BSAMC

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The Giant Market of CLOs

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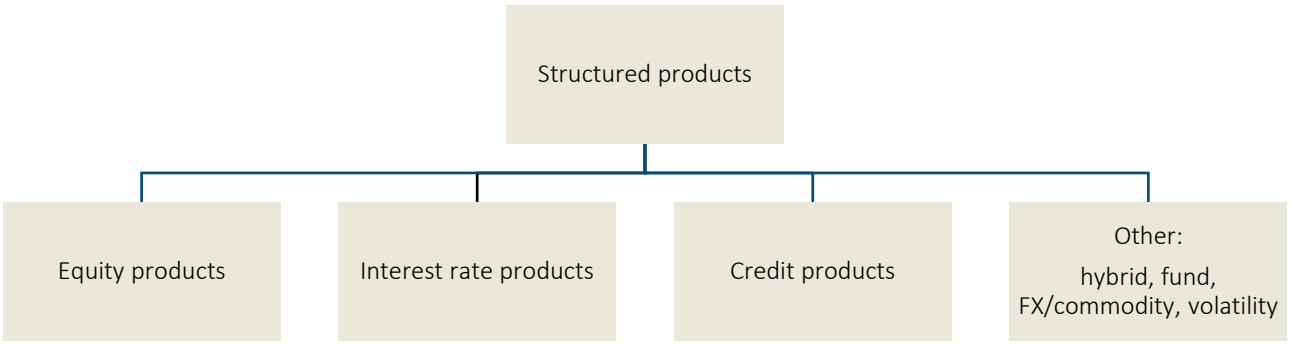
Table of Contents

A Brief Introduction to Structured Products

As investment banks continue to innovate their derivatives technologies, investors can benefit from a wide range of different alternative investments to diversify their portfolios. A derivative is a financial contract, whose value is dependent on the fluctuations in an underlying asset or group of assets. The nature and risk of each derivative product must be well understood by investors in accordance with their strategies and risk profiles. Structured products are considered to be one of the most misunderstood derivative products proven by the subprime mortgage crisis of 2007-2010. However, they have been playing a significant role in complementing traditional retail and institutional portfolios and providing profitable returns over the years.

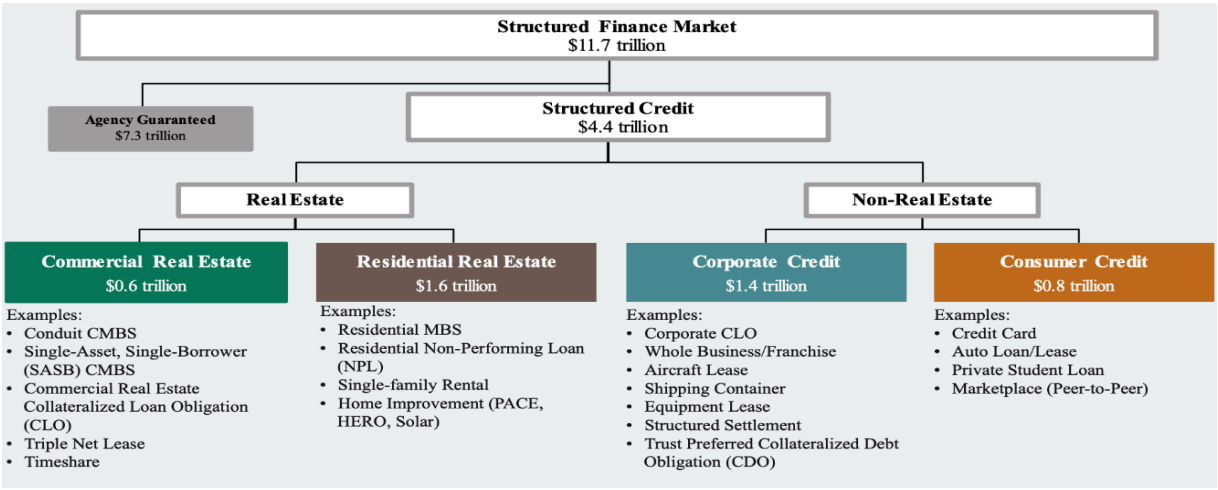
Structured products were first issued in Europe in the 1980s as a solution to the need of companies to issue cheap debt and preferred by retail investors by providing them access to stock market returns without capital risk. Currently, their global market has grown to $12 trillion, with banks employing financial engineering to make them a far more wide-ranging investment alternative.

What makes structured products attractive to investors is their underlying principle. They are pre-packaged investments whose value derives from one or more underlying assets, which are often combinations of equities, bonds, credits, commodities, and one or more derivative components.



Structured products derivatives are used to transform the risk-return characteristics of the traditional products by replacing their usual payoffs with non-traditional ones derived from how well the underlying assets perform in order to meet investors' needs.

The table below represents the breakdown of the structured finance market in 2018, in which structured credit products accounted for $4.4 trillion.



Sources: Oaktree Capital, SIFMA, AFME

As shown by the table, the most common products are residential mortgage-backed securities (RMBS), and commercial mortgage-backed securities (CMBS) in real estate. In non-real estate, the most common ones are

asset-backed securities (ABS) which consist of corporate contracts or consumer debt, and collateralized loan obligations (CLO) that are securities backed by a pool of corporate loans.

To create these products a process called securitization is employed by which similar assets are pooled together, transferred to a special legal entity known as special purpose vehicle (SPV), and issued to investors. As the name suggests, SPV has the only purpose of collecting the assets and issuing debt secured by those assets. In case of a bankruptcy, structured credit holders are not affected as an SPV is considered bankruptcy-remote. Structured credit products are made up of different tranches and are sold independently based on their risk-return characteristic, in which usually the senior tranche claims the first income and as the tranches get riskier their claim to income decreases.

Investing in structured credit products has several benefits and risks. Due to their increased complex nature, securities such as CMBS and CLOs have attractive yield premiums compared to traditional fixed-income products. Historically, other credit products have had higher loss rates than CLOs and different types of CMBS. The securitization process of structured products creates safeguards that reduce the credit risk of an issue.

However, the risk of default cannot be eliminated and although structured credit products are designed to increase the liquidity of illiquid assets, it might be difficult to price and liquidate them if they are traded rarely.

Introduction to CLOs

CLOs are a $910 billion asset class using funds received from the issuance of debt and equity to investors to acquire a portfolio of a certain number (normally around 200) of loans. They originated in the late 1980s, as a way for banks to package leveraged loans together to provide investors with an investment vehicle with varied degrees of risk and return to best suit their investment objectives. The focus of these structures lies on generating income through the interest payments of collateralized loans. Those loans act as the collateral value for the CLOs. The proceeds of these loans are typically used by non-investment grade borrowers to support a range of activities for instance:

- Mergers and Acquisitions
- Stock repurchases
- Dividend payments
- Leveraged buyouts

These loans are typically made possible by a group of lenders that pool their resources together in order to make such investments possible and to diversify risk. Afterwards, the loans are bundled into securities to sell them to other investors. CLO securities are comprised of Senior Secured Corporate Loans of larger companies, the most senior tranche possible. Therefore, the collateralized loans bundled into CLOs are secured by the assets of the borrowing company and have the highest claim on recovery in case of default. Historically speaking, they had a very high recovery rate of 80% in case of a company default and are therefore comparably secure. Exemplary is their performance during the financial crisis of 2008 in which CLOs continued to remain profitable even though cash flows and the entire economy were impacted by Loan defaults. Research conducted by Guggenheim Investments, an asset management firm, found that from 1994 to 2013 CLOs experienced significantly lower default rates than corporate bonds. Only 0.03% of tranches have defaulted from 1994 to 2019.

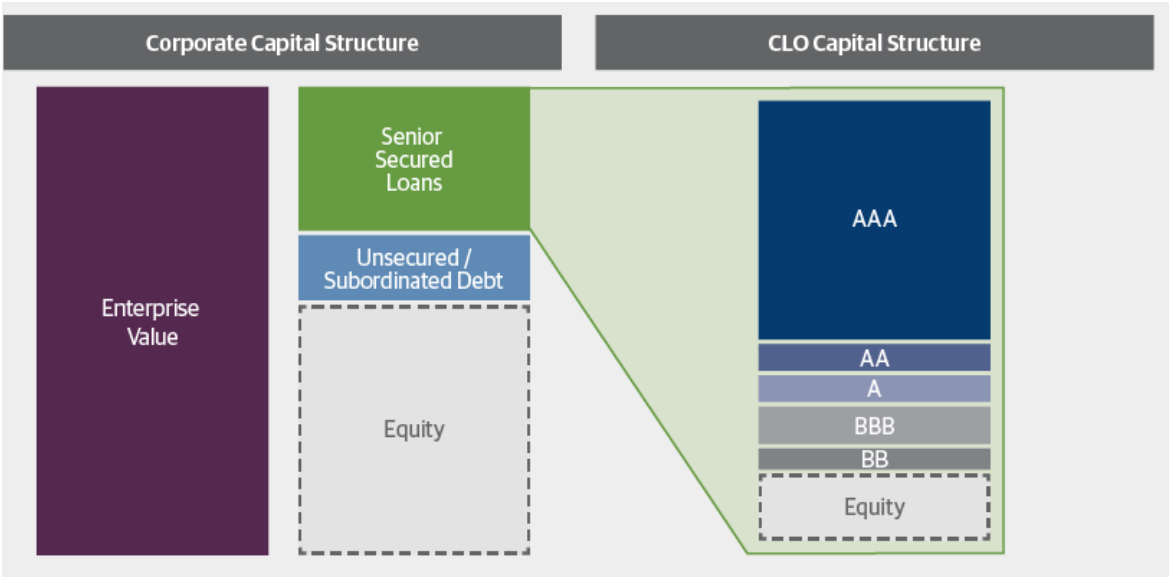
The following table shows S&P U.S. CLO Default History by Credit Rating (1994-2013)[1]:

Original Rating	Total Tranches	Defaulted Tranches	Default Rate	Loss Rate
AAA	1,992	0	0%	0%
AA	1,005	0	0%	0%
A	1,119	5	0.45%	0.08%
BBB	1,069	3	0.28%	0.21%
BB	841	14	1.66%	0.78%
B	115	3	2.61%	1.13%
Total	6,141	25	0.41%	0.04%

How are CLOs structured?

CLOs are structures that combine multiple elements with the goal of generating an above-average return while providing a low level of risk at the same. They consist of tranches that hold the underlying loans typically consisting around 90% of debt and 10% of equity. The tranches are ranked highest to lowest in order of credit quality, asset size, and income stream – and, thus, lowest to highest in order of riskiness. Each tranche is a piece of the CLO, and it dictates who will be paid out first when the underlying loan payments are made. Debt tranches are treated just like bonds and have credit ratings and coupon payments.

These debt tranches are always in the front of the line in terms of repayment compared to equity. The CLOs most senior and highest-rated AAA tranche carries the lowest coupon but is entitled to the highest claim on the cash flow distributions and is the most loss-remote. Mezzanine tranches (not rated AAA) pay higher coupons but are more exposed to loss and have lower ratings. Equity tranches do not have credit ratings and are paid out after all debt tranches. Equity tranches are rarely paid through cash flow but do offer ownership in the CLO itself in the event of a sale. The equity tranche occupies a distinct place in the CLO structure. It's essentially a highly leveraged play on the strength of the underlying collateral. Because the equity tranches success depends on the success of the loan tranches – it's last in line to receive cash flows and first to realize loan losses – its owners take the most risk of any CLO investors. Their goal is therefore to maximize the value of the equity.



[1] Source: S&P LCD. "Twenty Years Strong: A Look Back at U.S. CLO Ratings Performance From 1994 Through 2013," January 31, 2014. Guggenheim Investments

Each CLO has a defined lifecycle in which collateral is purchased, managed, redeemed, and returned to investors. The standard lifecycle includes five stages:

- *Warehouse Period*: The manager purchases the initial collateral
- *Ramp-Up Period*: The manager purchases the remaining collateral to complete the original portfolio. After the ramp-up is complete, the manager also performs monthly tests to ensure the portfolio's ability to cover its interest and principal payments
- *Reinvestment Period*: The manager can reinvest all loan proceeds, either purchasing or selling bank loans
- *Non-Call Period*: Loan-tranche holders earn a per-tranche yield spread specified at closing, after which the majority equity-tranche holder can call or refinance the loan tranches.
- *Amortization Period*: As underlying loans are paid off, the manager pays down the loan tranches in order of seniority and distributes the remaining proceeds to the equity-tranche holders.

Who manages, and owns CLOs?

CLOs are actively managed by a CLO manager. Their active management helps to maintain (and can improve) the yield of the portfolio of loans within the CLO. The CLO manager will try to mitigate any risk by continually performing various coverage tests on the portfolio. He is able to sell or buy underlying securities in order to keep the risk as low as possible and avert possible default scenarios.

Owners of CLOs:

Rating	Outstanding In Billion USD	Insurance	Banks	JPY-Banks	Asset Managers/Hedge Funds
AAA	502	19%	30%	18%	33%
AA	99	47%			53%
A	53	60%			40%
BBB	50	56%			44%
BB	36	12%			88%
Equity	103	14%			66%

CLOs are only available to institutional investors. There is a high difference between owners of the different risk trenches due to significantly different risk/profit ratios.

Which mechanisms exist to protect investors?

In the wake of securitized investments' difficulties during the financial crisis, US and European regulators took steps to mitigate CLOs' structural risks and make CLOs more attractive for investors:

- Collateral concentration limits: Many deals mandate that at least 90% of the portfolio be invested in senior secured loans
- Borrower diversification: The pool of loans typically must be diversified across 150-450 distinct borrowers in 20-30 industries, with a small percentage of the assets (e.g., 2%) invested in the loans of any single borrower
- Borrower size requirements: Managers are often restricted from purchasing loans of small companies, whose trading liquidity is low
- Excess Spread: CLOS generate excess interest in order to stomach a certain number of defaults without passing them on to investors

The Market Outlook

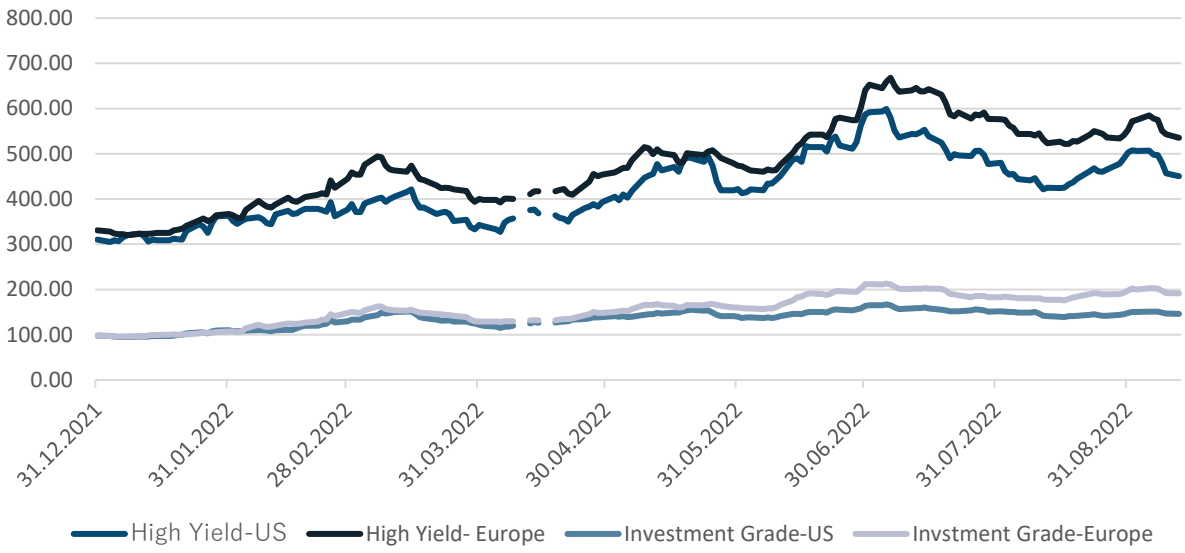
After the end of 2022, it is possible to say that the market has been extremely volatile, and the interest rates globally have fluctuated massively. Therefore, as happens to most of the investors globally, this environment has put pressure on the leveraged loan borrowers.

The worsening growth prospects and changing perceptions of the monetary positions in macro economical aspect transformed financial markets. Economic indicators got worse because of the Ukraine war, high inflation and weaknesses in China. Overall, all these factors affected the market volatility.

Therefore, equity markets were volatile as investors' perceptions of the policy to "lower inflation" evolved. In mid-June (2022), advanced economies stocks began to rise even though the earnings forecasts fell. Starting in August, however, this situation was reversed. With energy crisis in Europe, policymakers globally emphasized their commitment to lower the inflation rates globally. Therefore, investors expected greater policy rates.

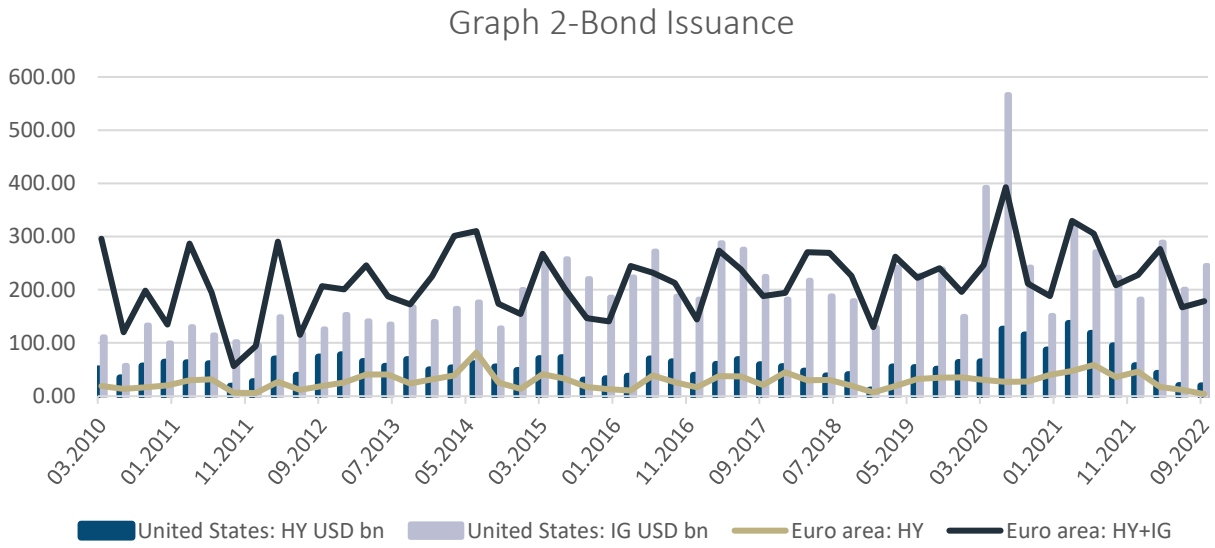
Corporate bonds broadly tracked equity market dynamics. However, not all the bonds are in the same class. Here, it is important to understand what high yield and investment grade is. The bonds classified as investment grade tend to be less risky than high-yield bonds, as its name suggests. High yield bonds tend to be riskier but also more rewarding. An upward trend in the gap between High yield and Investment grade spreads indicates stronger differentiation depend on the "credit risk" as can be seen below the "Bonds Spread in US and Europe" chart.

Graph 1-Bonds Spread in US and Europe



Sources: ICE of BofAML; BIS Calculations

As Graph 1 suggests, an increase in high yields can be observed both in US and Europe. While this was happening new bond issuance dropped especially for High yield segment in Europe during the June 2022-September 2022 period. This can be seen from Graph 2, below:



Sources: Bloomberg; BIS Calculations

There are two main factors affecting the recent bond issuance patterns. Firstly, from the borrower's perspective, rising rates deduced the appeal of refinancing through debt. Secondly, investor's demand. As represented by fund flows, they remained weak in the High yield segment.

Thus, private credit and structured finance also got affected from this situation. Private credit agreements fell below 2021 levels, after a sustained growth for a long time. The flow of collateralized loan obligations (CLOs) remained broadly stable, after having losses earlier in the year, mostly due to losses on warehouse loans as the Russia-Ukraine war broke out. However, as mentioned, since the demand for refinancing out of debt reduced, also CLOs came to a halt.

CLO Market 2021 vs 2022:

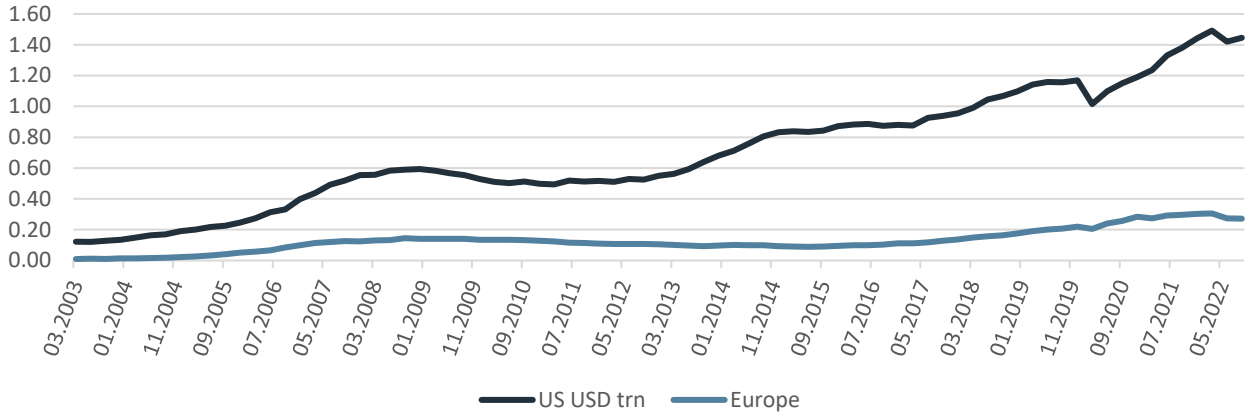
There is no doubt to say that the CLO market in 2022 faced a battle to match in 2021's position which was a record-breaking year. Approaching 180$ billion-plus in primary CLO deal volume appears to be unattainable. Many of the incentives and market factors that fuelled the 2021 market remain intact, including strong corporate performance, a growing and increasingly diverse CLO investor base, namely insurance companies, and strong CLO debt and equity returns.

However, the first 6 months of 2022 have been very difficult for CLOs. There are several reasons as mentioned earlier. Expected interest rate rises from FED was the major reason. Even though, CLO returns remained more appealing than returns on corporate debt, CLO issuance for 2022 is less than from the level in 2021. Especially more for Europe than US.

US vs. Europe

European CLO markets particularly affected more to defaults than US. The first reason for this is the smaller size of the European leveraged loan market relative to the US market. European CLOs have less diversified portfolio. Also, according to Citi Research "Global CLO market mid-year outlook" (Wang, 2022), the European CLO market is relatively illiquid, which is amplifying the price swings in times of stress.

Graph 3-Leveraged Loan market in US and Europe



Sources: Bloomberg; BIS Calculations

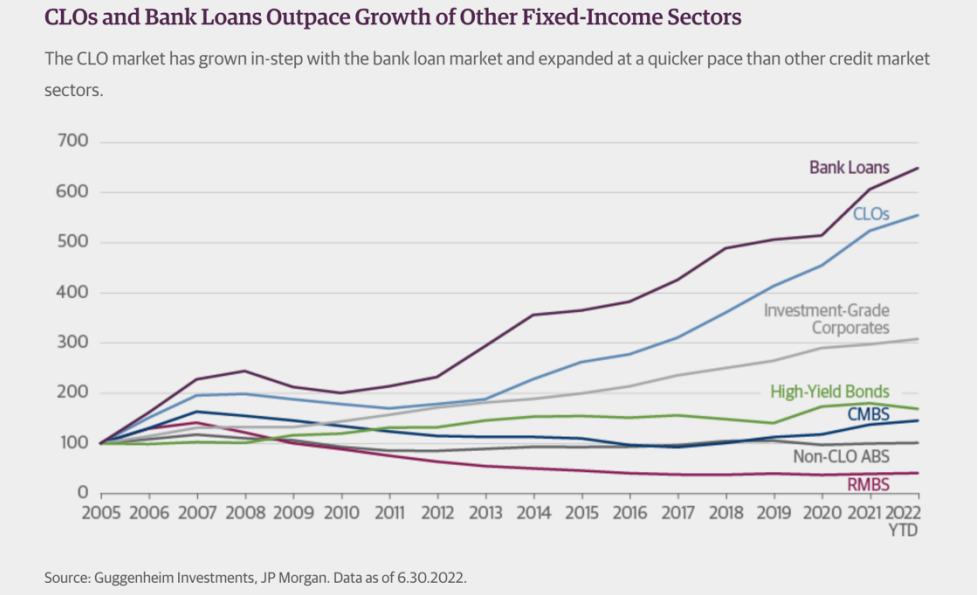
Divergent signals about default risk correlations

Rising interest rates and slower economic growth is putting pressure on leveraged loan borrowers, it is inevitable. Hence some will get their ratings downgraded however, according to the research done in "BIS Quarterly Review", market prices are sending divergent signals about default correlations. On the one hand, investors in equity markets have recognized that, due to the Ukraine War, the outlooks for European companies are more entangled than in the past. Indeed, realized correlations among stock returns rose sharply in the first quarter of 2022 and remained raised relative to the previous year. On the other hand, investors in European credit markets saw only a limited increase in default risk movement. There can be two causes of this situation according to the research, "The first is that the correlations of changes in credit default swap (CDS) spreads increased only slightly after the Ukraine war and dipped below Q1 2021 levels by mid-year. The second is that a common market-based proxy for future default risk correlation rose after the war's outbreak but subsequently eased back to early 2022 levels." (BIS, 2022).

To conclude, it is still undecided whether defaults will be more correlated in the future. It is not unusual that equity and credit markets send divergent signals about correlations. However, if equity market turns out to be correct in their assessment, the risk in AAA-rated CLO tranches is currently under-priced.

Industry Performance

CLO's have historically outperformed other securities and equities through financial crises such as the Great Financial Crisis of 2008. CLO structures are designed and adjusted for exposures through avoiding being subject to riskier borrowers and industries to increase overall portfolio quality. As they are made of other securities, CLOs are affected by credit and liquidity, and the CLO structure requires that investors understand the waterfall structure and mechanisms that CLOs provide as well as the protections, conditions, and credit profile of the underlying loan collateral.



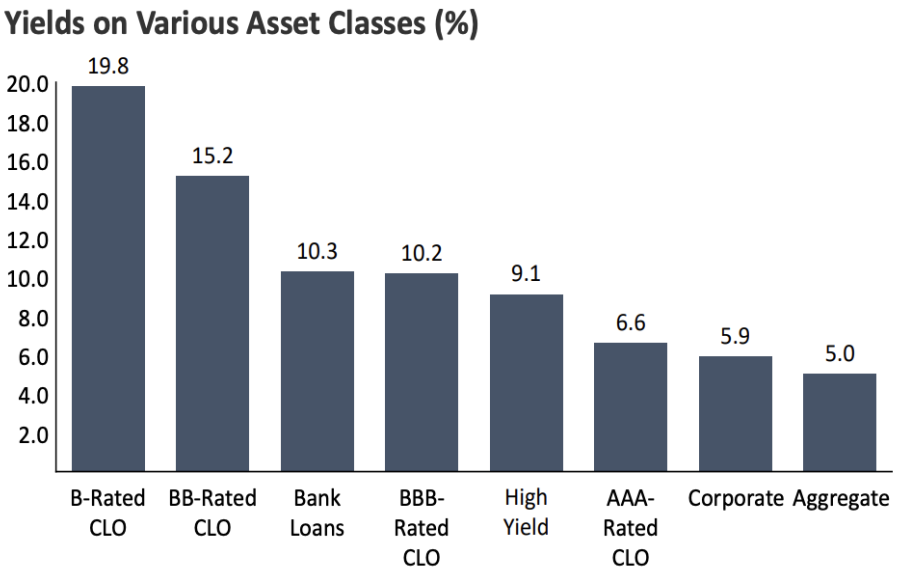
One of the key characteristics of CLOs is that their coupon is adjusted at a floating rate, which helps to insulate bond prices from rising interest rates. Floating-rate securities prices, as a result, tend to be less sensitive in rising interest-rate environments than those of their fixed-rate counterparts.

Market Data	Oct-22 Return (%)	1-Year Return (%)	Yield (%)	Yield Change (bps)	DM (BPS)	Price($)
JP Morgan CLO Indices						
AAA-Rated	0.43	-0.90	6.6	23	224	96.75
AA-Rated	0.12	-3.14	7.3	29	306	94.00
A-Rated	0.58	-4.93	8.1	21	394	91.69
BBB-Rated	-0.55	-7.78	10.2	47	597	87.24
BB-Rated	0.40	-8.92	15.2	37	1077	80.77
B-Rated	-0.64	-8.95	19.8	60	1515	68.78
Credit Suisse Leveraged Loan Index						
BB-Rated	1.76	1.29	8.34	-17	378	97.08
B-Rated	0.72	-2.41	11.59	18	705	91.83
CCC-Rated	-1.71	-12.08	19.34	126	1476	77.57
Distressed (CC, C, and Default)	-5.85	-28.79	30.40	230	2588	46.53

Source: JP Morgan, Credit Suisse, as of Oct 31

October returns were varied across the tranches of the CLO capital structure, with positive returns for senior tranches (AAA-A) and mezzanine tranches (BBB-B) slightly negative for the month. JP Morgan CLOIE index return estimates were 0.43% (AAA), 0.12% (AA), 0.58% (A), -0.55% (BBB), 0.40% (BB), and -0.64% (B). The Credit Suisse Leveraged Loan Index returned 0.85% in October, with the ever-growing loan coupon rate (now at 7.2%) providing most of October's return. Due to Japan's largest AAA-rated CLO investors is pausing its

purchases in the new issue market, CLO issuance was hit with yet another challenge. CLO issuance ended October slightly down from the year-to-date trend, with only $8.7bn issued for the month.

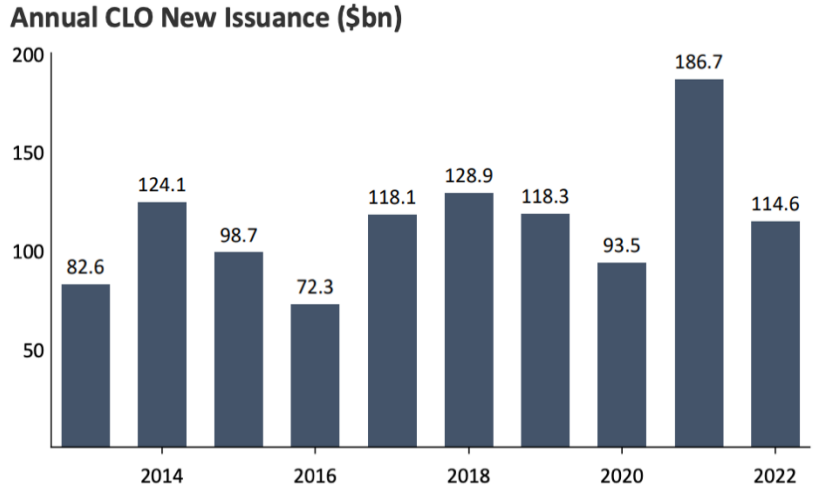


Source: JP Morgan, Credit Suisse, Barclays, as of October 31, 2022

During the third quarter of 2022, CLO spreads widened with AAA to A tranches widening by 20 and 55 bps, while both BBB and BB tranches widened by 50 and 100 bps respectively. Despite higher spreads, the floating-rate coupons and shorter maturities insulated CLO performance, with AAAs and BBBs returning 0.2 percent and -1.4 percent respectively.

Although CLOs' corporate bank loan collateral is beginning to see downgrades and default rates are increasing, CLO structures are positioned defensively as performance test thresholds have nearly recovered to pre-COVID levels.

For example, CLOs' exposure to CCC loans has fallen to 4 percent from a peak of over 10 percent during the COVID pandemic, while junior overcollateralization cushions (OC) —the measure of losses CLO collateral can take before cash flow diversion—is back to pre-COVID levels of 5 percent after falling to almost 2 percent. The new issue market is challenging for issuers as investor demand for AAA CLOs is unenthusiastic and capital is readily available for only the most heavily resourced and established CLO managers.



Source: Source: S&P Global Research as of October 31, 2022

Valuation and Pricing Models

CLOs rely on the performance of the underlying assets to provide enough cash flow to satisfy the different tranche holders and a competitive return on the equity tranche.

Therefore, the determination of relative value for a CLO simultaneously considers potential returns relative to other securitized and corporate fixed-income sectors as well as its pricing relative to other short-duration options. CLOs can be valued through three different valuation methods, each with a focus on different factors.

The most basic level of evaluation of a CLO tranche therefore involves an analysis of the underlying portfolio of assets and the structure of the CLO. It is important to consider how the CLO has performed so far with respect to cash flow coverage and quality tests as well as expected losses stemming from the portfolio. Most important factors influencing the number of defaults and the resulting losses in the portfolio are credit quality, diversity among debtors and recovery rates.

A slightly more sophisticated, still straight-forward, approach for valuing CLOs and other asset-backed securities is based on the present value of projected cash flows. This technique is known as discounted cash flow (DCF) valuation and it attempts to simulate the cash flow characteristics of the tranche in situations where a liquidation of the CLO is expected, e.g., when the equity holders exercise their possibility to call the CLO or when the collateral manager is forced to liquidate due to broken test triggers.

The call possibility is sometimes exercised when the deal performs very badly, and equity holders believe that the CLO is worth more liquidated (rare). In these cases, a net asset value (NAV) approach for valuing the CLO might be more suitable. NAV technique tries to estimate the value of the CLO to the different tranche holders if it was liquidated at time. Depending on other investor needs yet a third way of valuing CLOs can be used. The thought behind it is to separate the principal and interest components from the CLO tranche and to value them on interest only (IO) and principal only (PO) basis. In most cases investors use more than one of the mentioned techniques when analyzing a CLO tranche.

Mathematical and Statistical Calculation

CLO Tranche Premium Leg Value Formula:

$$\sum_{i=1}^{N} s \cdot D_i \cdot (t_i - t_{i-1}) \cdot E^Q[U_k - R_k(t_i)]$$

CLO Tranche Protection Leg Value Formula:

$$\sum_{i=1}^{N} D_i \cdot E^Q[L_k(t_i) - L_k(t_{i-1})]$$

In general, the contractual spread of a credit derivative is determined at contract initiation so that the expected present value of the protection leg payments is equal to the expected present value of the premium leg payments. After initiation, the value of the contract to the protection buyer, V, is the expected present value of the protection payments minus the expected present value of the premium payments. The value to the protection seller is V. The notation above is as follows: *s* denotes the spread; the payment dates are $t_i, i = 1, \dots, N,$ and D_i is the discount factor at t_i.

The formulas for the CLO tranche require some explanation. We denote the attachment and detachment points of the kth tranche (expressed as percentages of the total portfolio notional) by A_{k-1} and A_k, respectively. The total portfolio notional *U* and the notional of the k_{th} tranche U_k are given by:

$$U = \sum_{j=1}^{M} m_j, \quad U_k = (A_k - A_{k-1}) \cdot U$$

We then denote by $R_D(t_i)$ and $R_P(t_i)$ the cumulative portfolio reductions at time t_i owing to default and prepayment/cancelation respectively:

$$R_D(t_i) = \sum_{j=1}^{M} m_j \cdot LGD_j \cdot 1\{\tau_j \leq t_i\}, \quad R_P(t_i) = \sum_{j=1}^{M} m_j \cdot 1\{\sigma_j \leq t_i\}$$

The total reduction in the notional tranche *k* until the time t_i is then:

$$R_k(t_i) = \min\left(\max(R_D(t_i) - A_{k-1} \cdot U, 0) + \max(R_P(t_i) - (1 - A_k) \cdot U, 0), U_k\right)$$

and the cumulative default losses on the tranche until time t_i are given by:

$$L_k(t_i) = \min\left(\max(R_D(t_i) - A_{k-1} \cdot U, 0), U_k\right)$$

The pricing formulas for the CLO-squared are identical to those for the CLO, with the notation suitably reinterpreted. In this case, m_j denotes the notional of the j_{th} CLO tranche in the collateral pool underlying the CLO-squared. As before, the total portfolio notional is denoted by *U* and is simply the sum of the notionals of the underlying collateral.

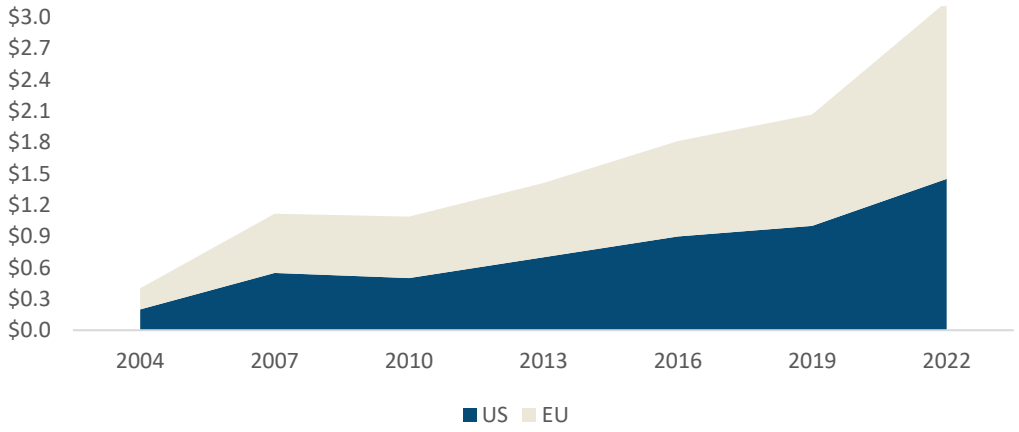
A_{k-1} and A_k denote attachment and detachment points of the k_{th} CLO-squared tranche. U_k denotes the notional of the k_{th} CLO-squared tranche. With $L_k(t_i)$ and $R_D(t_i)$ reinterpreted as the loss on the k_{th} tranche of the CLO-squared and the reduction in the collateral portfolio notional due to default, the pricing formulas given above for CLOs remain valid for CLO-squared.

Naturally, in this context the determination of the losses on the underlying collateral is more complicated and involves calculating the losses for each of the underlying collateral instruments of the CLO-squared.

Banks 'exposure to CLOs – EU and US

Collateralized loan obligations (CLOs) are among the largest holders of leveraged loans. As seen above, CLOs are tranched securitizations, meaning that they are investments in risky pools of leveraged loans using funds raised by issuing notes, or tranches, with different risk profiles. The most senior notes typically have AAA ratings because they are insulated by the junior tranches from all but the largest losses, which are more likely when defaults are highly correlated.

Graph 4 - Leveraged loans market volume

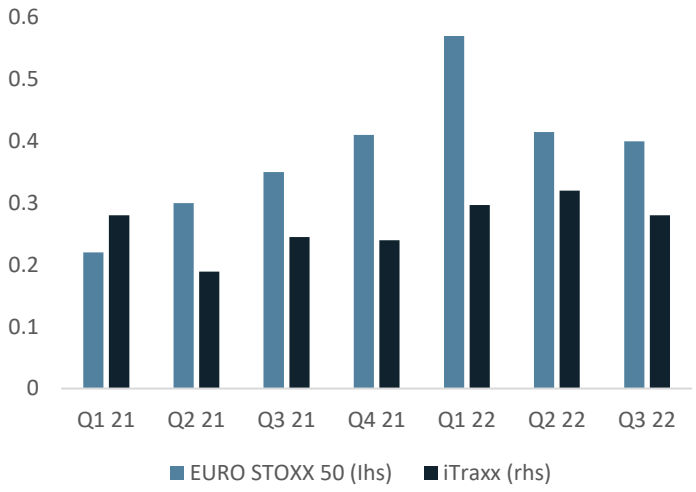


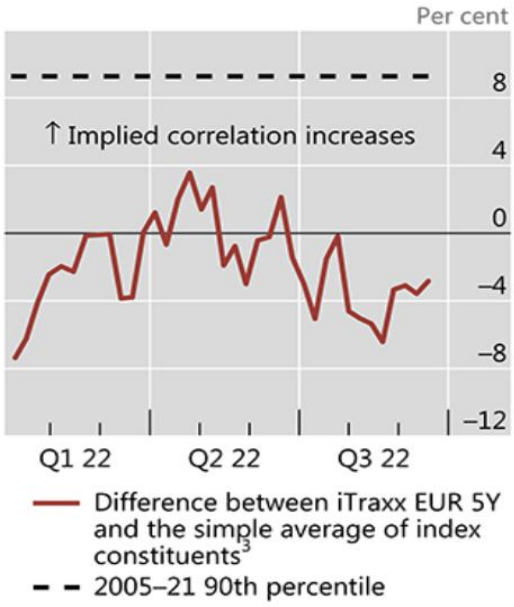
CLOs are popular with ultimate investors for three main reasons. First, investors can fine-tune the desired risk exposure to a large market, as leveraged loans amount to more than $1.5 trillion overall in the United States and Europe. Second, CLOs' floating rates are appealing for investors seeking hedges against rising interest rates. Third, CLOs tend to engage in search for yield, enhancing the income stream.

The two graphs below explore the potential implications of the energy crisis in Europe for AAA-rated CLO tranches, which are very sensitive to broad-based disruptions. Persistent issues with the supply of electricity or industrial inputs in Europe might worsen the outlook for many firms simultaneously, thus raising the risk of correlated defaults. Such a scenario could generate principal losses for AAA tranche investors, chiefly banks, and insurers. Even in the absence of outright credit losses, price declines due to increased risk premia could generate mark-to-market losses.

European CLO markets could be particularly exposed to correlated defaults. First, partly due to the smaller size of the European leveraged loan market relative to the US one, European CLOs have less diversified portfolios. Second, there is a higher overlap across the portfolio holdings of various European CLOs, which further limits investors' ability to diversify. Lastly, the European CLO market is relatively illiquid, which could amplify price swings in times of stress. Given the geopolitical forces at play and the structure of European CLO markets, it is noteworthy that market prices are sending divergent signals about default correlations.

Graph 5 - Correlation between stock and credit indexes



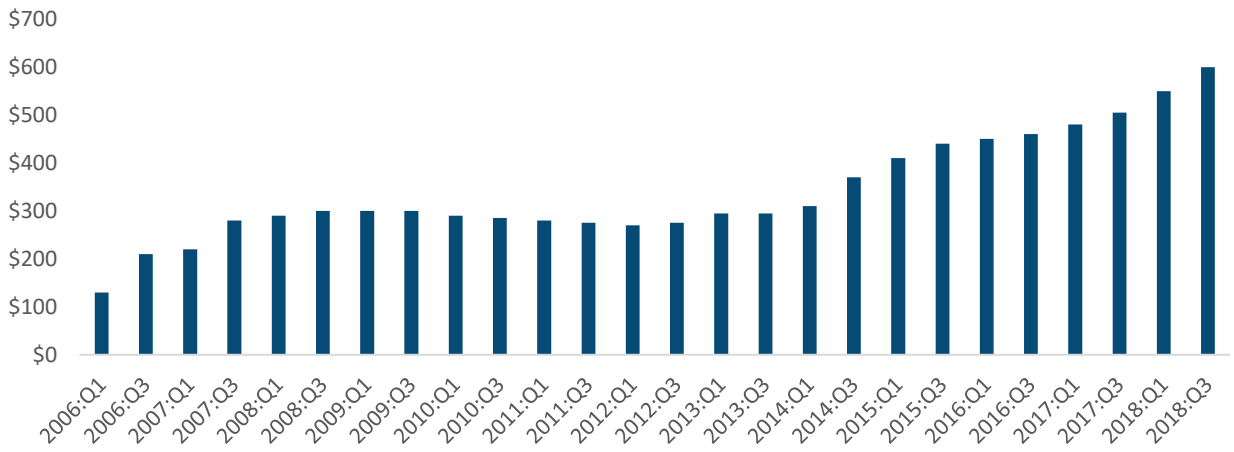


On the one hand, investors in equity markets have recognized that, due to the fallout of the Ukraine war, the outlooks for European companies are more intertwined than in the past. Indeed, realized correlations among stock returns rose sharply in Q1 2022 and remained somewhat elevated relative to the previous year. On the other hand, investors in European credit markets appear to see only a limited increase in default risk co-movement. This assessment rests on two observations. The first is that the correlations of changes in credit default swap (CDS) spreads increased only slightly after the Ukraine war and dipped below Q1 2021 levels by mid-year (Graph 5). The second is that a common market-based proxy for future default risk correlation rose after the war's outbreak but then eased back to early 2022 levels.

On balance, the jury is still out on whether defaults will be more correlated in the future. It is not unusual that equity and credit markets send divergent signals about correlations, which may reflect investor segmentation. However, if equity markets turn out to be correct in their assessment, the risk in AAA-rated CLO tranches is currently underpriced.

For what concerns the U.S., CLO market accounts for approximately half of the country's leveraged loans outstanding. Therefore, the volume has grown dramatically over the past several years following a lull in the market after the crisis, reaching $617 billion in 2018: Q4, a 6-times jump with respect to 2006 levels. (Graph 6)

Graph 6 - U.S. CLOs Outstanding



Regarding more recent data, and especially the period 2020 and 2021, volumes are generally high and speedily growing. In fact, several smaller banks have added CLOs to their securities books after reporting none in the former year, and some of the nation's largest banks have added billions in CLOs over the latter year. The U.S. banking industry, in aggregate, reported $120.22 billion of CLOs in their securities holdings as of June 30, 2021, up 7.7% from March 31 and an increase of 17.7% from June 30, 2020. Most of the securities were classified as held-to-maturity, accounting for more than 65% of the CLO securities. Demand for CLOs have been rising as investors seek higher yields, pushing CLO issuance to record highs in 2021. (Table below)

More than 75% of CLOs in the U.S. banking industry remained in the hands of Wells Fargo & Co., JPMorgan Chase & Co., and Citigroup Inc.

The first one overtook JPMorgan as the bank holding company with the most CLO investments due to rising CLO holdings of 34.9% year over year to $33.74 billion.

JPMorgan, meanwhile, pared its CLO book by $200 million over the last year, giving the bank $33.41 billion of CLOs as of June 30, down 0.6% from where it was a year ago.

Citigroup retained its No. 3 ranking in the list of banks holding companies with CLO investments with holdings increasing by $4.74 billion year over year, or 22.2%, to reach $26.11 billion on June 30.

The remaining member of banking's Big Four, Bank of America Corp., reported CLO holdings in its securities book of just $76.0 million, down 5% from a year ago.

Another factor affecting CLOs' boost relies upon new entries in the market. Several banks holding companies reported CLO balances in the second quarter after having zero CLOs in the year-ago period: Western Alliance Bancorp., Santander Holdings USA Inc., United Services Automobile Association, First Interstate BancSystem Inc., OceanFirst Financial Corp., Banner Corp., and Hope Bancorp Inc. As an example, Western Alliance began purchasing CLOs because the floating-rate investments generate higher yields than mortgage-backed securities, and the CLOs will benefit from future increases in interest rates, the bank stated in a 2020 year-end filing. The company has been steadily adding to its CLO portfolio over the past several months, putting its holdings at $937.1 million as of June 30, all designated as available for sale.

Banks with CLOs as of June 30, 2021

		Structured financial products backed by corporate or similar loans			
		Total		Available for sale (fair value) ($M)	Held to maturity (cost basis) ($M)
Company (top-level ticker)	Total assets ($B)	($M)	Change since Q2'20 ($M)		
Wells Fargo & Co. (WFC)	1,946.00	33,736.0	8,722.0	12,407.0	21,329.0
JPMorgan Chase & Co. (JPM)	3,684.26	33,407.0	-200.0	6,083.0	27,324.0
Citigroup Inc. (C)	2,327.87	26,108.0	4,739.0	0.0	26,108.0
State Street Corp. (STT)	326.53	5,607.0	2,813.0	5,607.0	0.0
Bank of New York Mellon Corp. (BK)	466.96	5,139.0	707.0	5,139.0	0.0
TD Group US Holdings LLC (TD)	514.17	4,994.2	1,808.6	4,994.2	0.0
Stifel Financial Corp. (SF)	29.74	4,947.2	586.6	118.4	4,828.8
MUFG Americas Holdings Corp. (8306)[1]	165.30	1,153.8	-205.4	1,153.8	0.0
BankUnited Inc. (BKU)	35.71	982.3	-146.5	982.3	0.0
Western Alliance Bancorp. (WAL)[2]	49.07	937.1	937.1	937.1	0.0
PNC Financial Services Group Inc. (PNC)[3]	554.78	912.9	77.1	912.9	0.0
PacWest Bancorp (PACW)	34.87	382.0	245.4	382.0	0.0
Santander Holdings USA Inc. (SAN)[2]	155.19	369.4	369.4	369.4	0.0
United Services Automobile Association[2]	209.22	350.7	350.7	350.7	0.0
East West Bancorp Inc. (EWBC)	59.85	291.5	17.6	291.5	0.0
First Financial Bancorp. (FFBC)	16.04	243.2	93.7	243.2	0.0
First Interstate BancSystem Inc. (FIBK)[2]	18.94	187.3	187.3	187.3	0.0
OceanFirst Financial Corp. (OCFC)[2]	11.50	97.9	97.9	97.9	0.0
Bank of America Corp. (BAC)	3,029.89	76.0	-4.0	76.0	0.0
Banner Corp. (BANR)[2]	16.18	75.0	75.0	75.0	0.0
Hope Bancorp Inc. (HOPE)[2]	17.47	62.4	62.4	62.4	0.0
BMO Financial Corp. (BMO)	193.28	61.4	15.9	61.4	0.0
Webster Financial Corp. (WBS)	33.75	50.0	-34.5	50.0	0.0
Axos Financial Inc. (AX)	14.27	48.5	2.7	48.5	0.0
Ameriprise Financial Inc. (AMP)	171.71	1.1	-0.9	1.1	0.0
Total for all banks[4]		**120,220.9**	**21,317.1**	**40,631.1**	**79,589.8**

Conclusion

The market of CLOs boomed 2021 reaching incredible volumes. 2022 presented challenges to the fixed income (and equity) markets following rising inflation and interest rates together with the war and a general global distress. Moreover, this industry has often been overly criticised as some see (mistakenly) too many similarities with the hated CDOs. These arguments make CLOs and structured finance a more than ever interesting subject.

We began with a general introduction of structured products and of CLOs where we understood the mechanisms of these securities and their investment profile. As we saw, this kind of instrument has proven to be able to provide diversified and high returns to investor and to deliver unexpectedly low default rates compared to the underlyings' markets.

Then, we analysed the outlook of the market where we came across some complexities proper of this market: on the one hand, investors in equity markets have recognized that, due to the Ukraine War, the outlooks for European companies are more entangled than in the past. On the other hand, investors in European credit markets saw only a limited increase in default risk movement. In other words, even if we expected a systemic risk to spread across markets, we did not observe a general increase in default rates. We should also not that CLOs have historically outperformed other securities and equities through financial crises

In addition, we presented very interesting and insightful mathematical models for the pricing of these instruments which allow us to understand how the industry evaluates these securities.

Lastly, we considered an extremely relevant topic in latest years: banks exposure. With a comparison between US and EU we were able to take into consideration how the banking sector is treating these instruments. The huge holdings of CLOs prompt many questions to investors with regard to the financial sector and thus an accurate analysis of the exposure is fundamental to understand the risks and the scenarios entailed by the current situation. All this gives us a question that we want to answer: CLOs, threat or opportunity?

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