between market participants.

We first analyze the conditions for compression to be applicable. Compression opportunities exist when markets exhibit excess notional. Formally, the excess of a market is the positive difference between the total outstanding gross notional observed in the market and the minimum aggregate amount required to satisfy every participant's net position. Intuitively, the excess of a market measures the amount of redundant notional. We find that intermediation, determined by the existence of chains of fungible and outstanding trades, is a sufficient condition to observe strictly positive excess in a market. The networked nature of OTC markets makes them natural candidates for compression activities. Applying our framework to transaction-level data on European-

¹⁰ See for example the ESRB *Revision of the European Market Infrastructure Regulation* published on April 2017.

¹¹ D'Errico, M. and Roukny, T., 2017. Compressing over-the-counter markets. Available at SSRN: <https://ssrn.com/abstract=2962575> or <http://dx.doi.org/10.2139/ssrn.2962575>

wide OTC derivatives markets collected under EMIR,¹² we find large levels of intermediation which, on average, render 75% of the market notional eligible for compression. Figure 2 illustrates such a result for a specific set of fungible Credit-Default-Swaps (CDS) contracts.

In addition to intermediation conditions, the exact share of excess that can be eliminated through compression is also determined by counterparties' tolerances to portfolio reconfigurations. In fact, we find a theoretical trade-off between the efficiency of a market-wide compression and the individual levels of tolerance vis-à-vis trade reconfigurations. For example, a compression process that is limited to reducing or eliminating established positions (as shown in Figure 1) cannot achieve complete excess elimination. In contrast, a compression process allowing for any reconfiguration of trades can always reach a complete elimination of market excess. Using the above mentioned dataset, we empirically test the relative efficiencies of several compression benchmarks differing in their levels of reconfiguration tolerance. We find that even the most multilateral conservative approach, which fully preserves original trading relationships, eliminates on average more than 85% of the original market excess. Such efficiency can in general be further improved by 10 percentage points when allowing complete reconfigurations in the intra-dealer segment. A complete reconfiguration of the whole trade network achieves full excess elimination, as theoretically expected.

Overall, these results provide a first assessment of the implications of a market-wide adoption of portfolio compression in derivatives. On the one hand, the use of regulatory data allows for an original global analysis of the market impact. This approach extends previously reported statistics delivered by compression services themselves. Note that the scope of these previous records bears some differences: the reported performances are conditional upon the pool of clients of the reporting entity. In contrast, the data used in this

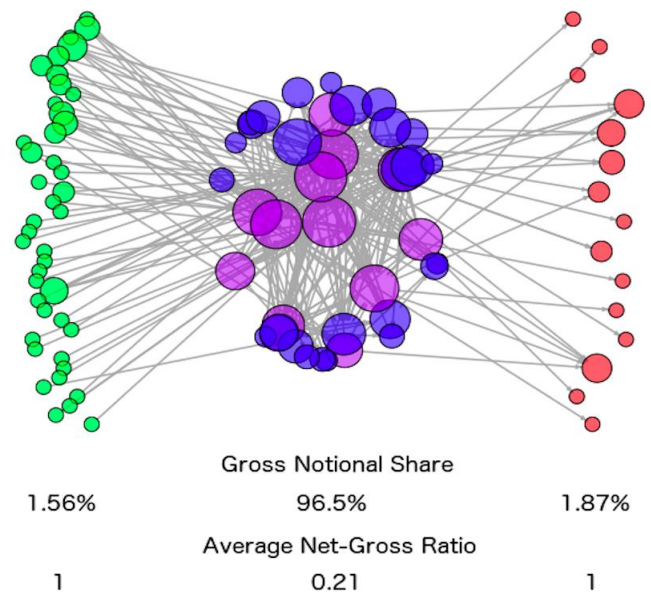


Figure 2. Network illustration of a real OTC derivative market, which maps all outstanding obligations for credit default swap (CDS) contracts written on the same sovereign government reference entity for the month of April 2016. Red nodes correspond to sellers. Purple nodes are G16 dealers. Blue nodes are dealers not belonging to the G16 dealers set. The first line below the figure retrieves the share of gross notional per set of market participants. The second line retrieves the average ratio between net and gross individual positions in each set. While buyers and sellers have a combined gross share of less than 5%, their net position is equal to their gross position. In contrast, the set of dealers covers more than 95% of gross market share while, on average, only one fifth is covered by net positions. As a result, 76% of the notional held by dealers is the result of redundant positions.

work accounts for all participants in the EU irrespective of their current use of compression services.

On the other hand, the development of a comprehensive framework brings a systemic perspective on novel post-trade services and highlights the following challenges. Ever growing needs to alleviate regulatory requirements increase participants' search for more efficient compression. Our findings suggest that efficiency gains can be achieved in two ways. First, by virtue of the compression efficiency trade-off, clients can increase their individual gains by their reconfiguration tolerances, for example, by allowing trades with new counterparties. Second, by virtue of the additive nature of market excess, increasing the pool of participants and trades to be considered for compression generates more netting opportunities. However, this second mechanism is currently limited as the demand for compression mainly comes from banking reforms. Participants other than banks are not subject to the same regulatory requirement. Therefore, they should extract less utility

¹² For more information regarding the dataset see Abad, J., Aldasoro, I., Aymanns, C., D'Errico, M., Rousová, L.F., Hoffmann, P., Langfield, S., Neychev, M. and Roukny, T., 2016. Shedding light on dark markets: First insights from the new EU-wide OTC derivatives dataset. *ESRB Occasional Paper Series*, 10, pp.1-32.

from compression services and be less incentivized to join the pool of compression participants.

In light of those observations, it appears that increasing compression gains is currently more likely to be achieved through the first option, that is, clients increasing their tolerances to portfolio reconfigurations. While the exact consequences of such disruption are unclear at the moment, they deserve a precautionary stand. In fact, the interplay between unintended changes in the network structure and other key variables such as leverage, size, common exposures, and short-term funding can have large effects on financial stability and systemic risk.¹³ In contrast, other forms of compression gains could be achieved by aligning incentives across different types of intermediaries in order to increase the pool of participant types. An increase in the extensive margin could result from harmonization of regulatory frameworks and generate efficiency gains while limiting disruptions in the underlying web of counterparty relationships.

Finally, under well-designed conditions, portfolio compression can also be a major tool for systemic risk mitigation. In times of crisis, excessive gross positions can dramatically amplify distress: in September 2008, Lehman Brothers, which was believed to be counterparty to around 5 trillion dollars of CDS contracts,¹⁴ was reportedly subject to a compression run in collaboration with policymakers.¹⁵ The attempt failed due to technical limitations and timing constraints. It is difficult to gauge the outcome of a successful compression of Lehman's swap portfolio. However, our findings suggest that, Lehman being a major dealer at the center of several intermediation chains, its portfolio might have been largely compressed. A successful compression might have curbed the systemic effects of its default. Currently, portfolio compression is mainly privately valued by individuals seeking to alleviate regulatory constraints. In times of systemic distress, the same service could serve

as a public risk management tool to effectively reduce both expected and realized losses.

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¹³ See literature review on financial networks and systemic risk: Glasserman, P. and Young, H.P., 2016. Contagion in financial networks. *Journal of Economic Literature*, 54(3), pp.779-831.

¹⁴ Speech 'Rethinking the financial network' by Andrew G Haldane, Executive Director, Financial Stability, Bank of England, at the Financial Student Association, Amsterdam, 28 April 2009.

¹⁵ See the Bloomberg article by B. Ivry, C. Harper and M. Pittman, "Missing Lehman Lesson of Shakeout Means Too Big Banks May Fail," September 8, 2009.