

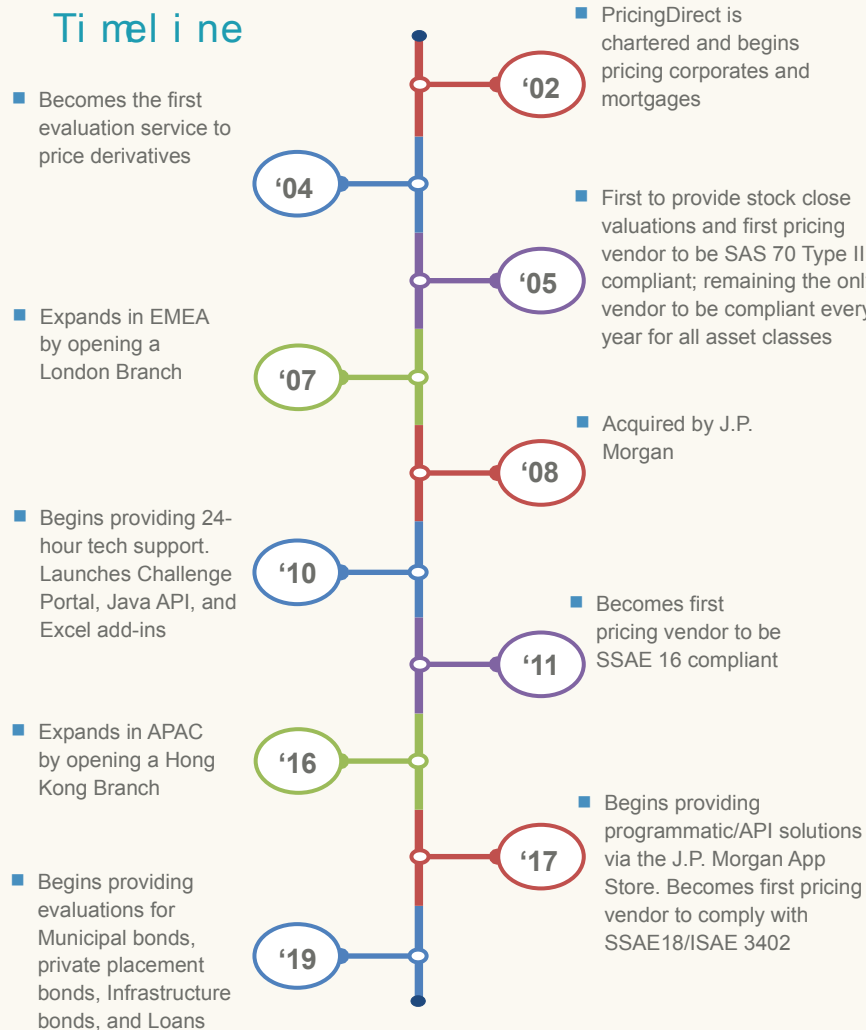


Independent
Valuation in Evolving
Markets

PricingDirect
a J.P.Morgan company

PricingDirect Executive Summary

Timeline



J.P. Morgan Franchise	<ul style="list-style-type: none"> ➤ PricingDirect, a wholly-owned subsidiary of JPMorgan Chase & Co. has been in business since 2002, and benefits from direct access to insight and market color held by JPMorgan trading desks, and research and technology of J.P. Morgan, a firm with broad capabilities in primary and secondary markets. ➤ PricingDirect offers product expertise in fixed income securities, distressed securities, and derivative products.
Real-time Market Access	<ul style="list-style-type: none"> ➤ PricingDirect evaluators located in New York, London, and Hong Kong work closely with global trading desks to reflect market changes throughout the day. ➤ PricingDirect observes a "follow the sun model", offering multiple snapshots from Asia Close to New York Close.
Client Confidentiality	<ul style="list-style-type: none"> ➤ PricingDirect does not know the size or direction of its clients' security positions. ➤ The list of securities priced for each client is confidential and is not shared with the broker dealer or with other third parties.
TransparencyDirect® and Risk Reporting	<ul style="list-style-type: none"> ➤ TransparencyDirect® is a web portal that provides security-level evaluation inputs, a deep dive analysis of observed market pricing, back-testing graphs, and customized risk reports that measure liquidity and volatility in defined security sub-sectors.
FASB ASC Topic 820 (FAS 157) Fair Value Measurement	<ul style="list-style-type: none"> ➤ PricingDirect has created a methodology book to help clients determine input levels for FASB ASC Topic 820 hierarchies. ➤ PricingDirect offers guidance in preparing disclosure statements.
SSAE 18 / ISAE 3402 (SSAE 16 / SAS 70) Auditing Standards	<ul style="list-style-type: none"> ➤ The SSAE 18 / AT801 / ISAE 3402 Type II report is an effective way for service organizations to communicate independently verified internal control information to their clients. ➤ PricingDirect is the only pricing service provider which has an SSAE 18 / AT801 / ISAE 3402 Type II audit performed by a third party for all products and services, since 2005.
Price Challenge Procedure	<ul style="list-style-type: none"> ➤ Developed a comprehensive price challenge process where evaluators respond to all challenges in a timely manner. ➤ Using a web portal or an Excel add-in, clients can register price challenges and receive real-time challenge responses.
PricingDirect Plus	<ul style="list-style-type: none"> ➤ PricingDirect Plus is a comprehensive analytical service covering a broad spectrum of fixed income securities. ➤ It presents delinquencies, severity of loss, scenario analysis and stress testing based on loan level modeling.
Customer Base	<ul style="list-style-type: none"> ➤ PricingDirect has a diverse customer base which consists of over 2,500 clients ranging from asset managers, audit firms, banks, broker dealers, custodians, hedge funds, insurance companies, issuers, mutual funds, pension funds, private equity, service providers, software companies and UCITS.
<p>Using state-of-the-art technology, PricingDirect offers its clients the highest quality evaluations available, across a broad range of fixed income securities and derivative instruments.</p>	

Overview

- PricingDirect benefits from direct access to the trading desks, research and technology of J.P. Morgan, a firm with broad capabilities in primary and secondary markets.
- PricingDirect employs state of the art analytics and technology.
- Its proximity to the trading desks allows constant monitoring of market data.
- Its state-of-the-art third-party interfaces are compatible with a variety of portfolio management and accounting systems.
- It offers multiple derivative pricing types for accounting purposes.
- It has multi-channel distribution (web portal, Excel add-in, IFT webpage access, SFTP, API and email).
- It offers a robust price challenge and price validation process, delivered via website or directly to the client desktop.
- J.P. Morgan's finance desk, Client Valuation Group, margin department and other internal units of the firm utilize, among other sources, the same pricing data that is provided to clients of PricingDirect.

Indicative Pricing of Standard Service

- Cost of the service is subject to factors including:
 - Number of securities
 - Complexity of securities
 - Frequency of evaluations
- We can structure a proposal based on the timing and volume of pricing service required.

Instruments Evaluated

Security	Total
Asset-Backed Securities (ABS)	9,038
ABS-CDS	1,107
Adjustable-Rate Mortgages (ARMs)	72,217
Bank Loans	3,463
CDO/CLO	20,659
Commercial Mortgage-Backed Securities (CMBS)	67,146
CMOs, Strips & Inverse IOs	264,969
Credit Derivatives	9,916
Emerging Market Securities	57,053
Equity and Commodity Derivatives	11,491
Foreign Exchange Products	12,177
Fixed-Rate Pass-Throughs	1,102,192
Floating-Rate Corporate Securities	1,393
To Be Announced Securities (TBAs)	750
Hard-to-Value Securities (HTV)	24,327
High-Yield Corporate Securities	5,790
Investment Grade Corporate Securities	21,948
Interest Rate Derivatives	46,489
Money Market Instruments	6,439
Mortgage Synthetics	224
Municipals	902,402
Non-US Developed Markets Fixed Income	64,468
Small Business Administration Pools (SBAs)	3,933
Stipulated TBA	3,768
US Treasury & Agency Debentures	18,358
Total	2,731,717



3 REGIONS

8 SNAPS

20 YEARS

Setting a Fixed Income Evaluation Framework

Color Gathering

- We receive information from the J.P. Morgan trading desks.
- We collect information from TRACE, other electronic trading platforms and third-party vendors.
- We receive information on primary and secondary transactions.
- We use color from back-testing as well as from client challenges.

Analytics

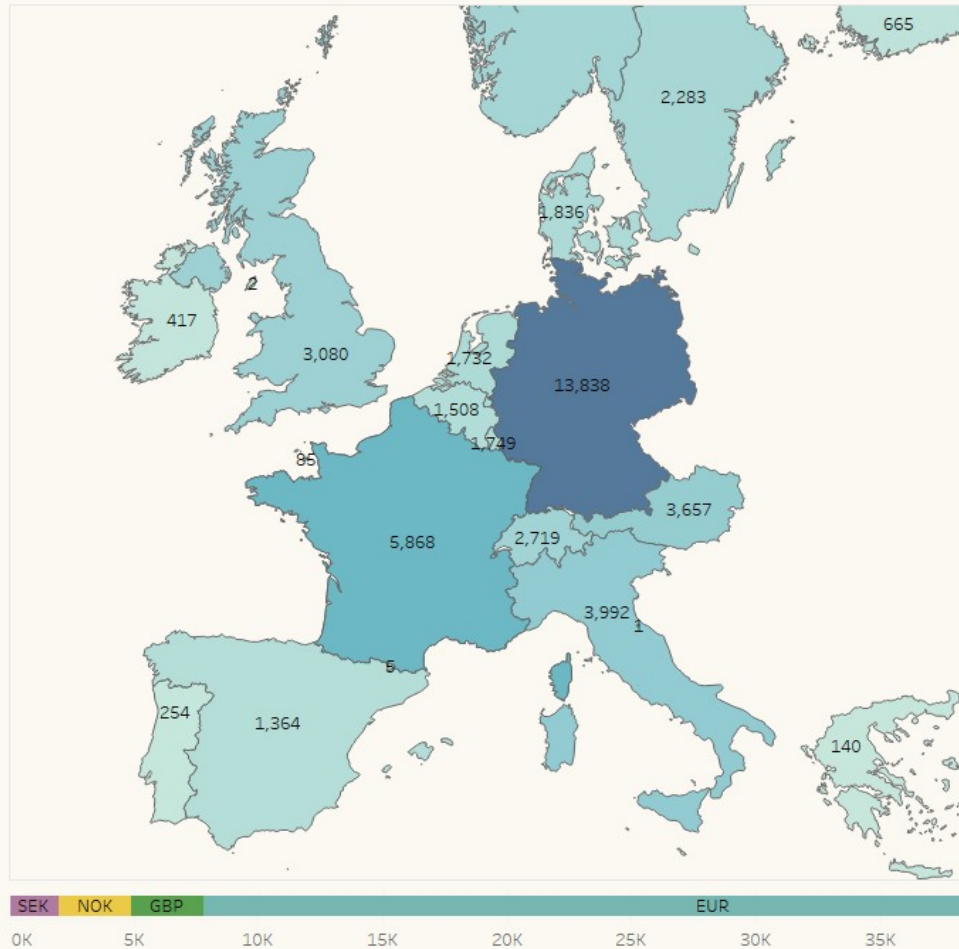
- Cash flow generators and/or Option-Adjusted Spread (OAS) models are utilized in evaluating most asset classes.
- Pricing spreads are based on both primary and secondary market transactions.
- Accuracy is tested through ongoing monitoring of evaluations vs. transacted prices and bid lists.

Quality Control

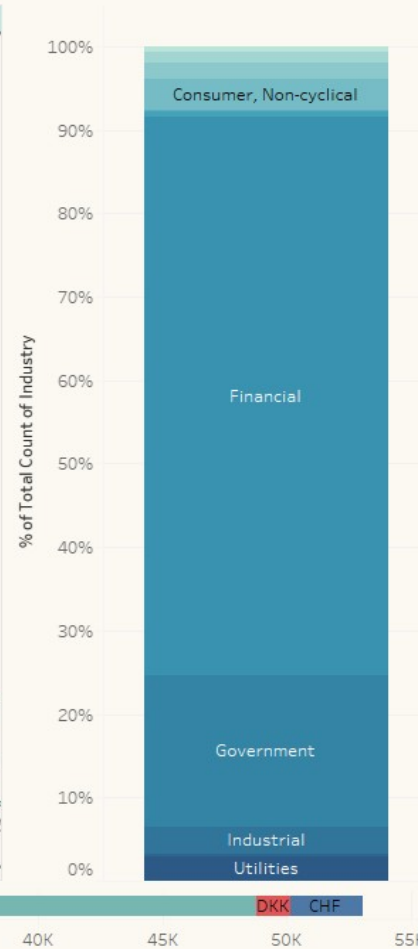
- Inputs to the evaluation model are scrubbed to ensure they are consistent with current market conditions.
- Outputs from the evaluation model undergo a series of checks (e.g. day-over-day price change in absolute and/or percentage terms) that are customized for each product type.
- Evaluators also compare day-over-day price changes for each security to historical price volatility statistics for all similar securities, so that they can determine if the price change is within market context.

European Corporate and Sovereign Evaluations

Coverage by Country



Industry



European Corporate and Sovereign Growth Highlights

Country	Securities Coverage 1-Year Growth
Italy	184%
Austria	106%
France	56%
Switzerland	52%
Germany	29%

Industry	Securities Coverage 1-Year Growth
Government	57%
Financial	53%
Industrial	39%



European Corporate and Sovereign Evaluations: Curvebuilding

Curvebuilding Methodology

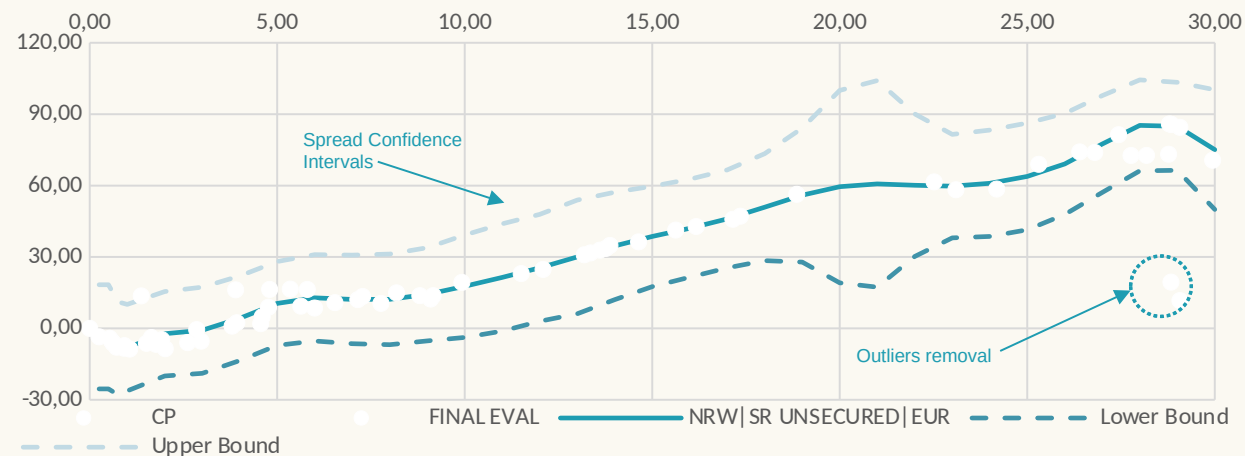
➤ Organization of data and colour:

- Evaluates over 50,000 securities by combining all available market colour, spread levels and reference data in a single application.
- Performs automatic quality control checks on all evaluation inputs.
- Segregating market colour across 120 sector/rating and 3,500 issuer/seniority buckets.
- Directly calls analytics to test evaluation results.

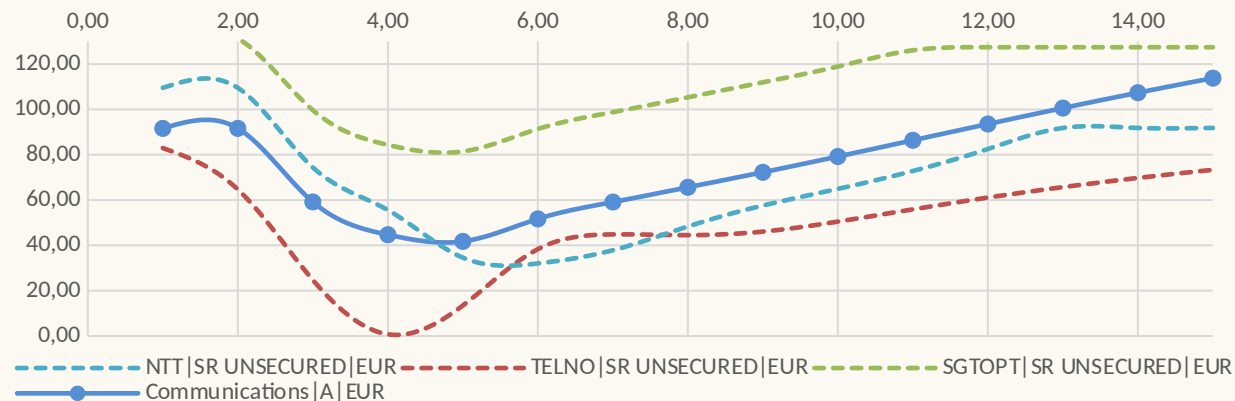
➤ With flexible functionality, evaluators:

- Add new tools, analytics and new sources of colour.
- Adjust methodology to adapt to a changing market environment.
- Updates issuer and industry curves based on latest market colour.
- Quickly recalibrate all curves within a given sector.
- Improve evaluation response in volatile markets.

Issuer Curves Latest Development



Sector / Rating curves



Money Market Evaluations

Offerings

PricingDirect provides evaluations on the following money market instruments:

- Certificate of Deposits (CDs)
- Corporate & Asset Backed Commercial Paper (CP)
- Treasury Bills
- Agency Discount Notes
- Repurchase Agreements (RPs)

Our evaluations are based on real-time market colour provided by J.P. Morgan's short-term fixed income trading desk who cover more than 300 issuers and supply product-specific data for other issuers.

Real-time issuer specific colour using BOOM and BOOM ECP available for the following currencies:

- \$ USD
- € EUR
- £ GBP

x 3

➢ Increase of the amount of issuers priced over 2023

Overview

Coverage:

➢ YoY Pricing Direct has been able to multiply by more than 9 the population valued under the EMEA money market environment (EUR and GBP) thanks to a robust methodology and access to more colors. An additional 25% increase have been conducted over the first quarter of 2024.

Methodology:

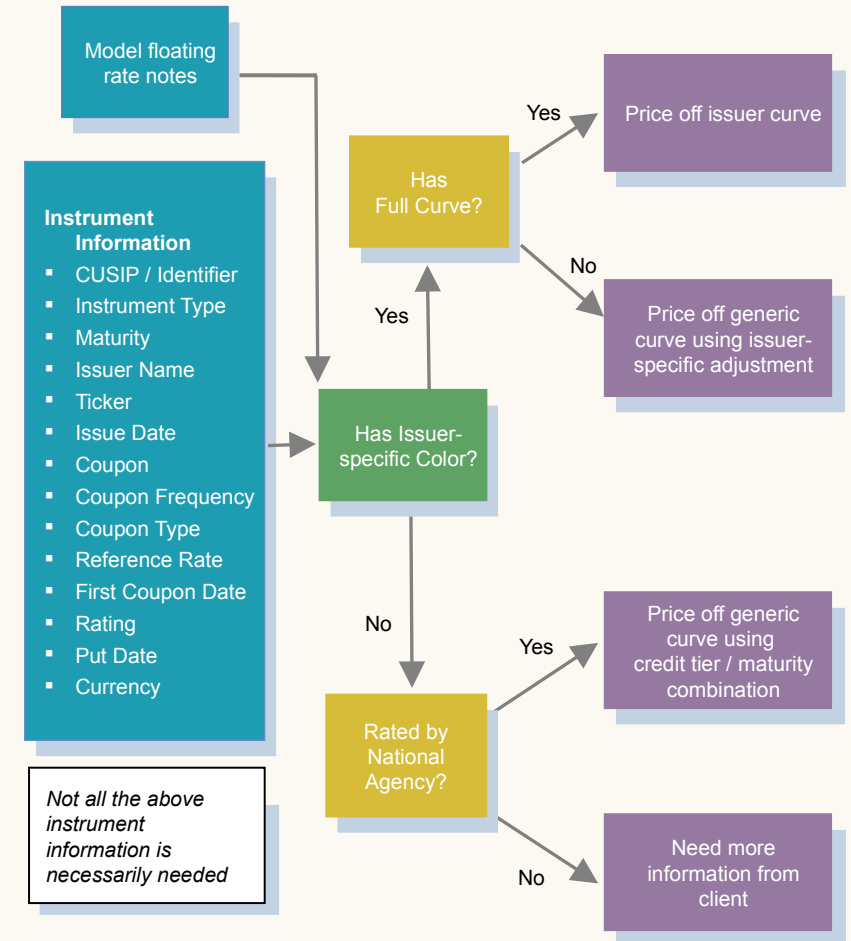
➢ Based on information, security characteristics and available colours, a complete and detailed decision tree is used for pricing methodology. Whether price on a generic curve or off an issuer curve, a number of layers of quality controls are being used for confirmation against market movements.

Diversity:

➢ We continuously expanding the number of issuers under coverage to reach as of Q1 2024 a total of 300.

x 9

➢ Coverage increase of EUR and GBP money market population over 2023

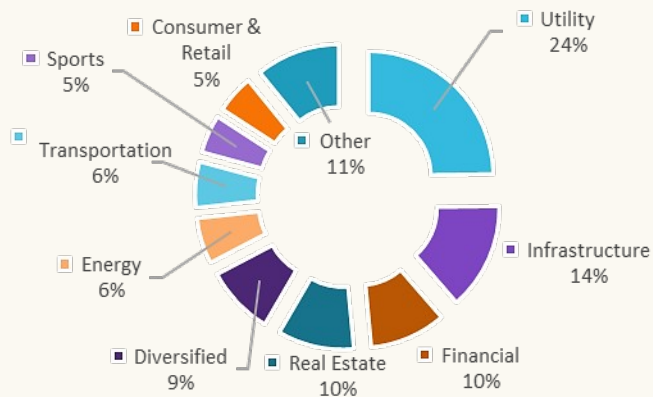


Private Placements Evaluations

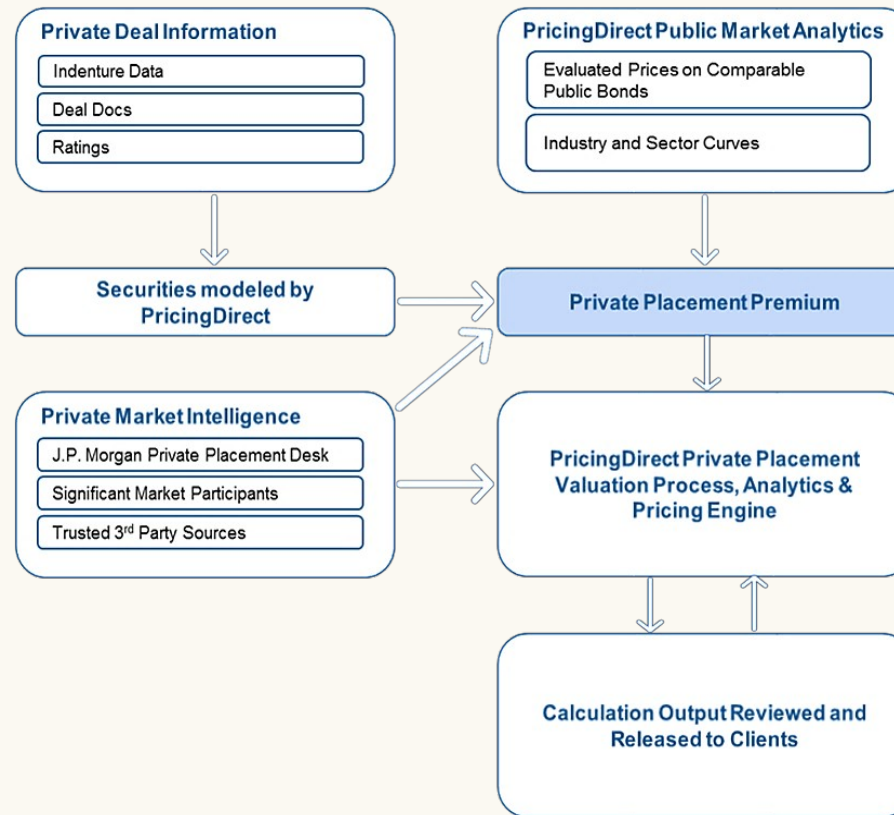
Evaluation

- Indenture data for private placements are not publicly available, therefore, the client must provide indenture data by filling out the PricingDirect Private Placement template, which is available on the PricingDirect website.
- PricingDirect leverages our insight into the current Private Placement market to review the data for discrepancies.
- Assumptions - PricingDirect leverages our public market insights pricing with our insights into the private market to determine pricing assumptions.
- Pricing assumptions are reviewed by the evaluation team and released to clients.

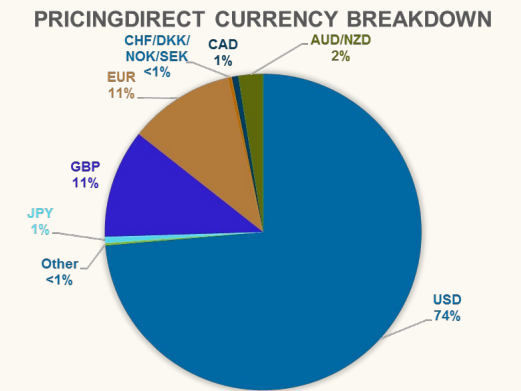
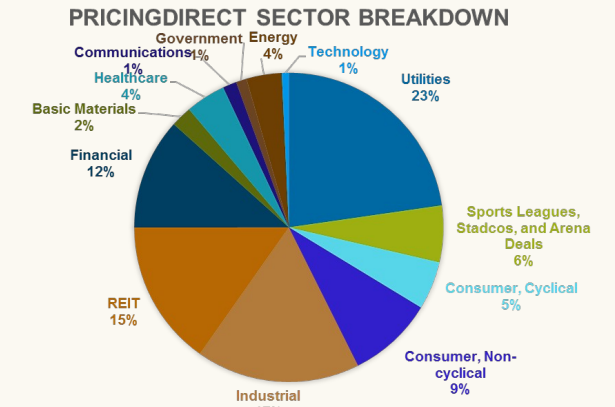
2023 Supply Trends



Premium Calculation



Breakdown



Private Placements Evaluations

General Characteristics

- Currently pricing over 4,500 unique instruments across Europe and US
- Capability includes bullets, callables, sinkers, floaters, step coupons.
- Pricing multiple deal types and structures:
 - Corporates, Foreign Currency Funded, Delayed Draws, FMB's, Funds/BDC's, Airlines / EETC's, CTL's, Equipment Trusts, Sports Leagues, Structured / Arenas or Stadiums, WBS's, Loans, Structured Royalty payments.
- Indenture data (including deal size) is provided by client, so available quantity can be misleading.
- Sports Leagues are very popular amongst investors:
 - Pricing over 100 deals.
 - Coverage includes, NFL, MLB, NBA (Hardwood Funding), NHL, and several European Football clubs.
 - Covering multiple structures, league wide, league level, Infrastructure, Arena/Stadium deals, etc.

Select J.P. Morgan-acted 2023 and 2024 Debt Private Placements

<p>\$300,000,000 Senior Notes</p> <p>T.RowePrice OHA</p> <p>Joint Agent</p>	<p>\$450,000,000 First Mortgage Bonds</p> <p>PGE</p> <p>Joint Agent</p>	<p>\$1,500,000,000 Senior Notes</p> <p>BASF</p> <p>Joint Agent</p>	<p>\$925,000,000 Senior Notes</p> <p>TECO PEOPLES GAS AN ENERGA COMPANY</p> <p>Sole Agent</p>	<p>\$524,000,000¹ Senior Sustainability-Linked Notes</p> <p>FrieslandCampina</p> <p>Joint Agent</p>	<p>\$400,000,000 Senior Notes</p> <p>Morgan Stanley Prime Property Fund</p> <p>Sole Agent</p>
<p>€370,000,000 Senior Secured Notes</p> <p>Sole Agent</p>	<p>\$475,000,000 Senior Secured Notes</p> <p>SH 130</p> <p>Joint Agent</p>	<p>\$900,000,000 Senior Secured Notes</p> <p>CDPQ Cristal-782 Port Financement Inc.</p> <p>Joint Agent</p>	<p>\$400,000,000 Senior Notes</p> <p>HPS</p> <p>Joint Agent</p>	<p>\$350,000,000¹ Senior Notes</p> <p>ORICA</p> <p>Joint Agent</p>	<p>\$1,000,000,000 Taxable Revenue Bonds</p> <p>AIRBUS Mobile Airport Authority</p> <p>Joint Agent</p>

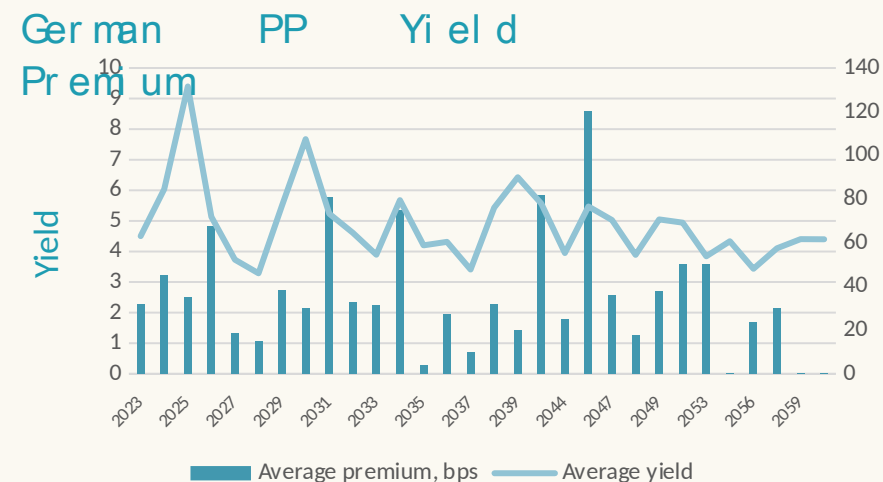
Graphic and table courtesy of J.P. Morgan Private Placement Primary Desk

Schuldscheins

- Covering number of German private placement deals, e.g.:

€300,000,00	€28,000,00	€34,000,00	€10,000,00
ANDRITZ AG	SWH	GEWOBAG	NORD/LB
Issuance Date 21-Jun-2017	Issuance Date 18-Dec-2020	Issuance Date 20-Jan-2020	Issuance Date 26-May-2021

- Insights about premium from J.P. Morgan Trading Desk and external vendors about the demand on various types of private placements
- Benchmarks from public markets from relevant rating /maturity and sectors of German economy



European Securitized Product Evaluations (RMBS, ABS, CMBS)

Framework and Sentiment

- **PricingDirect** uses security characteristics to create a multi-dimensional valuation framework and combines it with benchmark color from market participants, external sources, and the J.P. Morgan trading desk.
- **Market sentiment** is the final input into our evaluation process, and estimating the market sentiment involves color gathering, analysis, and matrix calibration.

Market intelligence from multiple market sources

- J.P. Morgan's primary and secondary trading desks - PricingDirect has direct access to J.P. Morgan's primary and secondary trading desks.
- **Bid list activity** – PricingDirect obtains bid list color from various market participants.
- **Primary market information** – Publicly available primary market information may be used to gauge the long end of the term curve.
- **Client dialogue** – evaluators engage in regular dialogue with buy-side clients, using bilateral client trades away from dealer offer sheets or bid lists.
- **Broad Market Indicators** – Evaluators observe movements in treasuries, swaps, CDS indices such as CDX and ITraxx, high yield ETFs, and leveraged loan indices to estimate market sentiment.

Sector Curves

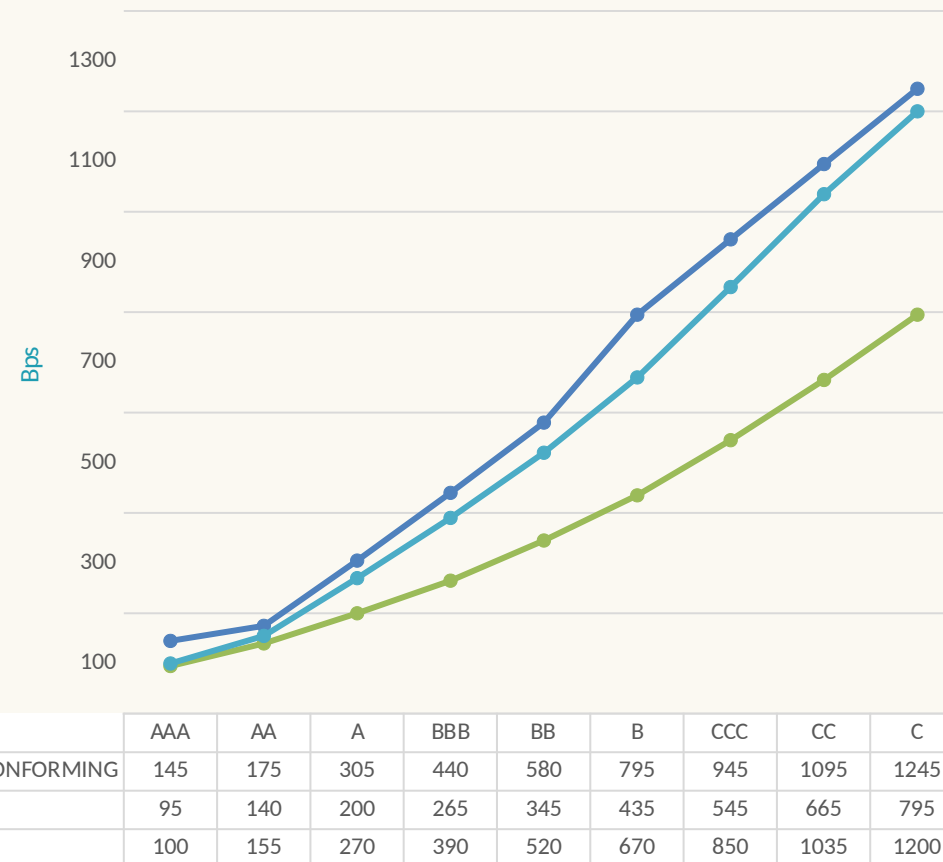
- **Matrix approach** to evaluate the universe of securities, matrix pricing cohorts the universe into distinct buckets based upon collateral characteristics and deal structure, subsequently to construct sector-based benchmark curves.
- **Curves are calibrated daily** based upon market color points (Inputs from primary/secondary trading, market participants, off market trades).

Coverage

Market-based, same day evaluations for over 5,000 securities

Products	Tranches	Deals
MBS	4,149	813
ABS	822	232
CMBS	329	70
NPL	89	30

Irish MBS



Collateralized Loan Obligation Evaluations

Product Overview

- The collateral varies based on the type of deal. Broadly syndicated deals consist primarily of senior secured loans of large companies, while middle market deals consist of small to mid-cap company loans. In most cases, the collateral in CLOs is dynamic and managed by a collateral manager.
- CLO tranches and collateral may be fixed or floating rate. Tranches with original ratings less than AAA, the subordinate tranches, provide credit support to the senior (AAA) tranches.
- Market-based, same day evaluations for over **22,000** CLO securities across US and International markets.
- Comprehensive pricing coverage of CLO securities from AAA-rated tranches through unrated equity; from top tier Broadly Syndicated USD deals to European SME CLOs.
- Comprehensive price challenge process with direct evaluator involvement; clients can register price challenges and receive real-time challenge responses.

JPM Index Coverage: €-CLO E

- **PricingDirect** is pleased to announce it has been designated as the sole pricing agent for the **J.P. Morgan European Collateralized Loan Obligation Index (€-CLO E)** index which is the first benchmark for broadly syndicated Euro-denominated CLO debt.

Products	Tranches*	Deals*
US CLOs	17,000+	2,400+
European CLOs	5,000+	545+
SME CLOs	50+	20+

*As of 3/31/2024

Evaluation Methodology



Emerging Markets Debt Evaluations

Emerging Markets Debt

Methodology:

➤ In preparing its evaluations, PricingDirect relies on information received from J.P. Morgan's global EM trading desks, including the latest trader color, analytical outputs, and closing prices for both local currency and Eurodollar securities. PricingDirect also receives information from other market participants via electronic trading platforms such as TRACE, and/or third-party vendors. The information that PricingDirect receives from other sources is used in conjunction with the information obtained from the J.P. Morgan trading desks, or to perform quality control on that information.

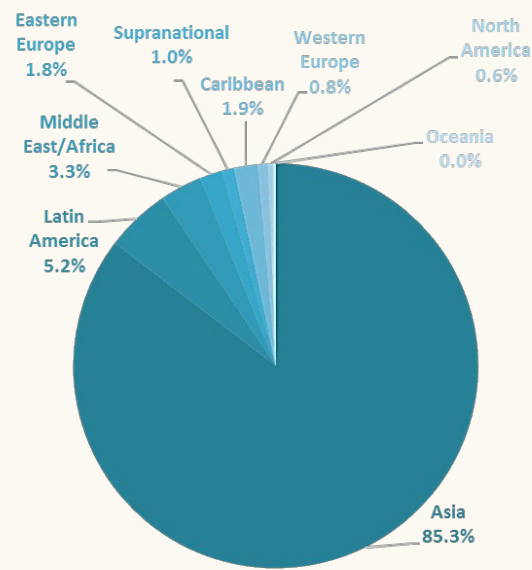
PricingDirect Emerging Markets Product Offerings

For each evaluated security, PricingDirect can provide the following information:

- Clean bid, mean, and offer prices
- Dirty bid, mean, and offer prices
- Trading convention (clean/dirty)
- Currency
- Accrued interest
- Inflation factor (if applicable)
- Unitary pricing factor (if applicable)
- Liquidity score

I. Coverage By Currency

	Total Count	Total Pct.
Local	48,992	85.9%
USD	6,818	12.0%
EUR	694	1.2%
GBP	44	0.1%
Other	505	0.9%
Total	57,053	100%



II. Coverage By Region and Country

	Total Count	of which Hard Ccy.	of which Local Ccy.	Total Pct.
Asia	48,694	3,299	45,395	85.3%
China	42,949	940	42,009	75.3%
India	1,568	218	1,350	2.7%
South Korea	1,323	673	650	2.3%
Hong Kong	668	539	129	1.2%
Singapore	474	195	279	0.8%
Other	1,712	734	978	3.0%
Latin America	2,973	1,683	1,290	5.2%
Brazil	1,137	292	845	2.0%
Mexico	634	461	173	1.1%
Chile	344	259	85	0.6%
Argentina	222	186	36	0.4%
Peru	169	110	59	0.3%
Other	467	375	92	0.8%
Middle East/Africa	1,896	1,374	522	3.3%
United Arab Emirates	295	292	3	0.5%
Turkey	211	159	52	0.4%
Egypt	156	67	89	0.3%
Qatar	130	124	6	0.2%
Saudi Arabia	128	96	32	0.2%
Other	976	636	340	1.7%
Eastern Europe	1,046	702	344	1.8%
Russian Federation	364	197	167	0.6%
Romania	111	86	25	0.2%
Poland	94	57	37	0.2%
Hungary	93	51	42	0.2%
Ukraine	75	60	15	0.1%
Other	309	251	58	0.5%
Supranational	546	28	518	1.0%
Caribbean	1,078	975	103	1.9%
Western Europe	461	0	461	0.8%
North America	333	0	333	0.6%
Oceania	26	0	26	0.0%
Total	57,053	8,061	48,992	100%

* Data as of January 2023

Artificial Intelligence Models and Methods

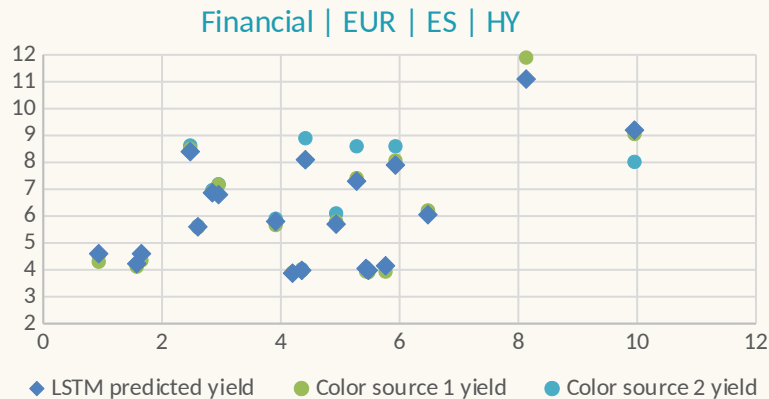
Neural Networks

European Corporate Bonds LSTM NN

- **Multi-layered Neural Network** – PricingDirect has developed a complex neural network model to analyze observable market color and identify outliers.
- **Variability of input factors** – Quantitative and qualitative input parameters to capture details impacting the current yield.
- **Fast and precise analytics** – NN computes thousands of yields in less than 5 minutes and allows comparison across various sectors, currencies and credit rating.

Municipal Bonds RNN

- **Large-Scale NN** – Municipal bonds Neural Network processing data from 30,000+ issuers with over 900,000 evaluated securities.



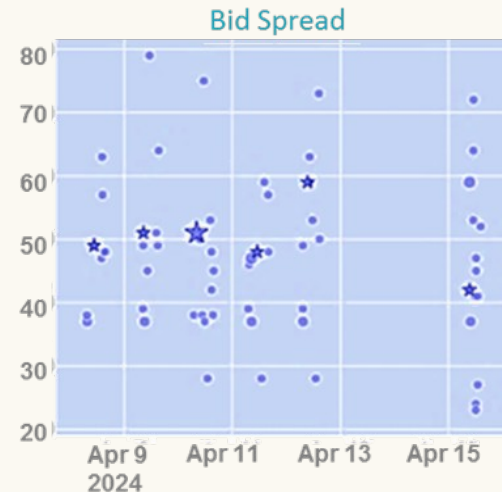
AI Clustering and Ensemble Method

Best Color Model

- **Process control** – systematically selecting best level considering source hierarchy, trade/quote size, timestamp and supporting colors.
- **Utilization** – Average color utilization rate increase from 44.39% to 80.21%.

Dynamic BO spread

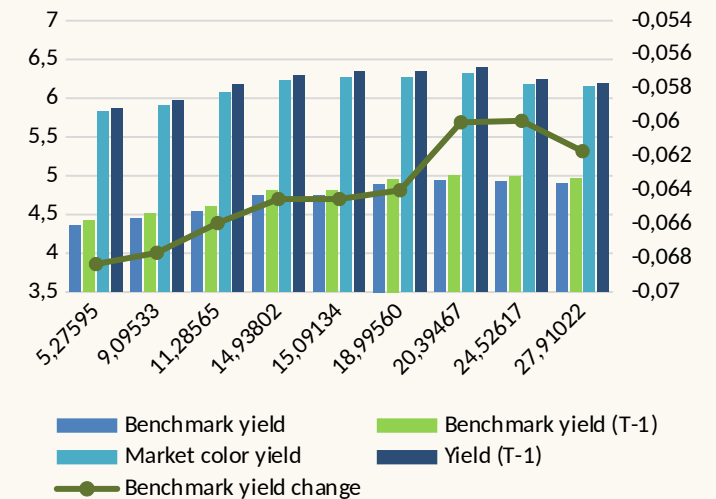
- **Random Forest** – Powered by ensemble method to reduce the risk of overfitting.
- **Dynamic** – Reflecting market insights in a timely manner.



Benchmarking

- **Benchmark securities** – Every corporate security has assigned benchmark government bond and respective yields.
- **Tracking risk parameters** – Duration and convexity computed for every security and utilized when.
- **Colour comparison** – Market quotes and trade colour is compared against predicted price movement and outliers analysed in the context of market events.

CLARHG | 1ST LIEN | GBP | N



Derivatives Evaluations

Overview

- **Evaluated pricing:**
 - Access to trading desk insight
 - Compliant pricing model
 - Benchmark against contributor marks
- **Price confirmations and challenges:**
 - Dedicated challenge tool
 - Evaluator insights
- **Comprehensive delivery options:**
 - Flexible file formats
 - Multiple delivery channels

Offerings

- **Interest Rate Derivatives:** Interest Rate Swaps (including Vanilla, Amortizing, Zero-Coupon, Non-Deliverable, CMS, Cancellable), Cross Currency Swaps, Basis Swaps, Forward Rate Agreements, Inflation Swaps, Interest Rate Swaptions, Interest Rate Caps & Floors, Inflation Caps & Floors.
- **Credit Derivatives:** CDS Single Names, CDS Indices, CDS Index Tranches, CDS Index Options, CDS on CMBX, iBoxx Total Return Swaps.
- **FX Derivatives:** Swaps, Forwards, NDFs, Options, Exotics (including Barrier, Binary, Touch, Basket, Asian Options), Volatility Swaps, Variance Swaps.
- **Equity Derivatives:** Options, Forwards, Variance Swaps, Barrier Options, Asian Options, VIX Options, Total Return Swaps.
- **Commodity Derivatives:** Swaps, Forwards, Options (Energy, Agricultural, Precious Metals, Base Metals), Total Return Swaps.



FOLLOW THE SUN OPERATION



REAL TIME DATA



EVALUATOR INSIGHT



PROPRIETARY MODELS



STATE OF ART INFRASTRUCTURE



CUSTOMIZABLE SOLUTIONS



ADDED TOKYO INTRADAY SNAP

Additional Services

Validation

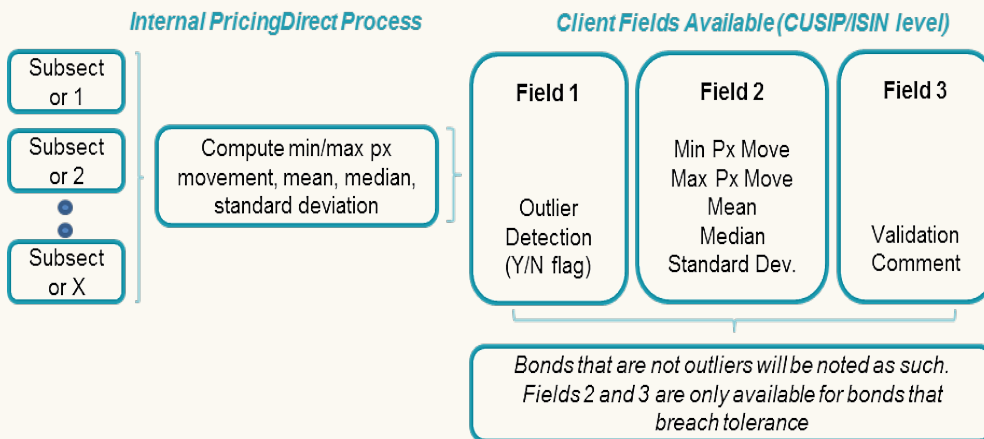
PricingDirect offers **Validation +**, a customized, enhanced price validation tool for all fixed income instruments (2+ million securities). PricingDirect has offered standard validation comments for years and now offers enhanced price validation techniques for day-over-day price movements, in addition to the static +/- 2% tolerance. Clients may opt to receive validation comments based on the new methodologies listed below:

Sector Level Outlier Detection

- The validation technique returns comments for any day-over-day price movement that falls outside of 2 standard deviations, at a subsector level.

10-YR Treasury Benchmark

- An enhanced version of the static +/- 2% rule, this calculation factors in daily market movements through the 10-YR Treasury. The validation technique returns comments for any day-over-day price movement +/- 2%, benchmarked to the movement in the 10-YR.



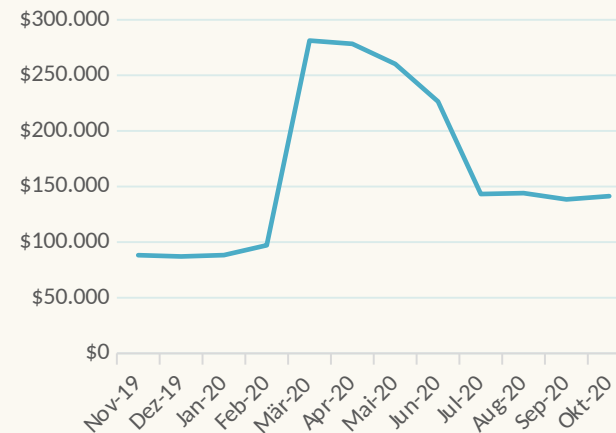
Liquidity Report and Scores

Key Benefits:

- Insightful for fixed income portfolio liquidity analysis.
- Liquidity ranking of a portfolio's holdings at universe and asset class levels.
- Convenient for time series and short-term trend analysis review by risk managers.
- Valuable for compliance reporting and regulatory purposes.

Key features:

- Provides two sets of liquidity scores (1-10) daily at the fixed income universe level and at an asset class level. (Score 1 denoting the lowest, Score 10 denoting the highest).
- Liquidity score offering accounts for security level bid-offer spreads for over 2.5 million fixed income securities that are evaluated by PricingDirect on daily basis.
- Liquidity score calculations are inclusive of traded volume from the public domain and J.P. Morgan trade data.



Month	Weighted Average Spread	Liquidity Cost	Holdings
Nov-19	0.6283	\$ 88,254.40	712
Dec-19	0.6176	\$ 87,101.22	712
Jan-20	0.6365	\$ 88,364.64	712
Feb-20	0.6965	\$ 97,122.08	712
Mar-20	1.9906	\$ 281,234.06	712
Apr-20	1.9765	\$ 278,342.94	712
May-20	1.8397	\$ 260,224.48	712
Jun-20	1.5802	\$ 226,498.66	712
Jul-20	1.0131	\$ 143,253.61	712
Aug-20	1.0243	\$ 144,038.63	712
Sep-20	1.0201	\$ 138,411.07	712
Oct-20	1.0325	\$ 141,329.27	712

Additional Services

Fixed Income Reports

- Risk reports are provided across:
 - More than 300 security sub-sectors
 - For 1-, 2-, 3-month holding periods
 - For time horizons ranging from 1-5 days
- Risk statistics are compiled for:
 - Raw price movement
 - Percentage price movement
- Risk statistics include:
 - Standard deviation of price movement
 - Percentile price movement
 - Dollar-weighted price return
 - Worst 1-day return

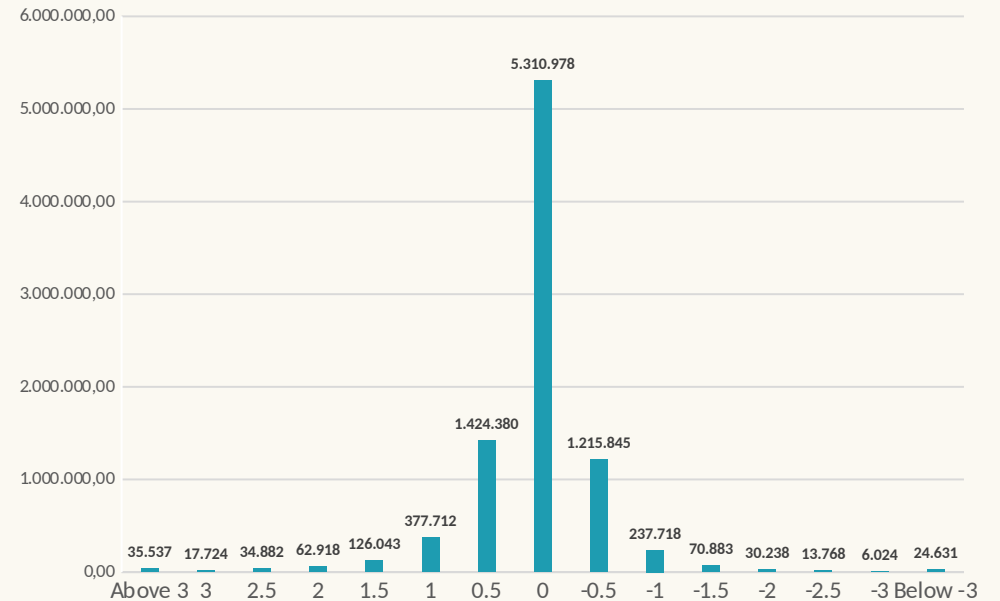
US CLO 2.0 Broadly Syndicated - Orig A 03-Feb 2020 to 30-Apr 2020 | Number of Bonds: 1281

3-Month: 02/03/2020 - 04/30/2020	Type: Raw Price Movement						Type: Percentage Price Movement					
	Time Horizon		1 St Dev	2 St Dev	3 St Dev		Time Horizon		1 St Dev	2 St Dev	3 St Dev	
	1-day		1.5116	3.0231	4.5347		1-day		1.8327%	3.6655%	5.4982%	
	2-day		2.2991	4.5981	6.8972		2-day		2.7668%	5.5337%	8.3005%	
	3-day		3.0997	6.1995	9.2992		3-day		3.6576%	7.3752%	11.0628%	
	4-day		3.6697	7.3364	11.0091		4-day		4.3274%	8.6548%	12.9822%	
	5-day		4.1266	8.2533	12.3799		5-day		4.7942%	9.5883%	14.3825%	
Raw Price Movement by Percentile 1-Day Series over 3 Months						Price Return for 3 Month Holding Period						
0.27% 4.55% 31.73% 50.00% 68.27% 95.45% 99.73%						-9.6953%						
8.079 3.029 0 -0.0042 -0.0005 0.0027 2.1066 6.2668						3 Worst 1-Day Price Returns						
-7.0762%		-5.2196%		-2.7076%								
Feb 28 Weighted Average Price		Mar 31 Weighted Average Price		Apr 30 Weighted Average Price		Feb 28 Weighted Price Tolerance		Mar 31 Weighted Price Tolerance		Apr 30 Weighted Price Tolerance		
98.7924		86.4258		89.4663		0.3278		2.8546		2.8574		

Back-Test i

- Of the 8,989,281 trades approximately 5,310,978 of the PricingDirect evaluations were found to be within \$0.25 of the trade price.
- Back-testing is utilized as a tool by management to assess the accuracy of our prices and to prove any absence of bias.
- On a "T+1" basis, prices released as of "T" are compared to actual trade prices, also as of "T".
- Each asset class has its own price tolerance, which is a function of the bid/offer spread.

Actual Trades Comparison for All Asset Classes



Summary

Fixed Income and Derivatives Pricing

- **PricingDirect** provides evaluated pricing for a wide universe of fixed income & derivative instruments.
- Utilizing market intelligence from buy-side & sell-side market participants, the J.P. Morgan trading desks & quantitative research teams, & electronic trading platforms, PricingDirect is able to price nearly 2.8 million securities multiple times a day.
- We consistently enhance our coverage capabilities to meet client demand and adjust our delivery mechanisms to fit within each client's workflow.
- As independently attested to annually through its SSAE 18/ISAE 3402 Type II, PricingDirect's evaluators adhere to extensive quality control processes and procedures that cover all of our asset classes & services.



Fixed Income Pricing

PricingDirect uses market-based cash flow generators, innovative OAS modeling techniques, and real-time access to primary and secondary markets to produce evaluated fixed income pricing and analytics on a variety of fixed income asset classes.



Derivatives Pricing

Our derivatives teams leverage market data from J.P. Morgan trading desks and external data providers, and use internal models developed by J.P. Morgan Research to provide derivatives pricing and perform valuations on a wide range of products across multiple market closes.



Featured Market Closes

- Two APAC Closes
- Two Central Europe Closes
- Two London Closes
- Five New York Closes



Client Confidentiality



Transparency-Direct



Evaluation Methodology Document



Board and Valuation Support Committee



Direct Access to PricingDirect Evaluators

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