



Why traditional risk measurement often fails

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Agenda



Intro

Who we are What we do Why should you care

Risk Models & Market Data Challenges Solutions

How does price reflect the risk the market takes into account Challenges Solutions

Best of both Risk Models & Market Price



- Market Risk / Price Risk
 - Volatility (Equity, Commodity)
 - IRR (interest rates)
 - FX (Foreign holdings)
- Liquidity Risk
 - Time / Disruption (performing, non-performing)
 - Opportunity Risk (call risk)
 - Funding Risk (obligations)
- Operational Risk
 - Fraud (in & external)
 - Reputational (internal)
 - Governance (legal, products, anti trust)
 - Physical risk (natural disasters, terroriem)
 - Technical risks (business disruption)
- Credit Risk
 - Counterparty Risk
 - Country Risk
 - Concentration Risk
 - Reputational (external)

Il about G! Governance





Visualization Federal Reserve Bank of Chicago



Market Data and models needed!



• Market Risk / Price Risk

→ Historical Correlations Don't Fit, Data Aggregation, Realtime Data, SME, Non-listed

Credit Risk

→ "Proxies Don't Work", Single Credit Risks ++, Controversies, old data, SMEs, non listed, EBA ESG?

• Liquidity Risk

→ Spreads, Market depth, Turnover ratio, Return to Volume, Data Aggregation?

Operational Risk

 \rightarrow Product Governance, Controversies, New Standards & Regulations?



Credit Risk – The challenge starts with coverage: Approximate Coverage of entities -Lniverse by Model

Regular updated single names CDS: 4,500 Global

S&P Global Ratings rates over 4,600 corporates globally 9000 entities

FITCH - 8,000 entities worldwide

Comparison:
Newswires daily average
+20,000 Global

- Smart Ratios Credit Risk:
- Structural Credit Risk:
- Text Mining Credit Risk:
- Combo Credit Risk:
- MarketPsych Sentiments:

+37,000 Global +25,000 Global + 43,000 Global

+41,000 Global

+120,000 Global



Forecasts Probability of Default for Publicly Traded Companies

- SmartRatios model Accounting ratio analysis using both financial statement data and forward-looking estimate data via the SmartEstimates
- Structural Credit Risk model Improves upon basic Merton or "structural" model
- Text Mining Credit model Applies text mining and machine learning algorithms to textual data from StreetEvents Transcripts, Reuters News, and financial filings.
- Combined Credit Risk Final estimate of corporate credit risk comprised of 3 sub-models that is the best estimate of credit risk.



CCR = Combined Credit Risk





SmartRatios Model Structure





SmartRatios Model Uses Estimates Instead of Backward-Looking Ratios

Estimates are better at predicting defaults





Input	Effect on default probability
Leverage (assets/debt)	Higher leverage increases default %
Volatility of assets	Higher asset volatility increases default %
Drift rate of assets	Higher growth rate decreases default %





StarMine's Structural Model Outperforms Both a Standard Altman-Z Model and a Baseline Naïve Merton Implementation



Global stocks. January 1998 – December 2020



Textmining Model - Different Sources Provide a better View of Financial Health

100%

Category	Description	Exampl in a Lov (Higher	e Resulting v Score Risk)	Example of Language Resulting in a High Score (Lower Risk)					
Income	Language on earnings growth or losses, profit margins, and other income statement related language	"a net los	SS"	"strong growth this quarter"					
Structural	Language about the company's balance sheet and debt structure	"a need t additiona	o obtain Il financing"	"starting a share repurchase program"					
Legal	Language concerning the company's legal obligations	"in talks v lenders t repayme	with its o extend nt deadlines"	"focused on strong internal controls"					
External	Language concerning factors external to the company	"regulato may have implicatio year's ea	ry changes e negative ons for next arnings"	"a lack compor signific for our	of available nents provides a ant barrier to entry competitors"	Percentage of			
					Broker				
Percenta	ge of Dictionary		Transcripts	News	research Filings				
Words in	Common	Transcripts	100%	33%	29% 35%) 			
		News		100%	20% 37%)			
S LSI	EG	Broker research			100% 19%	•			
CONTRACT CONTRACTOR		Eilim mm			10.00/	÷			

Filings

Words and Phrases by Category and Document Source



Predicting Credit Default: Historical Results

- Text Model captures 82% of default events in bottom quintile
- Altman Z-Score captures 66%



Accuracy ratio comparison



Combining Multiple Sources of Information Adds Value





CCR = Combined Credit Risk





StarMine MarketPsych Media Sentiment

Equity

prediction

Sentiment marketRisk

volatility

priceDirection priceForecast

Global model launched in 2021

Easy to use company sentiment scores based on **Refinitiv MarketPsych Analytics**

- The StarMine® MarketPsych Media Sentiment (MMS) model is a stock ranking system that provides a single 1 to 100 daily percentile-ranking for global stocks.
- MMS complements the StarMine suite of equity models and follows a similar methodology in research and implementation.
- Uses a subset of Refinitiv MarketPsych Analytics providing emotional indicators, buzz metrics, and fundamental perceptions based on 2,000+ global news sites and social media sources
- 120,000 entities covered





MarketPsych Sentiment Scraping / Market ESG Beobachtung



CRM

Sales Leads

API

Änderungen der ESG-Daten in Echtzeit und Intraday





1889.5

9925.4

452.5

8035.9

0.025404

0.020654

0.00221

0.019537

sustainability sustainabilityPolicy agriculturalStress

0.016142

0.007153

0.001105

0.00504

0.01032

0.01204

0.00442

0.012444

Comprehensive security coverage

Our global database covers **10+ million natively supported securities***, driven by pricing and reference data from Refinitiv** (now part of LSEG)



Single Security Analytics

Access extensive single security analytics by utilizing Yield Book's powerful suite of fixed income analytics to help you deliver differentiated results. The platform's flexible, open architecture allows for a wide range of custom inputs, including user-defined securities, yield curves and calculation options.

Advanced Mortgage Capabilities

Leverage market-leading mortgage capabilities to generate sophisticated analytics for your securitised universe including cutting edge prepayment model settings, cohort-building and P&L attribution as well as tracking of model performance against the market.

Dynamic Historical Analytics

Utilize over 10 years of historically validated analytical libraries and accompanying Yield Book datasets to backfill incomplete fixed income risk analytics records, enrich databases for listed and OTC products, and align calculations across multiple data and index providers.

Accurate Portfolio Analysis

Aggregate single security analytics for a comprehensive portfolio overview and evaluate past performance, calculate point-in-time portfolio risk characteristics and cash flows, and consider projected behaviour through scenario analysis, tracking error and VaR reports.

* Clients also have the ability to create their own user-defined bonds ** Other sources also used within Yield Book



Flexible & Granular Single Instrument / Portfolio Analysis

Yield Book

			aput	Identifier		66435000										
		<u>"</u>	formation	Description	1	101 D/2 75 Jan 1	5 2022	Price /Vield	Price Dat	0	Oct	tober 21, 2022				
			normation	Description	1		.5, 2025	Frice/ field	Price Dat	.e	00					
				Coupon			3.75		Settleme	nt Date	Oct	tober 26, 2022				
Yield Boo	ok			M-L'L. D-L-		46 1-	1011		C	<u>)-:</u>		100 610				
Date Index Date Partials	28/10/2022 01/10/2022 YBPD_PARTIALS		Portfolio Analysi Portfolio Definti Benchmark Defir	s ₀PF_MYPORTFOLIC 'n'F_WGBINDEX221	WYPORTFOLIO(P)	() (Y)										
									Potfol	io vs Benchmark A	nalysis					
					Yield	WAL	Effective	OAS -			Custor	m Partial Durations	s (Years))		
							Duration		0.5	1	2	3	4	8	12	
Sil	ngle Security Outp	ut	_	Portfolio	4.537	6.655	4.636	135.274	0.036	0.112	0.395	0.169	0.947	1.246	1.730	-
Portfolio output	Portfolio 281020.	22		Benchmark	3.223	9.511	7.437	11.485	-0.002	0.104	0.234	0.283	0.887	1.296	4.635	-
ISIN	Ticker	Coupon	Maturity Date	Currency	Country	Middle Rating	Yield	Yield To Worst	WAL	Effective Duration	Duration	Spread Duration to Treasury	OAS	Spread To Tsy Curve	Spread To Swap Curve	A
NL0000102275	NLGV	3.75	15/01/2023	EUR	NL	AAA	1.097	1.097	0.203	0.201	0.201	0.201	-30.993	-31.474	-42.975	
AT0000383864	ATGV	6.25	15/07/2027	EUR	AU	AA+	2.411	2.411	4.699	4.099	4.094	4.094	34.956	34.456	-40.389	
FI4000037635	FIGV	2.75	04/07/2028	EUR	FIN	AA+	2.533	2.533	5.668	5.165	5.153	5.153	41.945	41.807	-30.188	
BE0000343526	BEGV	2.25	22/06/2057	EUR	BEL	AA-	2.940	2.940	34.636	22.849	22.557	22.402	31.729	31.939	60.891	
US00287YBX67	ABBV	3.2	21/11/2029	USD	US	BBB	5.410	5.410	7.052	5.968	6.044	5.976	127.193	128.364	128.272	
US097023CQ64	BA	3.75	01/02/2050	USD	US	BBB-	6.527	6.527	27.249	13.942	14.022	13.983	227.154	227.964	278.472	
US25714PEF18	DOGV	4.875	23/09/2032	USD	DOM	BB-	8.071	8.071	9.890	7.274	7.320	7.340	406.443	407.930	402.162	
US22546QAP28	CSGN	3.625	09/09/2024	USD	US	Α	7.835	7.835	1.852	1.730	1.730	1.730	330.048	330.010	300.054	
US172967KY63	С	3.2	21/10/2026	USD	US	A-	5.690	5.690	3.967	3.607	3.640	3.586	136.446	137.706	132.127	
US31359MFJ71	FNMA	7.125	15/01/2030	USD	US	AAA	4.348	4.348	7.205	5.635	5.661	5.669	22.151	23.623	22.761	Sc
US3135G0W660	FNMA	1.625	15/10/2024	USD	US	AAA	4.525	4.525	1.953	1.887	1.888	1.888	1.625	1.494	-27.875	Sc
US46647PBA30	JPM	3.96	29/01/2027	USD	US	A+	6.025	6.025	3.241	2.944	2.947	2.948	164.663	164.617	153.991	
US46647PBZ80	JPM	0.697	16/03/2024	USD	US	A+	5.908	5.908	0.367	0.362	0.362	0.362	165.898	163.937	129.201	
CH0576402181	UBSG	0.25	05/11/2028	EUR	SWI	A-	4.710	4.710	5.008	4.749	4.741	4.741	262.084	262.380	188.628	
DE000A1YCQ29	ALVG	4.75	Perpetual	EUR	GER	A	5.013	5.013	0.975	0.929	0.929	0.929	301.533	301.686	252.365	
XS1974787480	TTEF	1.75	Perpetual	EUR	FR	A-	6.793	6.793	1.419	1.314	1.312	1.312	472.499	472.492	411.942	
00004000017222	011011	0.04		0.00				4 6 6 6								



Customizable Scenario Analysis

Yield Book

Date Portfolio Definition	28/10/2022																
Portiono Demition	Ibri_MirokiioLio_2											Portfolio - Tot	al Return	(1 month)			
		S	cenario Ana	alysis (1 mo	nth, Total Re	eturn, Curv	e Shift - bps)			6.000							
Identifier	Price	-100	-50	0	25	50	100	Steepen									
66435P9D	100.53	0.210	0.150	0.090	0.060	0.031	-0.029	0.084									
75999M9B	116.848	4.348	2.253	0.212	-0.788	-1.775	-3.711	-0.677									
FI008692	101.123	5.479	2.807	0.219	-1.045	-2.289	-4.720	-1.407		4.000							
BE019569	85.13	26.901	12.557	0.248	-5.243	-10.339	-19.466	-28.343									
00287YBX	87.1845	6.521	3.407	0.399	-1.066	-2.507	-5.324	-2.522				-					
097023CQ	64.8361	16.009	7.839	0.496	-2.896	-6.115	-12.081	-16.327		2.000							
25714PEF	78.5	8.237	4.362	0.658	-1.132	-2.882											
22546QAP	92.8616	2.287	1.443	0.609	0.195	-0.216	Scen	ario Analy	/sis Fur	ction Builder							\times
172967KY	91.2628	4.034	2.221	0.439	-0.444	-1.318	-										
31359MFJ	117.0134	6.088	3.153	0.319	-1.062	-2.419	Bond	l Inputs		Pricing In	puts	Horizon		Scenario	Outp	ut	
3135G0W6	94.6289	2.170	1.248	0.337	-0.115	-0.564	- Bond	Portfolio Id(5)	Curve Type		Method		Months	Keywo	rd	
46647PBA	93.9929	3.407	1.930	0.479	-0.237	-0.947		1010101010	<i>"</i>								
46647PBZ	98.1002	0.783	0.641	0.500	0.430	0.359	\$B	13	_	TsyMod	el 🗾	OAS Change	-	1			
CH011300	80.506	5.228	2.782	0.404	-0.760	-1.908	-			Curve Date		Value		Davs	A.c.	ruedInterestAtHerizon	
DE309732	99.75	1.314	0.881	0.452	0.238	0.026	Lever			Curve Date				Days		cruedInterestAthorizon	
FR163649	93.375	1.794	1.162	0.537	0.227	-0.081	\$C	213	-	\$C\$7	-	0	_	0	_ Acc	cruedInterestAtSettle	
CN183339	100.1985	0.393	0.265	0.138	0.075	0.012	-1			,					Act	tualAccruedInterestAtHoriz	on
ES026256	93.520848	7.509	3.809	0.258	-1.463	-3.149	Settle	ment Date		Volatility Typ	e	Prepay Rate		Scenario	Act	tualAdjustedAccruedInteres	stAtl 🚬
DE378204	96.321	1.981	1.040	0.112	-0.348	-0.803	— Ma	arket	_	Default	-		-	ParShift	-		
9128283V	95.84375	2.429	1.377	0.339	-0.175	-0.686	_		_	1		,	_		_		
							Prepa	у Туре				Settlement Reinv R	ate	Bp move			
									-			Default	_	H\$11	- Pa	ce keyword label above formula	
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							Prepa	iy Rate						nining	_		
									-					Gradual	•		
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Recent Launch: Yield Book Calculators available in Refinitiv Eikon & Workspace

Yield Book's trusted fixed-income analytics combined with Refinitiv's market-leading data creates even more possibilities for your workflows. With Refinitiv and Yield Book working together as one company under LSEG, fixed-income professionals now have a full solution across data and analytics

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Yield Book	Yield Book Calculator														
Q US 1.625 2	2029/08/15	× TESCO	011.1(A)	× FN	MA20.1(AL)		US 0.75 2023/1								
INDICATIVE DATA BOND ANALYTICS															
PRICE/YIELD	PRICE/YIELD SCENARIOS MATRIX PY WAL SENSITIVITY DEFAULT ASSUMPTIONS														
FNMA20.1 AL	FNMA20.1 AL CMO 3.000 FIX SEQ REG ISIN: US3136B8NQ82 CUSIP: 3136B8NQ8														
PRICING PARAM	PRICING PARAMETERS CALCULATE ^														
Metric Center Step Curve Date Level Price 100.2 0.5 2022-01-11 Market Convention Prepay Speed CPR 25 5 5															
MATRIX P/Y RESULTS															
Yield	V BY F	PRICE / CPR					YIELD / CPR AT P	RICE 99.2000	00 🗸						
			CPF	2				3.36							
	10.0	15.0	20.0	25.0	30.0	35.0	40.0	3.34 3.32 3.30							
99.200000	3.12	3.15	3.19	3.22	3.26	3.31	3.35	3.28 = 3.26				\nearrow			
99.700000	3.04	3.04	3.05	3.05	3.06	3.07	3.07	⇒ 3.22 3.20							
100.200000	2.95	2.93	2.91	2.88	2.86	2.83	2.8	3.18 3.16 3.14							
100.700000	2.87	2.82	2.77	2.71	2.66	2.59	2.53	3.12 3.10							
101.200000	2.78	2.71	2.63	2.55	2.46	2.36	2.26	10.0	15.0	20.0	25.0 CPR	30.0	35.0	40.0	
OTHER MEASURE	S/CPR		CD	,				WAL / CPR							
	10.0	15.0	20.0	25.0	30.0	35.0	40.0	7.00							
WAL	7.11	5.23	4.05	3.25	2.68	2.26	1.93	6.00 5.50							
Expected M	2049-01-25	2049-01-25	2049-01-25	2049-01-25	2049-01-25	2049-01-25	2049-01-25	1 5:00 ≸ 4.50 ≸ 4.00							
First Princip	2022-01-25	2022-01-25	2022-01-25	2022-01-25	2022-01-25	2022-01-25	2022-01-25	3.50 3.00 2.50							
								2.00 1.50							
								10.0	15.0	20.0	25.0	30.0	35.0	40.0	
											CPR			Ý	

Leverage the quality and breadth of Yield Book's leading fixed income analytics and functionality via Refinitiv Eikon



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THANK YOU