FASANARA CAPITAL

PRIVATE & CONFIDENTIAL

HOW TO NAVIGATE THE CLIFF EDGE IN MARKETS

New Markets For Old Investors

FINANCIAL TECHNOLOGY TO AVOID BUBBLES

MACRO Voices

Signatory of:

PRI Principles for Responsible Investment

Agenda

Twin Bubbles / Fake Markets: What Are We To Do

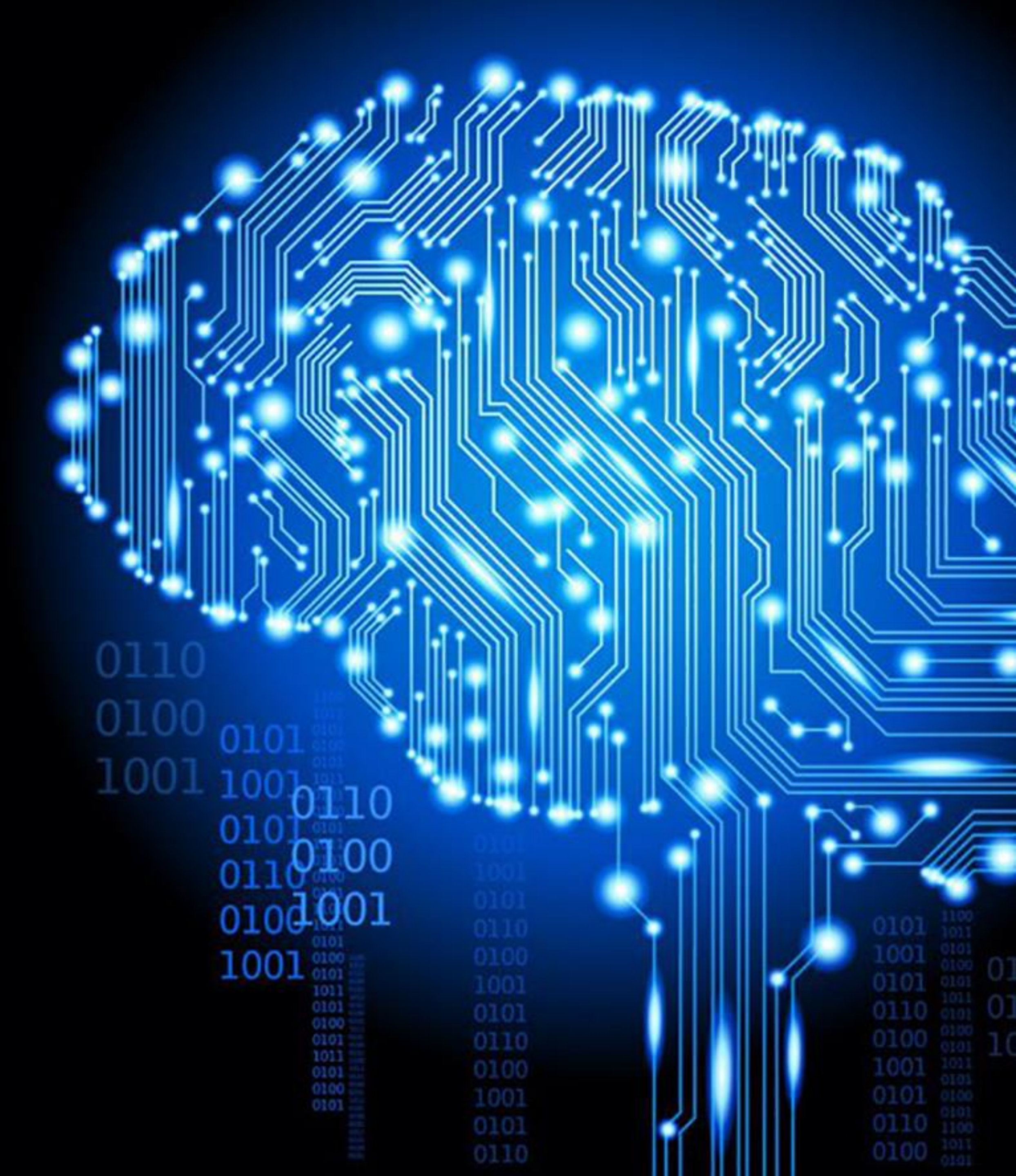
Fasanara Complexity-Based Systemic Risk Alerts

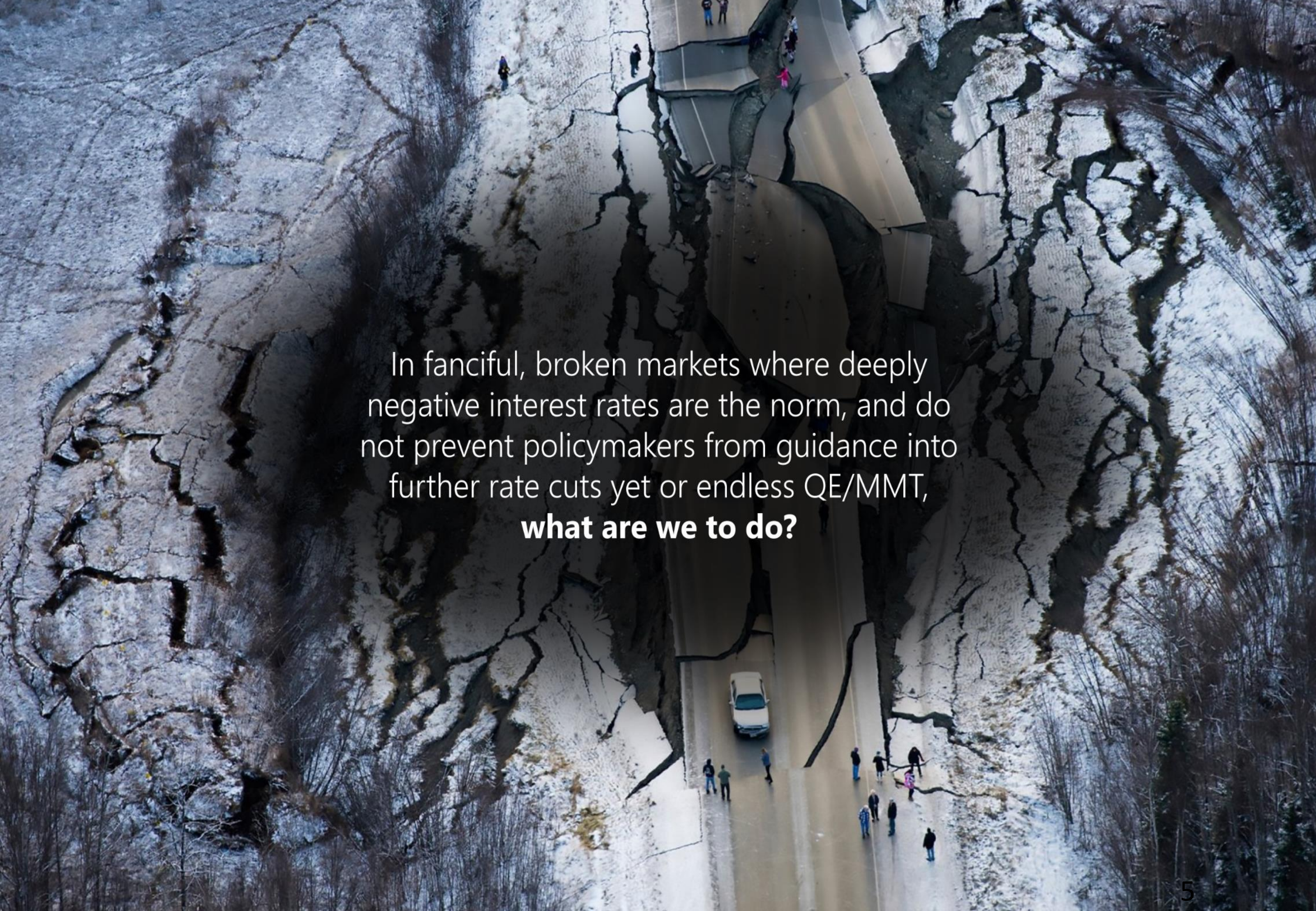
Escape Bubbles, Go To Real Economy, Pull Up Your Sleeves, Work On Infrastructure

Financial Technology and AI-Powered Credit Analytics

At a time in which bonds are no longer bonds but rather tax bills, and equities are as expensive as washing machines going on auction at 50 thousand dollars, **what role is left to play for us rational investors?**

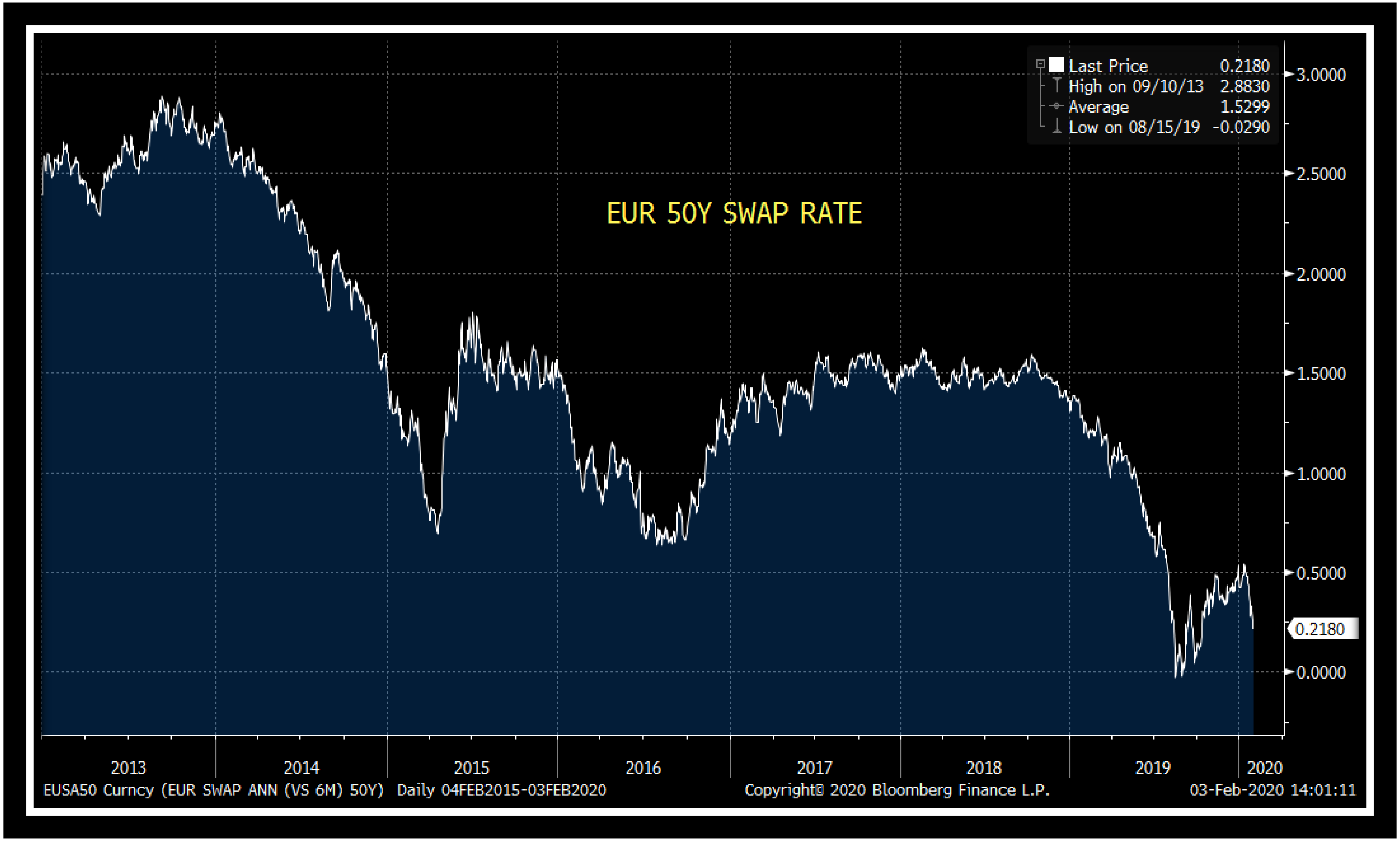
At a time when machines dominate 90% of daily trading flows, are pitted against other machines to extrapolate a non-existent alpha, and a passive or quasi-passive true nature infected most brands of investing (ETF, risk parity, risk premia, low vol vehicles, quant funds, CTA, all), **what role is left to play for us humans?**





In fanciful, broken markets where deeply negative interest rates are the norm, and do not prevent policymakers from guidance into further rate cuts yet or endless QE/MMT, **what are we to do?**

Bond of Fake-Cash?

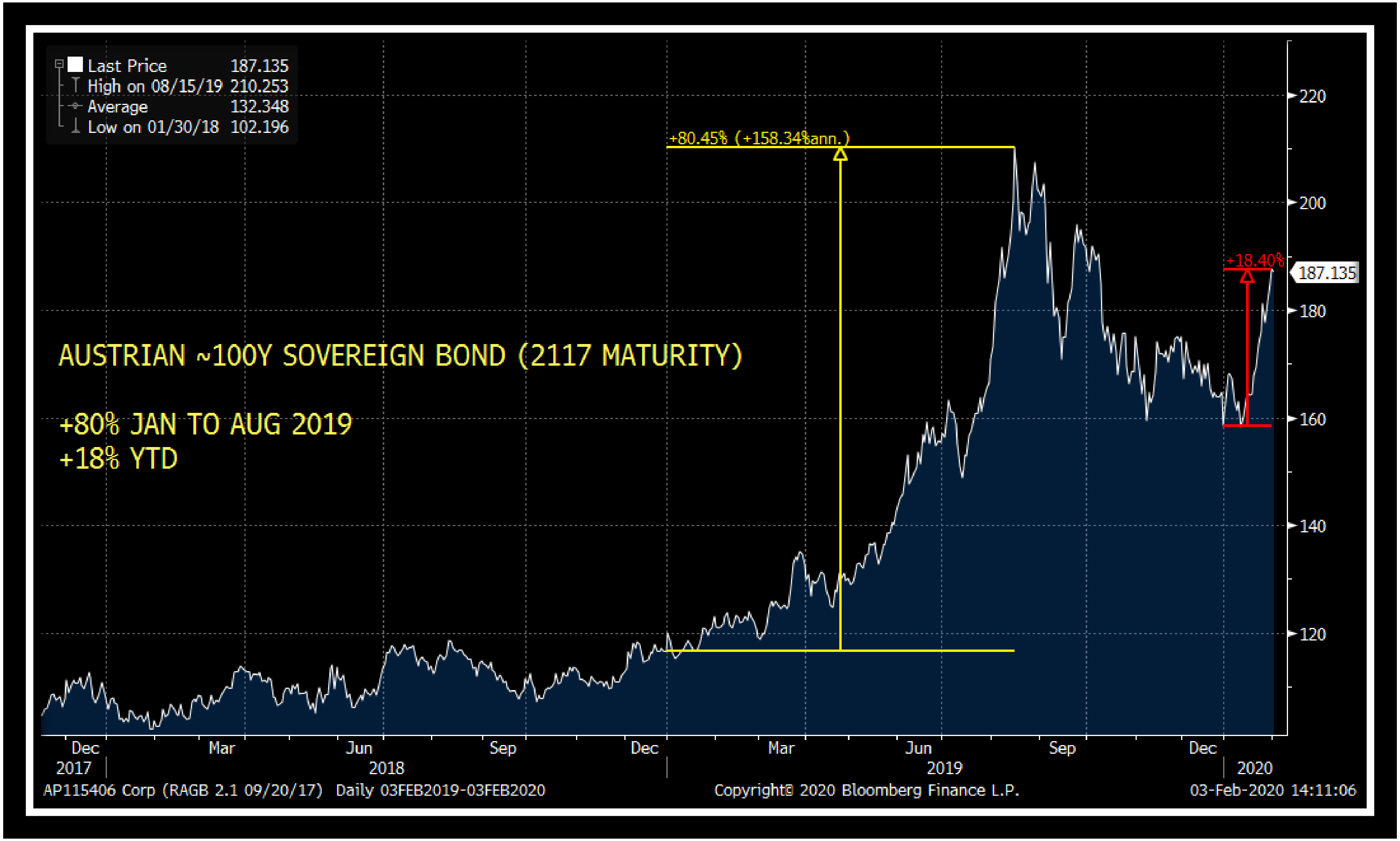


Bonds: To Be Or Not To Be

Negative Rates Are No Natural Law

Bond of Fake-Cash?

Bonds for Capital Gains, Equity for Income

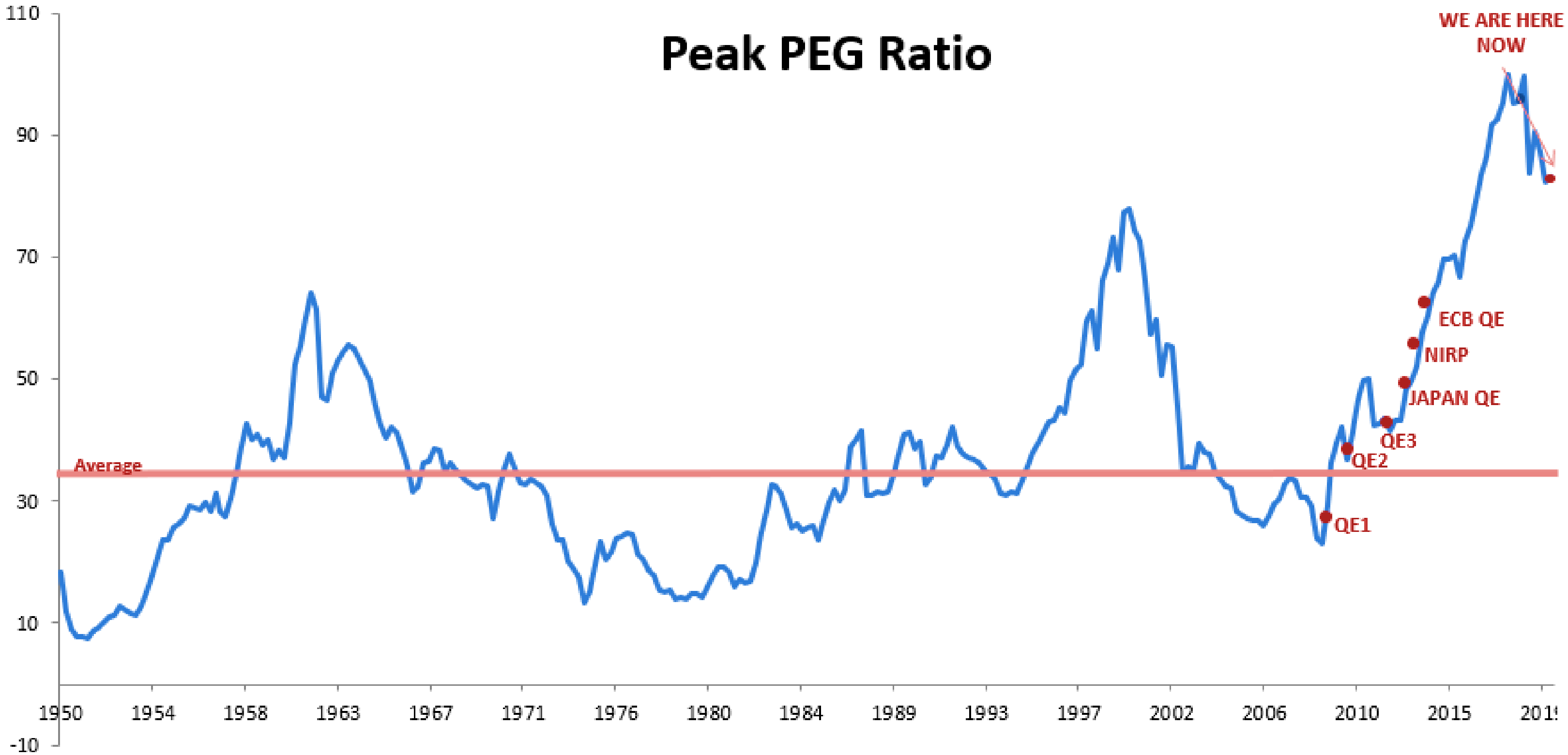


Equity Insanity

"Moody's, the rating agency has risen 1545% since the 2009 low, trades with a tech-like 34 P/E and has a $50bn market cap (?!) This, my friends, is the poster child of the largest debt orgy in history."

© **Raoul Pal** @RaoulGMI

FASANARA PEAK PEG RATIO: PRICE TO PEAK EARNINGS, ADJUSTED FOR TREND GROWTH



Source: Fasanara Capital ltd

Data Set:

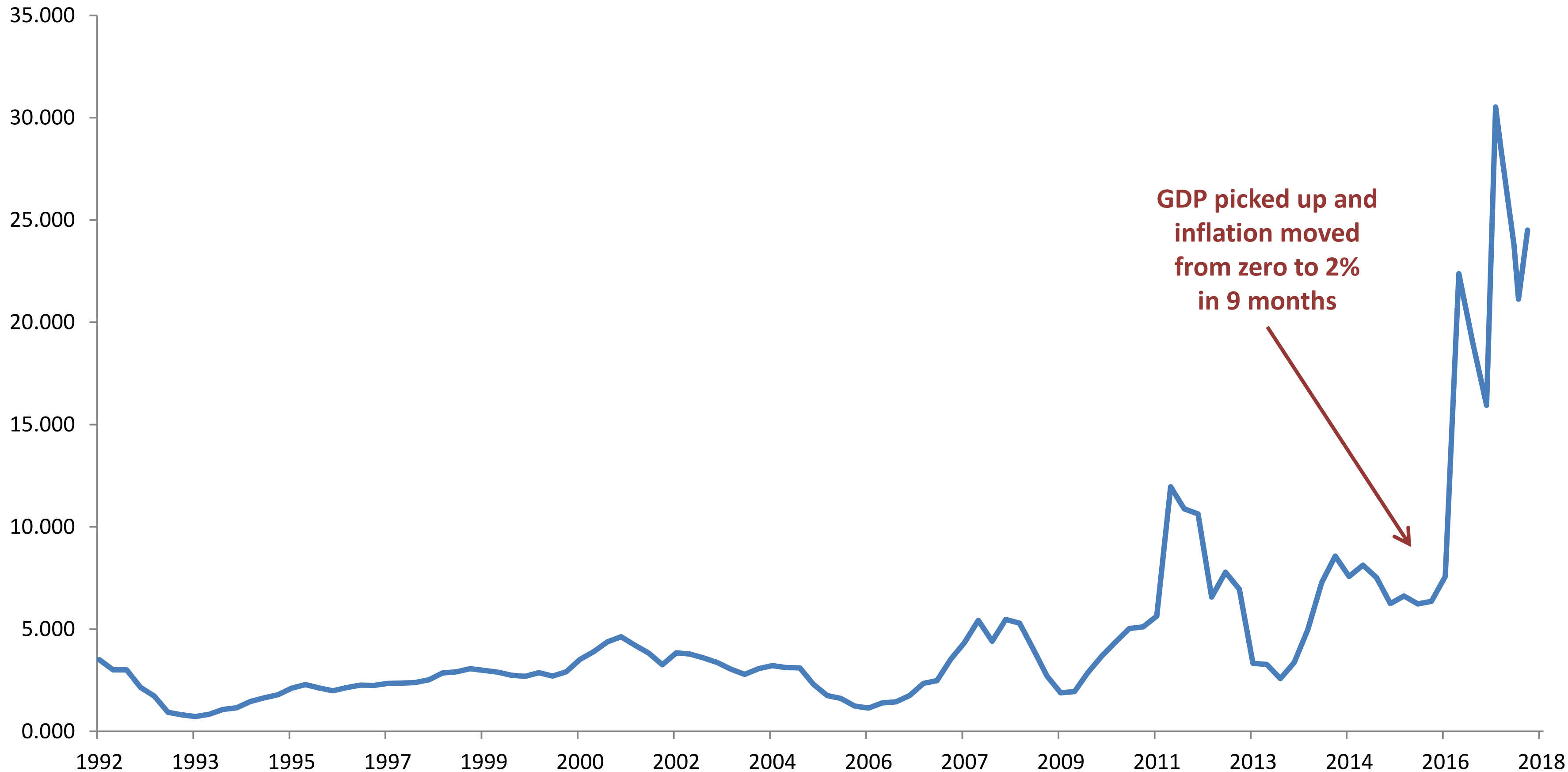
S&P quarterly price data, source Bloomberg

Corporate Profits After-Tax, quarterly data, average of the two highest quarters over the previous 10 years, source FED St Louis

US Real GDP % Change, rolling 10-year average, quarterly data, source IMF

Lunatic Markets: What Are We To Do?

The REAL RATE to GROWTH ratio in Germany

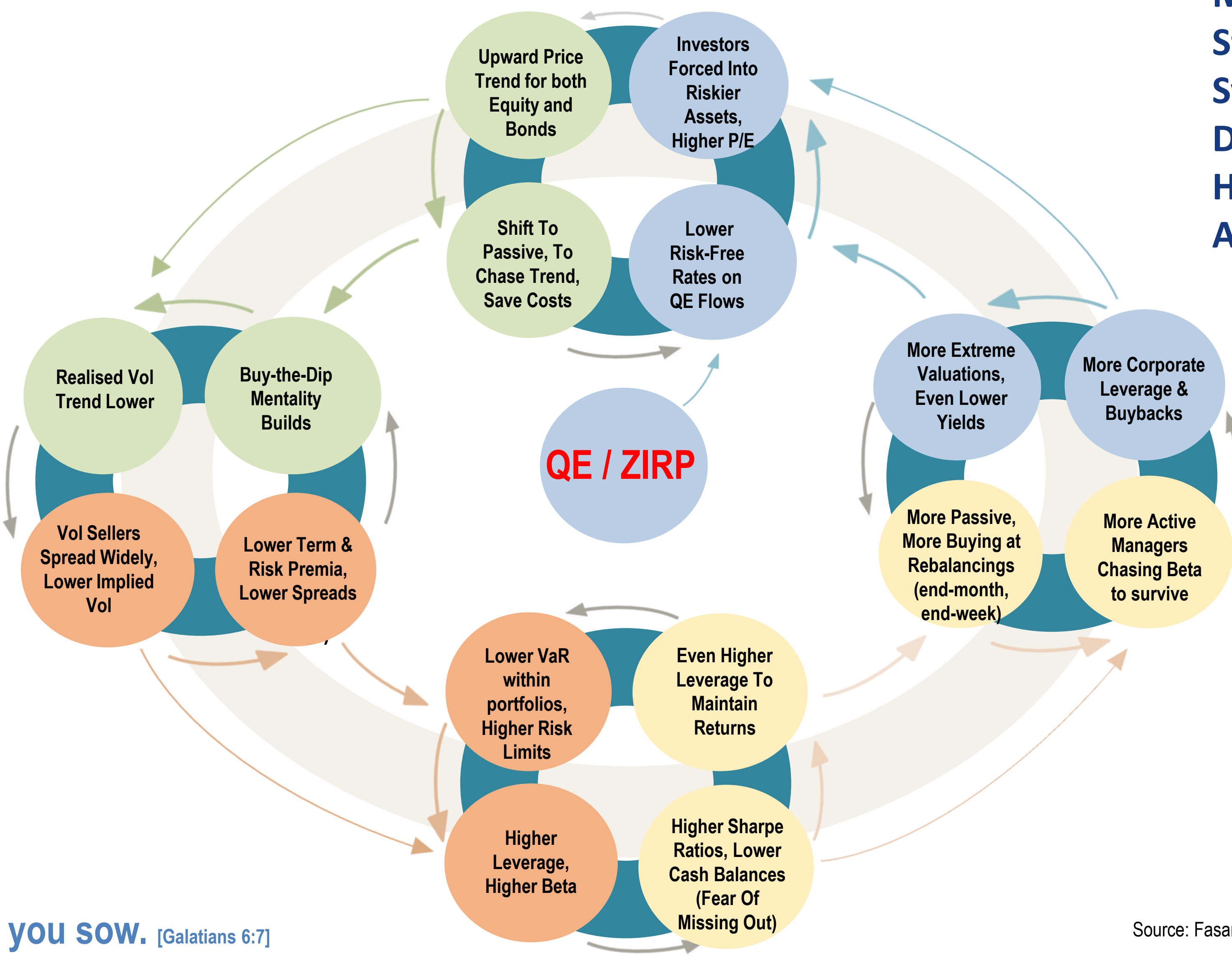


Source: Fasanara Capital ltd
Data Set:
- German CPI YoY, quarterly data, source OECD
- German 2year government bond yield to maturity, quarterly data, source Bloomberg
- German GDP YoY %Change, rolling 5-year average, quarterly data, source IMF

Please **refer to** Measuring the Bond Bubble, 19th Jan 2018

The Tree of Positive Feedback Loops

SYSTEMIC RISK AS A COMPLEXITY PROBLEM



Low Diversity Market Structure & System Degradation: How It Comes About

You reap what you sow. [Galatians 6:7]

Source: Fasanara Capital ltd

Negative Rates Are No Natural Law **A Magic Spell**

By **habituation**, we got so used to them that they became part of the furniture, boring and dismissed as a sort of **déjà vu'**. They must be accepted by the world of finance as a fact of life, and all better adapt to them at the margin.

As **investors' minds hibernate**, the market discourse dropped to new lows alongside interest rates, and is nowadays incessantly obsessing on secondary-order elements: the shape of the curve, trade tensions, the independence of the FED, indications from sector rotations, the VIX. Nowadays, victims of a magic spell, most market participants think it is OK for a bond to yield negatively. In behavioural finance, the spell can be broken down in the **'ostrich effect'** and the 'anchor bias': the mental hack that allows us to ignore the bigger picture and focus on a single element that worked well for us in the recent past, thus sticking the head in the sand to protect against warning signals.

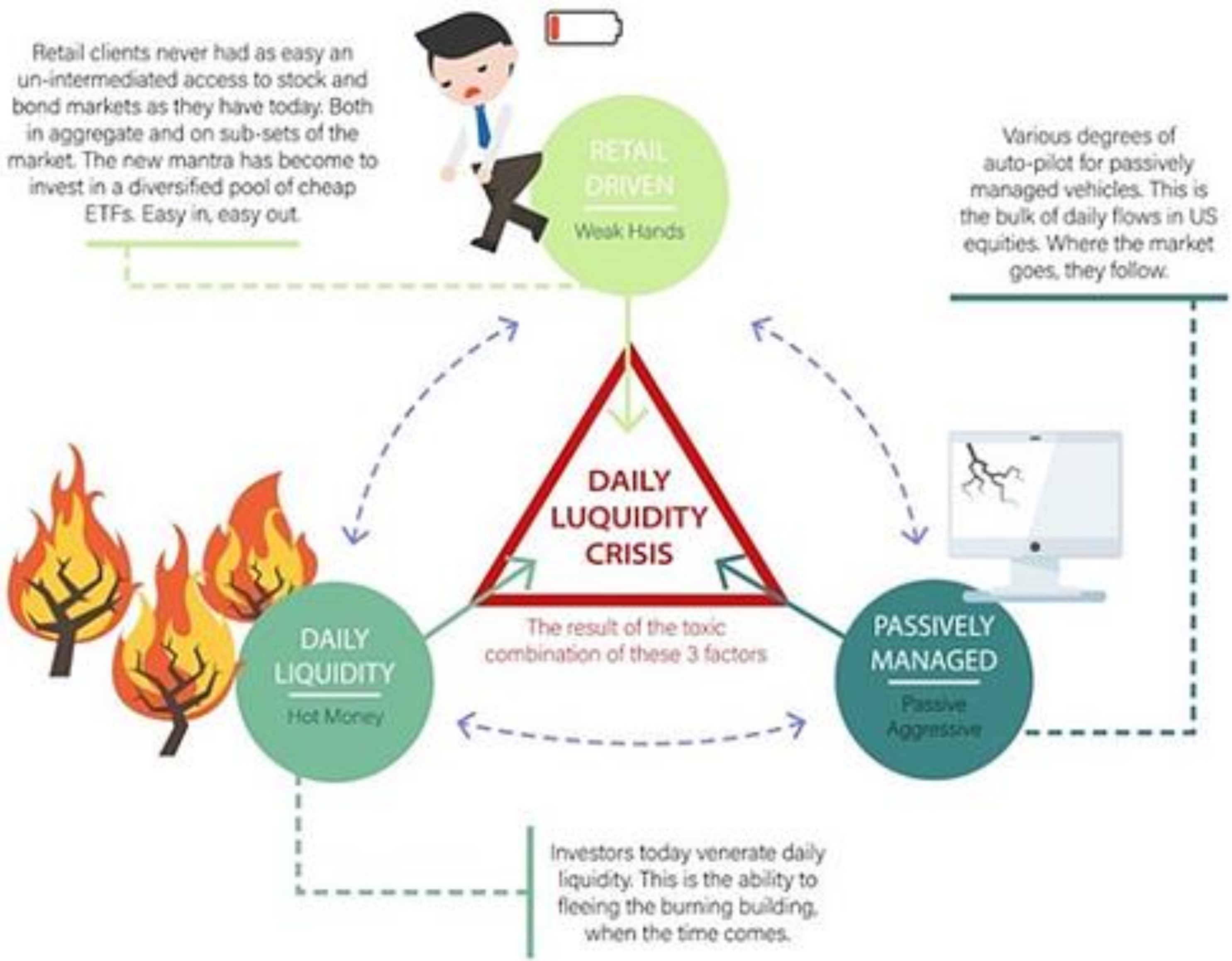
However, **there is a simple difference between a coupon-bearing bond and a negative-yielding bond. The difference is that one is a bond, while the other one is not**. It is something not seen before in financial history, at this order of magnitude and duration at least, something that needs a new name but surely is no longer a bond. Perhaps, an anti-bond, or a fake-bond, or fake-cash; but surely not a bond.

Because of mechanical effects and nocebo effects, the original sin of negative rates and heavy market manipulation led to the **'fake markets' we line in today, insensitive to fundamentals, dominated by passive vehicles, fraught with systemic risk.**

No-Bond world. Bonds as an asset class are in an existential crisis

The Upcoming Daily Liquidity Crisis

THE RISK OF A $ 2 TRILLIONS MARGIN CALL

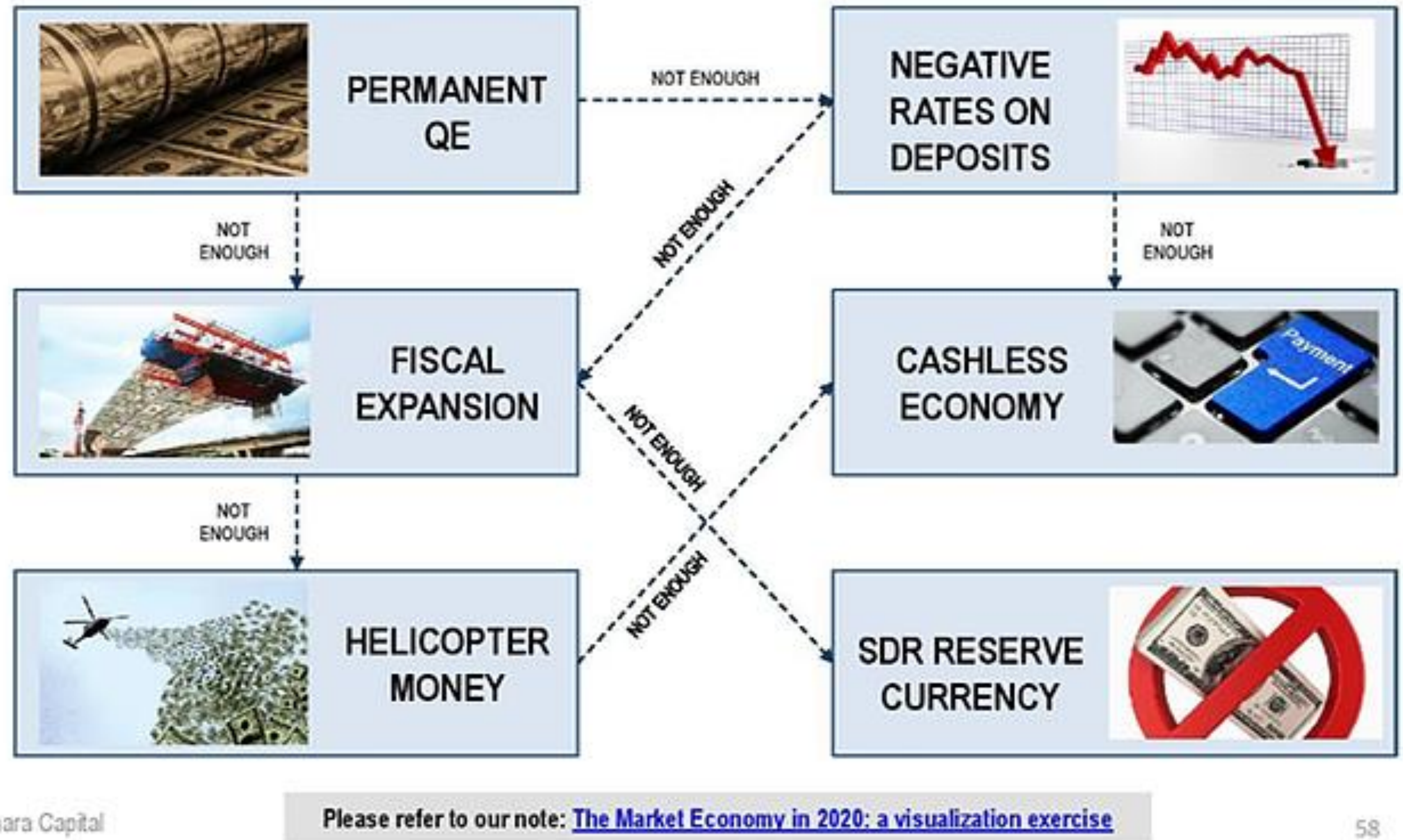


The Ideal Environment For Overnight Gap Risk

The Ugly Face Of Enduring Negative Rates: System Stability

Trash Ratios Have Never Been Trashier

A VISUALISATION EXCERSISE BACK IN 2016: ON TRACK TO END GAME



Source: Fasanara Capital | SCENARIOS, 7th June 2016

We are in the middle of the ocean during a storm with no compass to help navigation

TIMING MATTERS; BUT BEING RIGHT MATTERS MORE.

In the 1930s, Keynes said that markets can stay irrational longer than you can stay solvent. Yet, this is to put into context. When the cycle of the markets sits on a long wave - at the end of a prolonged journey which lasted probably 40 years now, ever since the end of Bretton Woods monetary system - **USUAL METRICS OF INVESTING SUCCESS ARE AN OBSTACLE, NOT A COMFORT**. They help casting the net underneath unaware or complicit, greedy or impatient investors. Recency bias has the crisis baked in the cake.

CATCHING A MAJOR DISCONTINUITY IN MARKETS IT'S LUMPY BUSINESS, NO CONTINUOUS GAME; this is what makes it tough for many to position for. Just as important, it's comforting and safe to be in the crowd; extremely distressing to be out. It requires radical thinking and full independence. Again, you either in or out.

Blink and you'll miss it. The scope for a flash crash. Our blueprint for the next daily liquidity crisis event is the **Quant Quake of August 2007**. [link]

Opening one's eyes may take a lifetime. Seeing is done in a flash. [Anthony de Mello]

EMPIRICAL EVIDENCE; NO SHORTAGE OF IMPENDING CHAOS

The wheels started to come off in Q4 2018, with a fast melting S&P/Nasdaq, nosediving economic indicators and suddenly freezing credit markets. **A bad month was all it took for Central Bankers to have second thoughts, for the supposedly-strong real economy to grind to a sudden stop, for markets to enter hysterical convulsions. A Single Bad Quarter Had Active Managers Burn Years Of Gains**

Not that there is a shortage of **recent evidence of impending chaos, even using conventional / traditional market analysis**. hot stocks meltdown and US Repo mess in mid-September 2019, interest rates cratering in mid-August 2019, market precipitous dive in Q4 2018, the VIX complex quake in early February 2018, first mushrooms of fake liquidity popping up (GAM, Woodford, H2O). If we have to guess, the blueprint for the next real crisis, large-scale, is still the **Quant Quake 2007, except 10X worse as this time it hits the core of the market instead of one small colony, followed by a prolonged bank holiday. A financial meltdown, with no strict necessity of consequential real economy shock**. In this, dissimilar to the credit crunches of 2008 and 1929, and more similar to financial mayhem in 1987, 2000, and 6th August 2007 (although the latter was only visible to the quant community).

'Critical Transition Hypothesis', posing that markets are indeed already well-inside that which in complexity science is called 'phase transition zone', the 'edge of chaos': this is a far-from-equilibrium state of the system where the dynamics of criticality take charge, and the system fragility is exposed in transition to a whole new regime.

We also called this a generational opportunity hidden in plain sight, an historical investment jackpot, for those who have eyes to see it.

WHAT ARE WE TO DO?

Cash, Gold and Wait It Out

Or Perhaps

Use complexity-based systematic risk-off indicators to navigate.

Quant Strategies

Go short with as asymmetric profiles as possible.

Tail Risk

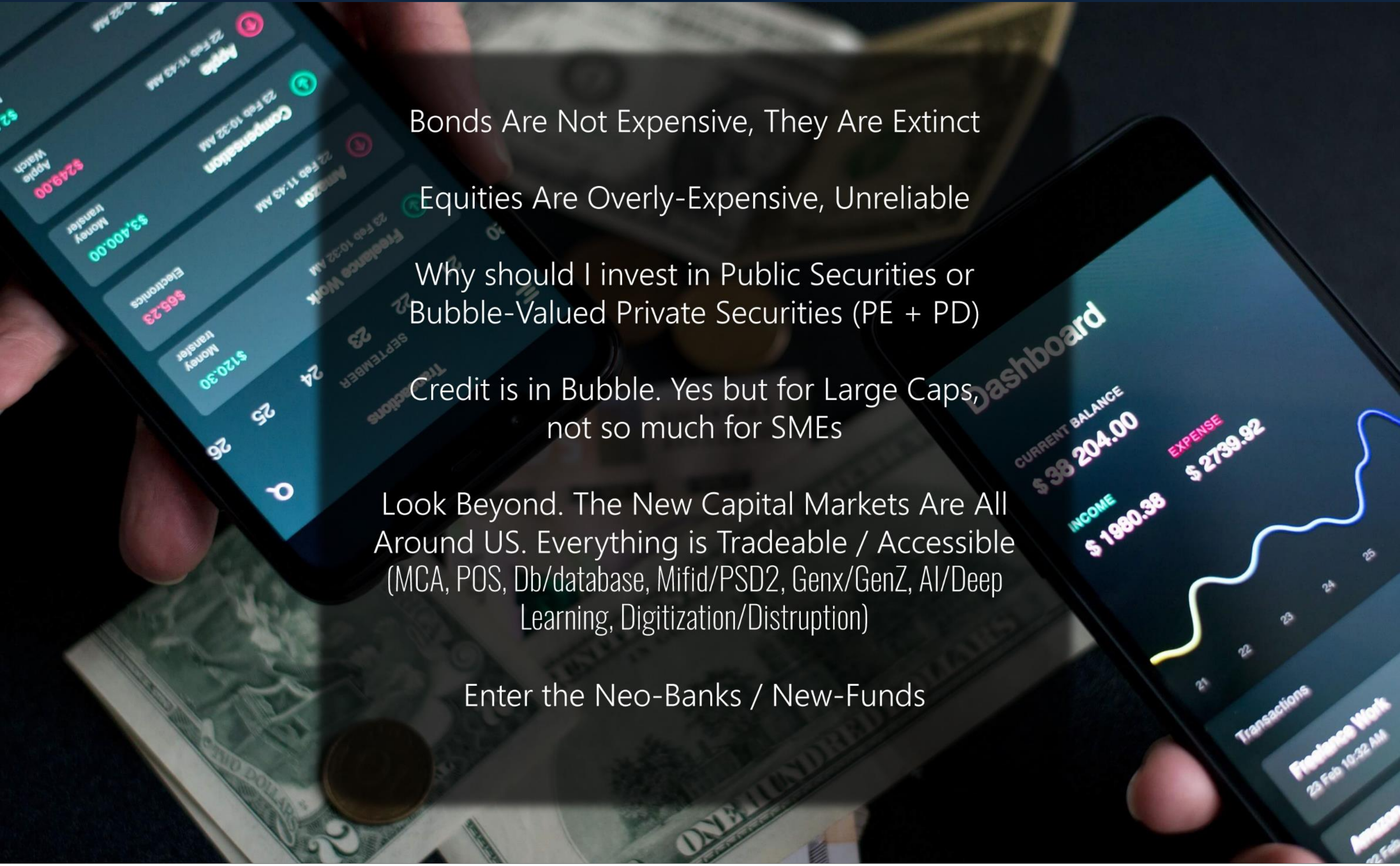
Pull up your sleeves and go to real economy.
FinTech Infrastructure.

Alternative Credit

Find disruptive technologies that challenge traditional markets.

New Technologies

Look Beyond Old Markets



Bonds Are Not Expensive, They Are Extinct

Equities Are Overly-Expensive, Unreliable

Why should I invest in Public Securities or Bubble-Valued Private Securities (PE + PD)

Credit is in Bubble. Yes but for Large Caps, not so much for SMEs

Look Beyond. The New Capital Markets Are All Around US. Everything is Tradeable / Accessible (MCA, POS, Db/database, Mifid/PSD2, Genx/GenZ, AI/Deep Learning, Digitization/Distruption)

Enter the Neo-Banks / New-Funds

Look Beyond Old Markets

PULL UP SLEEVES AND LOOK AT REAL ECONOMY,
WORK HARDER.
REAL ECONOMY IS IN NEED.
BUT YOU NEED INFRASTRUCTURE….
YOU NEED A TECHNOLOGY WIRING.
WILLING TO GO THE EXTRA MILE OR SET UP FINANCIAL TECHNOLOGY INFRASTRUCTURE.

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CRITICAL TRANSFORMATION HYPHOTHESIS

1	**CRITICAL SLOWING DOWN**	The **rate of recovery** rate **after a small perturbation is reduced, and will approach zero when a system moves towards a catastrophic bifurcation point (less slope of basin of attraction).** The difference to Oct14, Aug15, Jan16, Trump, Brexit may be informative. Calls for further investigation.
2	**VARIANCE**	1) Volatility had already bottomed out 9 months ago; 2) Volatility rising with market in January; 3) Volatility still not reflected in longer expiries and other asset classes. **As a bifurcation approaches (eigenvalue zero), the impact of shocks do not decay, and their accumulating effect increases the variance of the state variable**
3	**CORRELATION / AUTOCORRELATION**	1) Correlation across asset classed increases at times of systemic risk. 2) Increase in autocorrelation, the memory of the system increases , the **state of the system** at any given moment becomes **more and more like its past state**
4	**SKEWNESS OF FLUCTUATIONS**	The **asymmetry of fluctuations** may increase. Rates of recovery are lower. As a result, **the system will tend to stay in the vicinity of the unstable point relatively longer** than it would on the opposite side of the stable equilibrium. Vicinity to 200 days MA may qualify.
5	**FLICKERING / Bi-Modality**	**In the vicinity of a catastrophic bifurcation, the system goes back and forth between the basins of attraction of two alternative attractors**. Such behavior is also considered an early warning. **rapid alternations between a cold mode and a warm mode are typical in climate changes over history. In epileptic seizures, smaller transient excursions in the vicinity of an alternative state** precede the upcoming **major shift**. Call them 'EARLY TREMORS'. Violent rallies seen in bear market about to crash, may qualify.
6	**POCKETS OF STRESS**	**XIV was only the first ETF to go , many could follow (issues of 'fake diversification', 'fake liquidity')** Turkey, OIS-Llibor spread / DB, default events, HKD, EU Economic Surprise Index
7	**SHIFTING FEEDBACK LOOPS from NEGATIVE to POSITIVE**	**Critical Transitions Follow Shifts In Feedback Loops: they can be the final stressors** How does the system degrade? How is resilience lost? One such way is with a change in feedbacks. It happens when self-correcting negative feedback loops weaken, and self-amplifying positive feedback loops arise, and the system degrades. Positive loops correlate to an increase in system-level fragility. Now they flipped again to negative: saturation.

Systemic Risk Alerts Cockpit

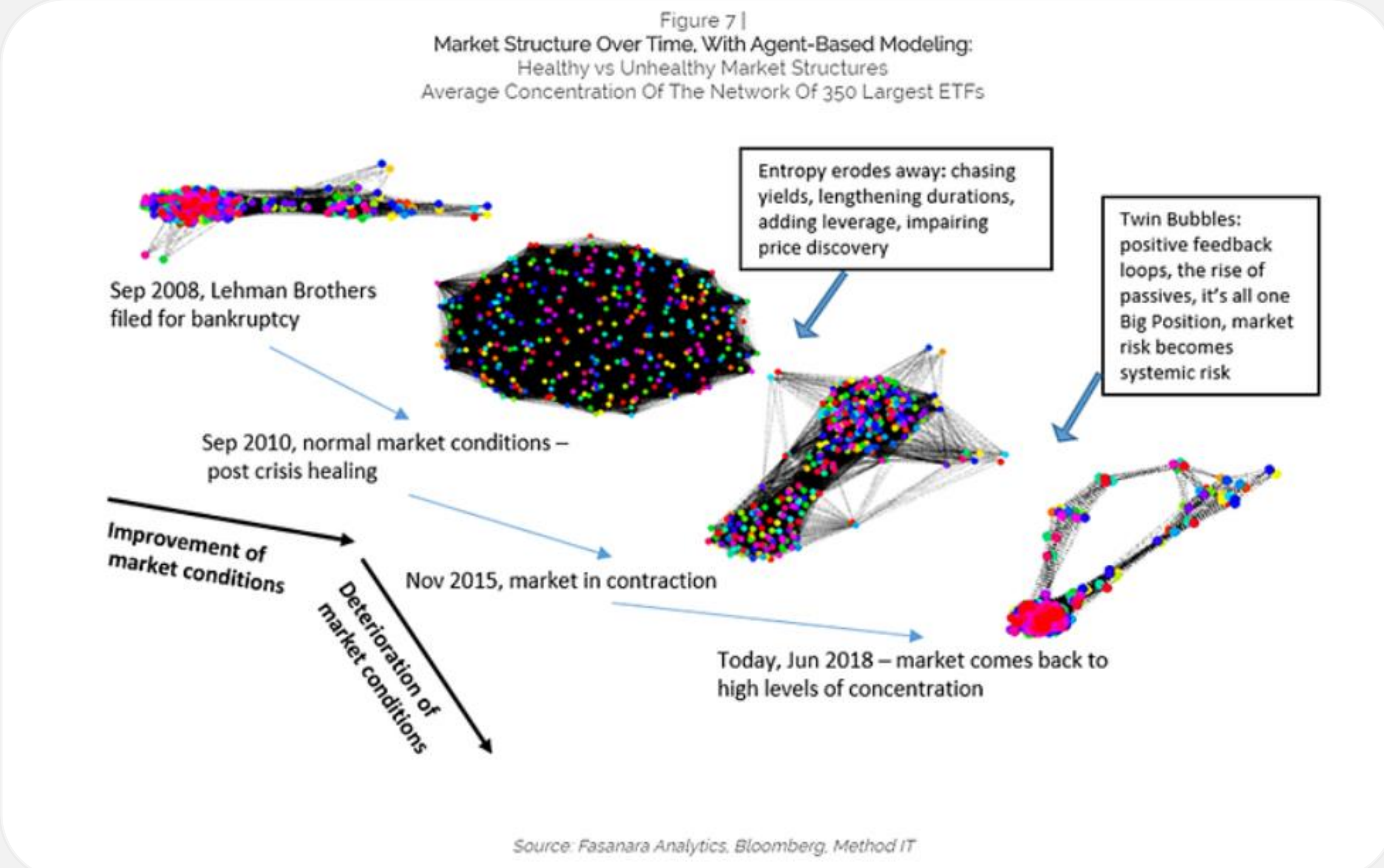
Helping Blind Navigation In Broken Markets

Lunatic Markets: What Are We To Do?

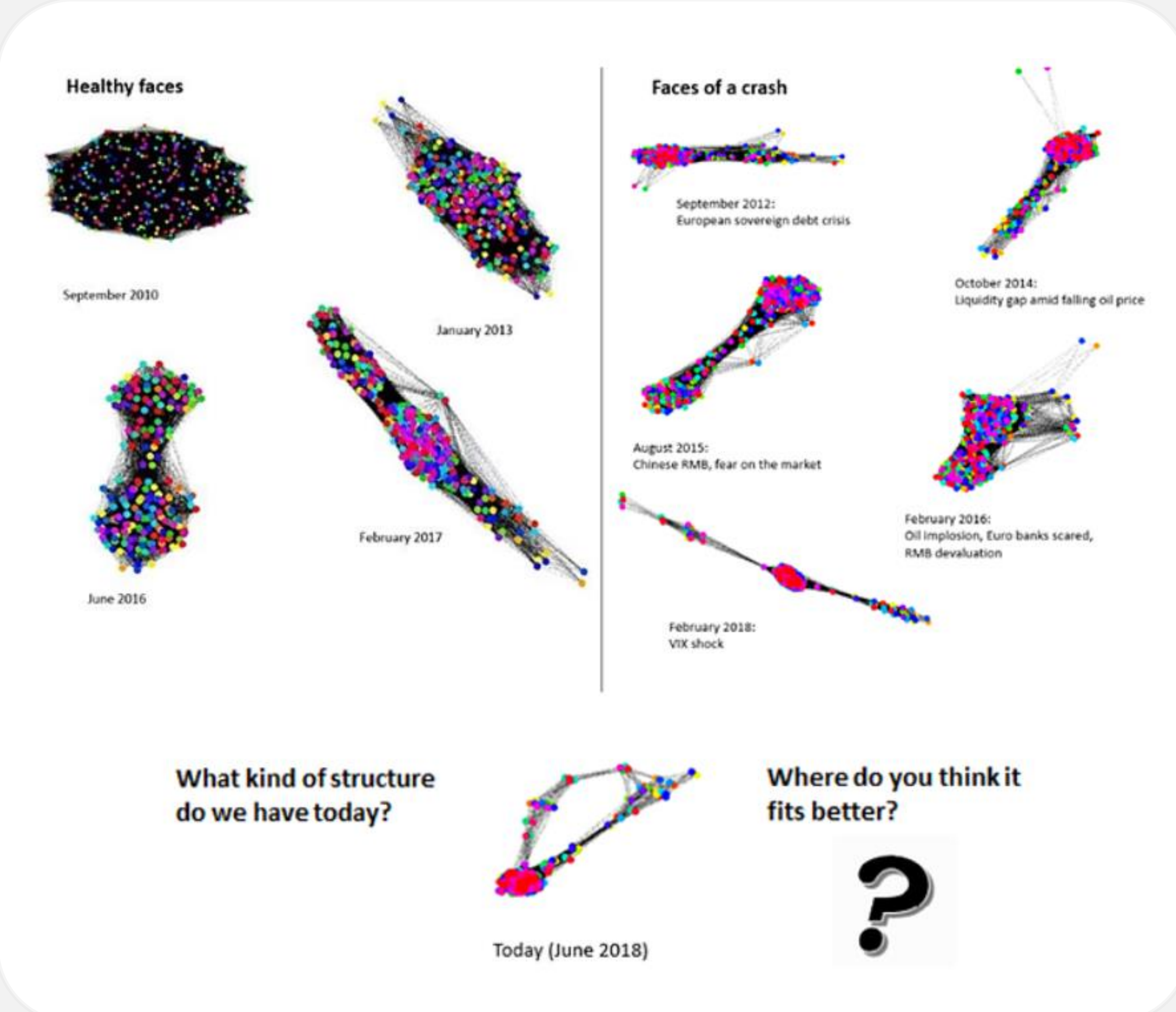
New Problems New Tools

- A Tool For Visualising Tensions In The Market Structure
- A Tool For Monitoring The Impact Of A Market Epidemic
- A Tool To Estimate Proximity To A Large-Scale Systemic Risk Event
- A Tool To Capture Small-Scale Market Events

Complexity-Based Systemic Risk Alerts



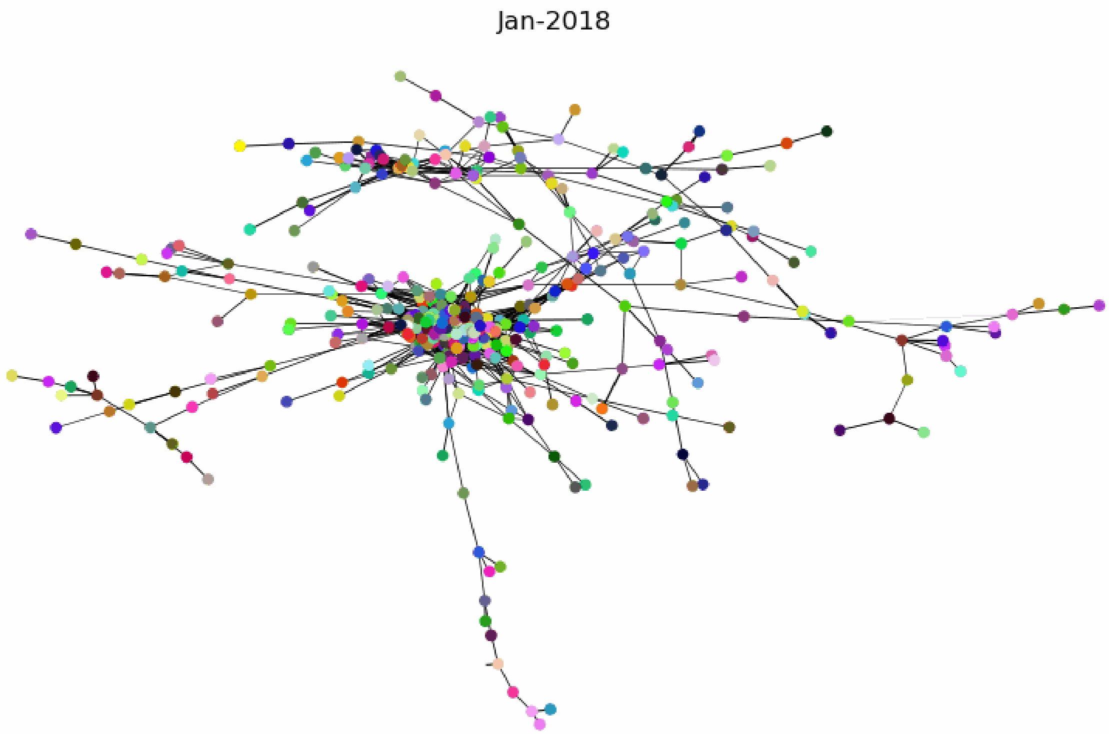
Structure Of The Market During Good & Bad Times



Video Of The Structure Of The Market During Good & Bad Times Since 2018

Daily/Weekly snapshots complement the interpretation and analysis of the dynamics of the market.

Visualisation of the results of market structure analysis, in this case for the S&P500.



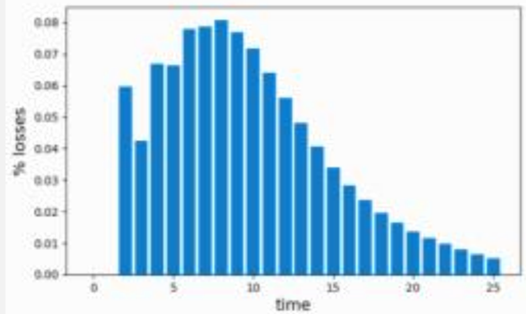
VIDEO available at:

https://www.fasanara.com/market-structure

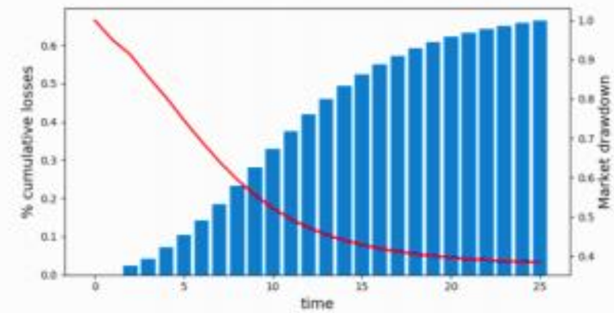
Simulating & Monitoring

The minimum trigger to a market epidemic. The possibility for a flash daily liquidity crisis: a market-endogenous blink-and-you-miss type event.

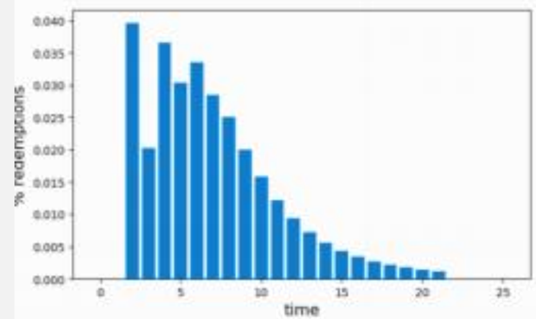
Following an idiosyncratic shock to a single stock and subsequent cumulative redemptions of approx. 15% on the 3 largest Asset Managers alone, the drawdown of the US equity market (as proxied by the Nasdaq) could reach 60% after 20 days.



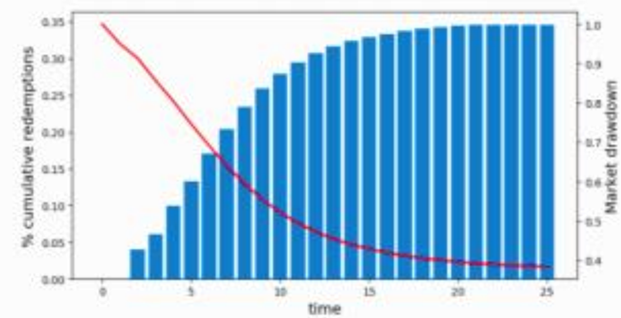
(i) Asset Managers' losses



(ii) Asset Managers' cumulative losses (as blue bars) and market drawdown (as a red curve)



(iii) Asset Managers' redemptions

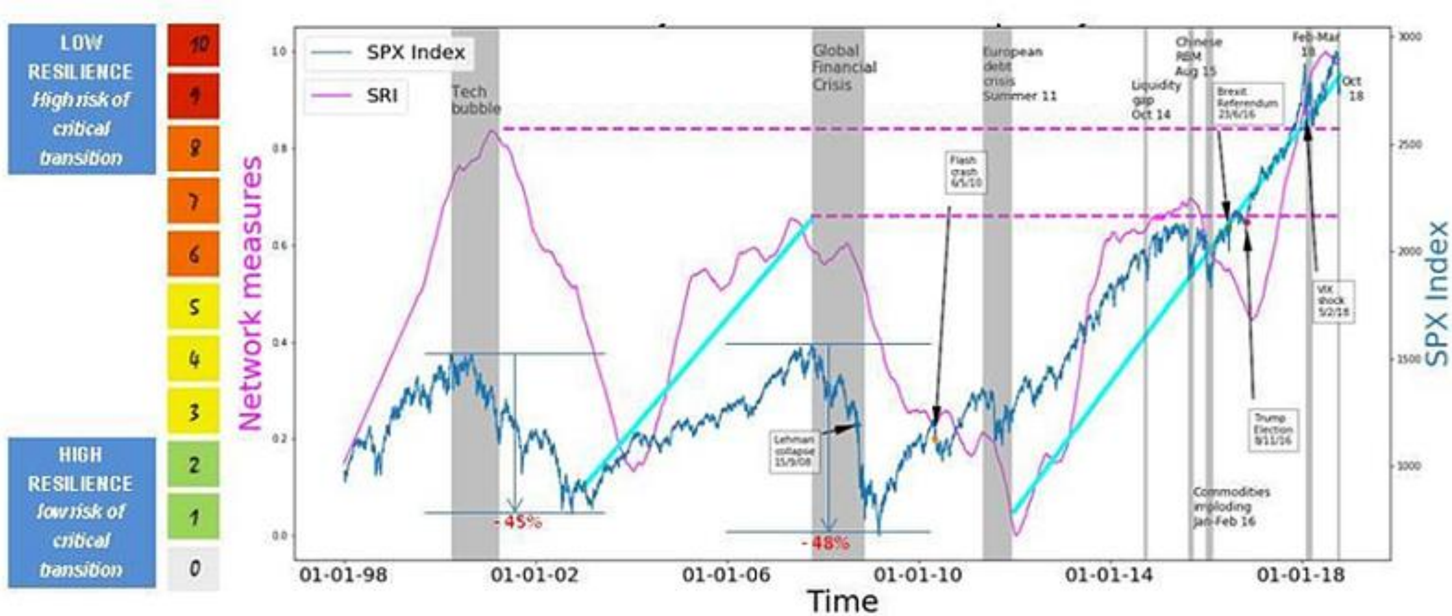


(iv) Asset Managers' cumulative redemptions (as blue bars) and market drawdown (as a red curve)

The Quest For A Quantitative Indicator Of System-level Market Fragility.

Measuring system degradation over time, with indicators strictly not volatility-based, but rather based on agent-based modelling and the Ricci curvature.

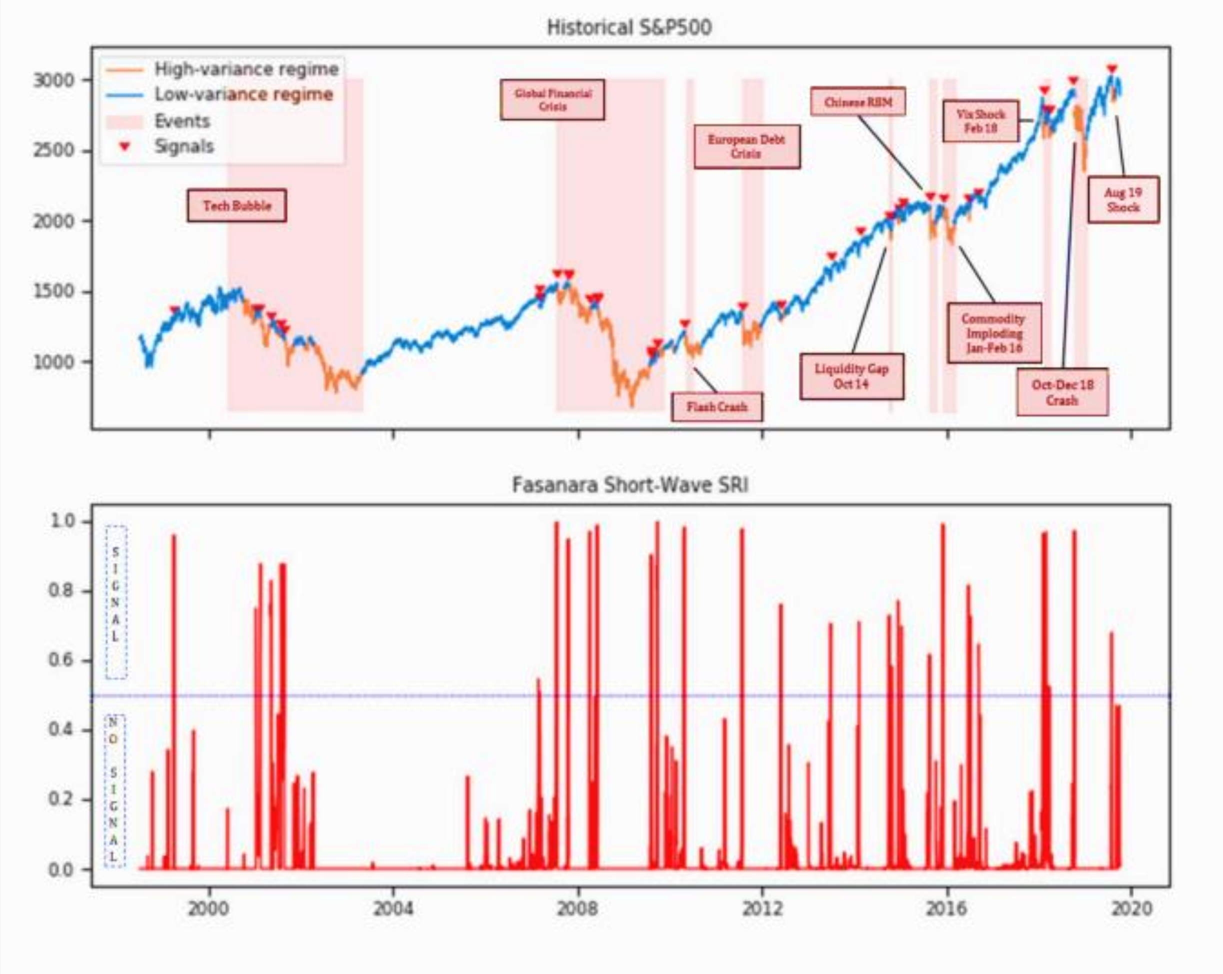
Systemic Risk As A Complexity Class — *Sensor For Proximity To A Market Crash, With The Ricci Curvature*



On the S&P500: A Visual History Of The Market Structure In The Last Twenty Years - Sequencing The DNA Of A Market Crash, Using Variations Of The Ricci Curvature

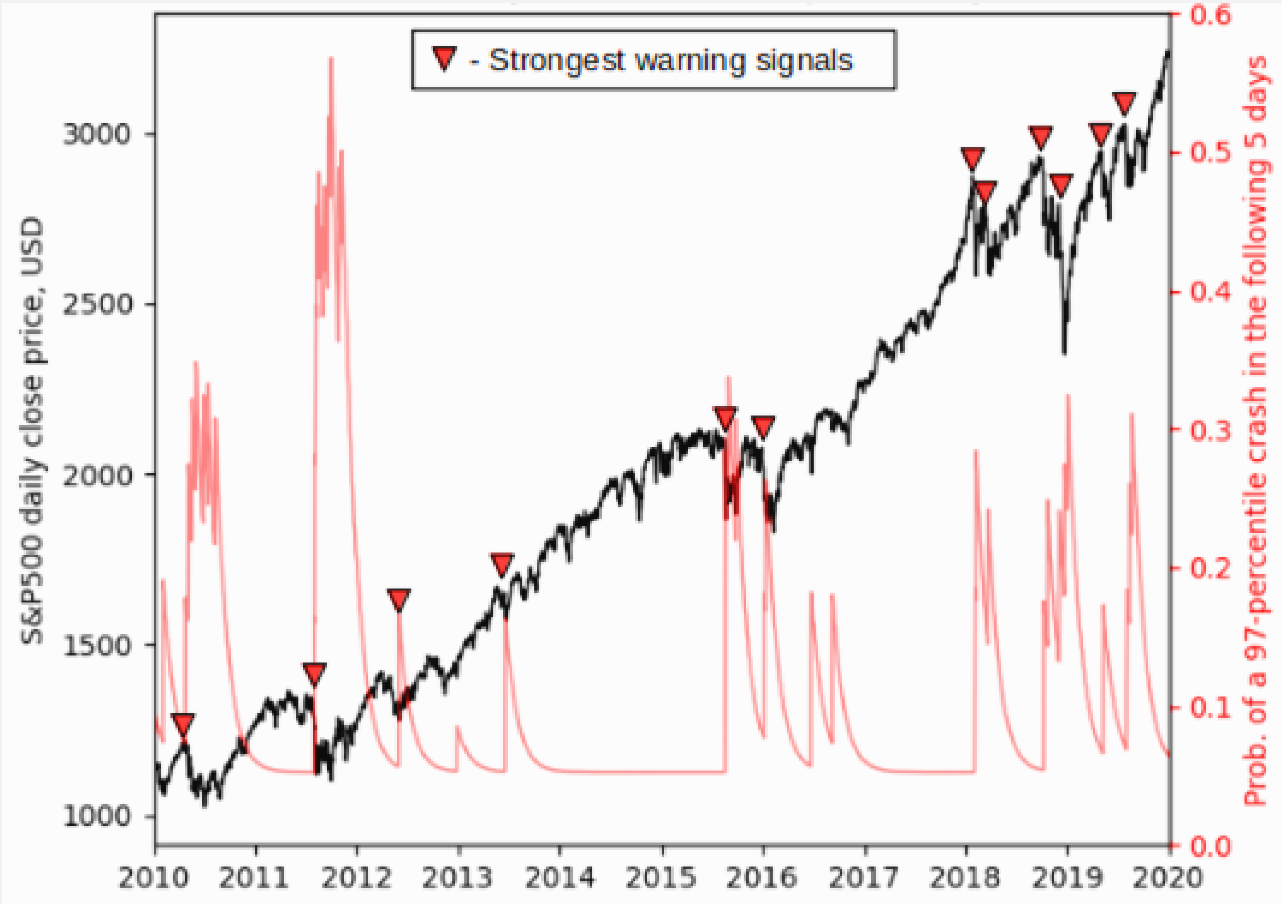
Capturing Medium-Scale Market Dips. This is a complexity-based indicator, defining the probability of a 10-15% decline in the next 15 days.

The model exploits both an Hidden Markov Model and an Artificial Neural Network to issue warning signals on a daily basis.

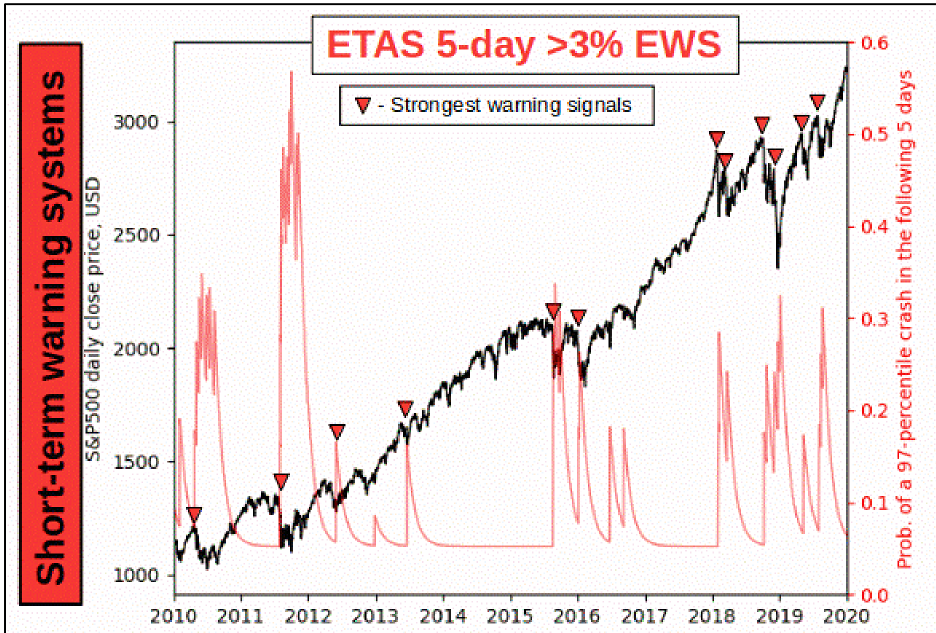


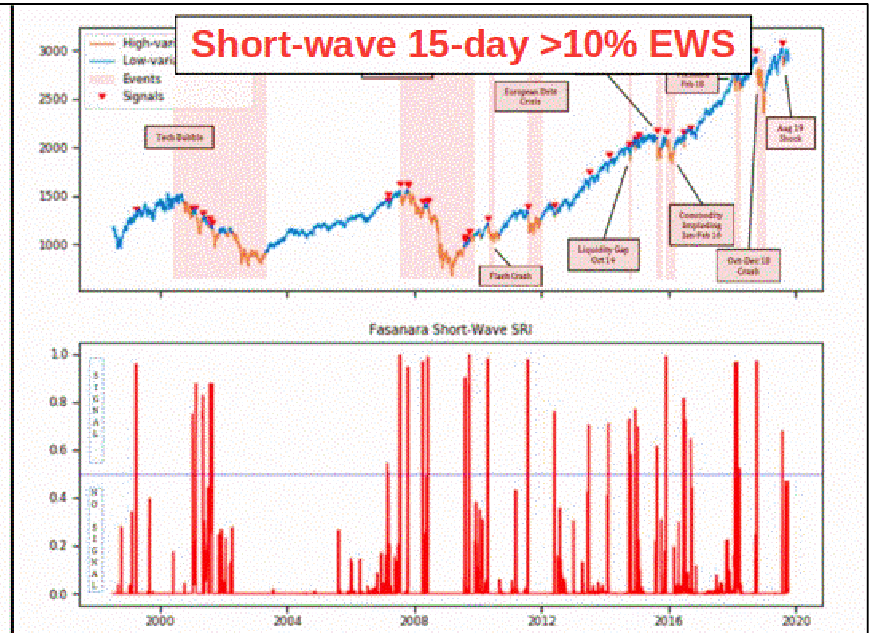
Capturing Small-Scale Market Dips. This is a complexity-based indicator, defining the probability of a 2-5% decline in the next 5 days.

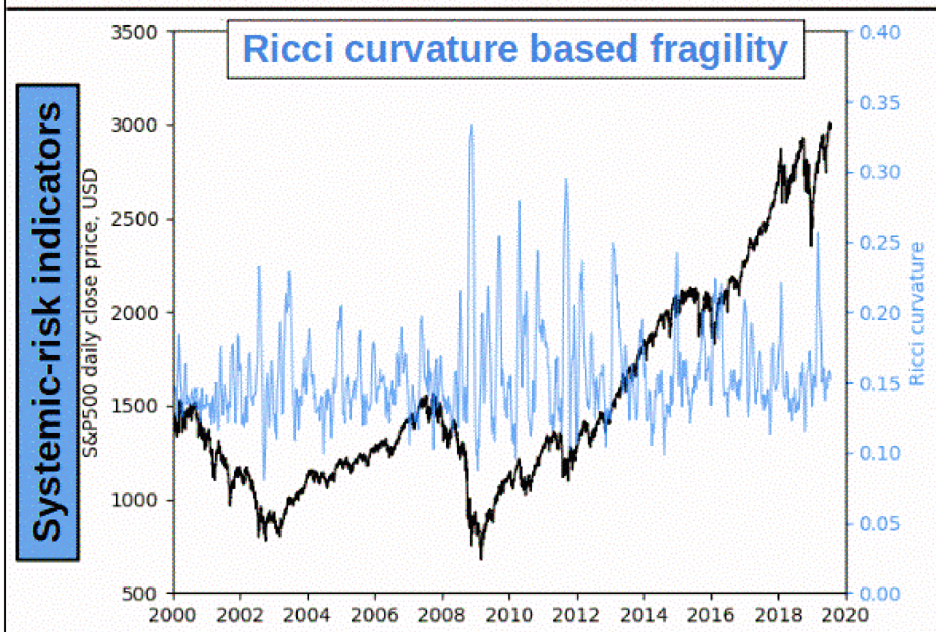
The indicator is derived from a family of models initially developed for earthquake predictions. It exploits the information contained in recent price movements compared to the entire distribution.

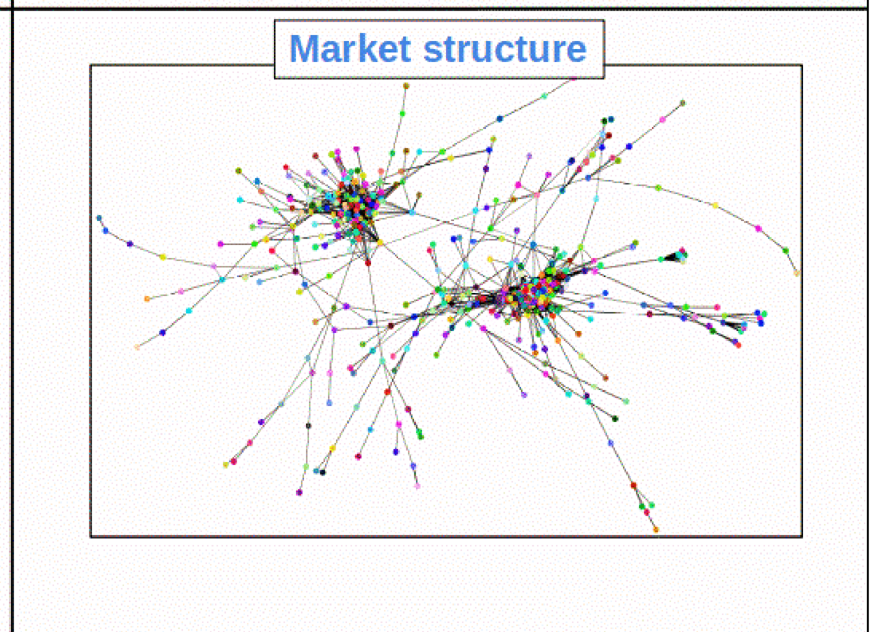


All In One: Systemic Risk Alerts Cockpit









Open Quant Ecosystem

Fasanara is a firm believer in open ecosystem and collaborative organizations, where we tie up the leading academic institutions and research groups to broaden our boundaries and establish superior understanding, better data and processing power.

OPEN ECOSYSTEM

Research

Our data driven research is based on rigorous mathematical techniques which seek to identify statistically significant and persistent patterns in the data.

Systematic Investing

Through the use of the latest advances in AI, machine learning, and operating with large datasets, we are constantly refining and enhancing predictive power of our investment strategies.

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Financial Technology and AI-Powered Credit Analytics

Digitalisation of how SMEs obtain credit against their corporate buyers has created an arbitrage opportunity. New technologies (Fintech) are allowing to access investment grade credit risk at SME-type interest rates, **thus creating a whole new investment opportunity. A new asset class is born and can be traded.**

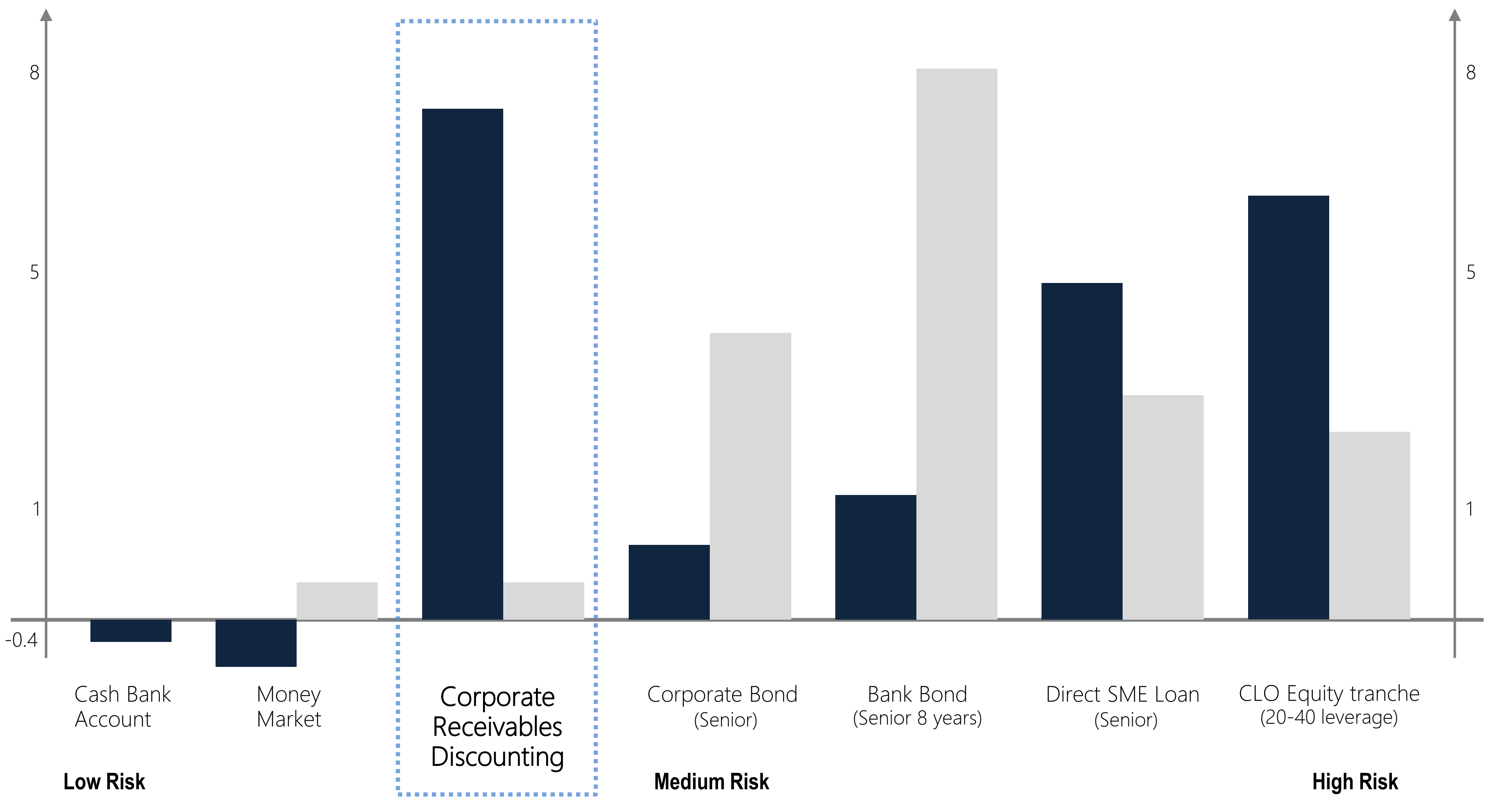
INVESTMENT GRADE CREDIT RISK + **SME FUNDING NEED** = **6%-8% ANNUAL YIELD**

CASE STUDY: easyJet

	EASYJET TRADE RECEIVABLE	EASYJET SENIOR BOND (ISIN: XS1505884723)
DEBTOR	EasyJet Plc	EasyJet Plc
CURRENCY	EUR	EUR
TENOR	45 days	6.5 years
MODIFIED DURATION	0 years	5.9 years
Δ PRICE IF INTEREST RATES ↑ 100bps	Unchanged	-6%
SENIORITY	Senior Unsecured (Commercial Credit)	Senior Unsecured
ANNUALIZED IMPLIED YIELD	8.7%	0.98%

Capital abundance in public debt markets has squeezed yields, leaving investors uncompensated for market/liquidity/duration premium.

Invoice & Trade Receivables Finance is a clear outlier



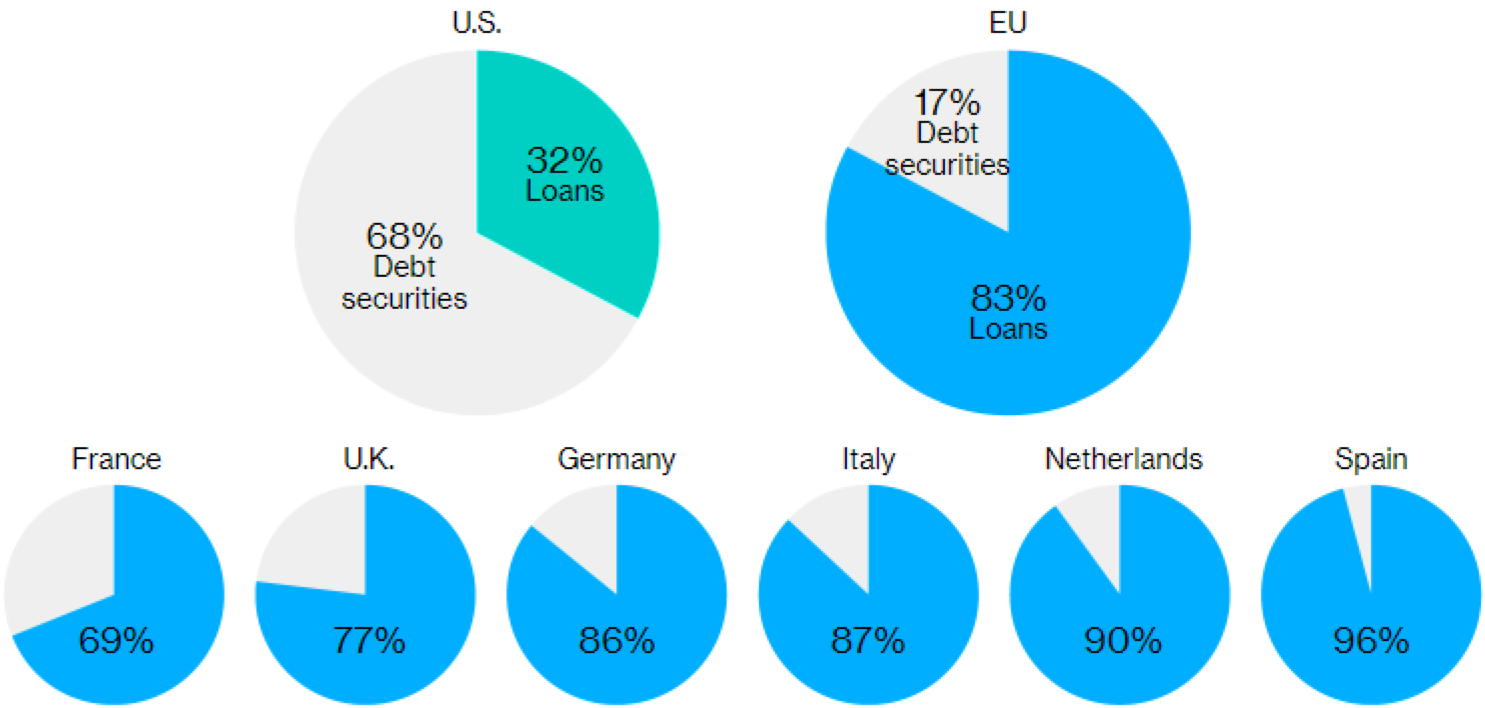
All instruments indicated in EUR

WHY SHOULD BORROWERS CARE ABOUT SME LENDING?

BANK ARE DEAD, BUT BANKING **IS NOT**

European Funding Market: Fragmented & Dislocated

European banks provide the lion's share of funding to the real economy.

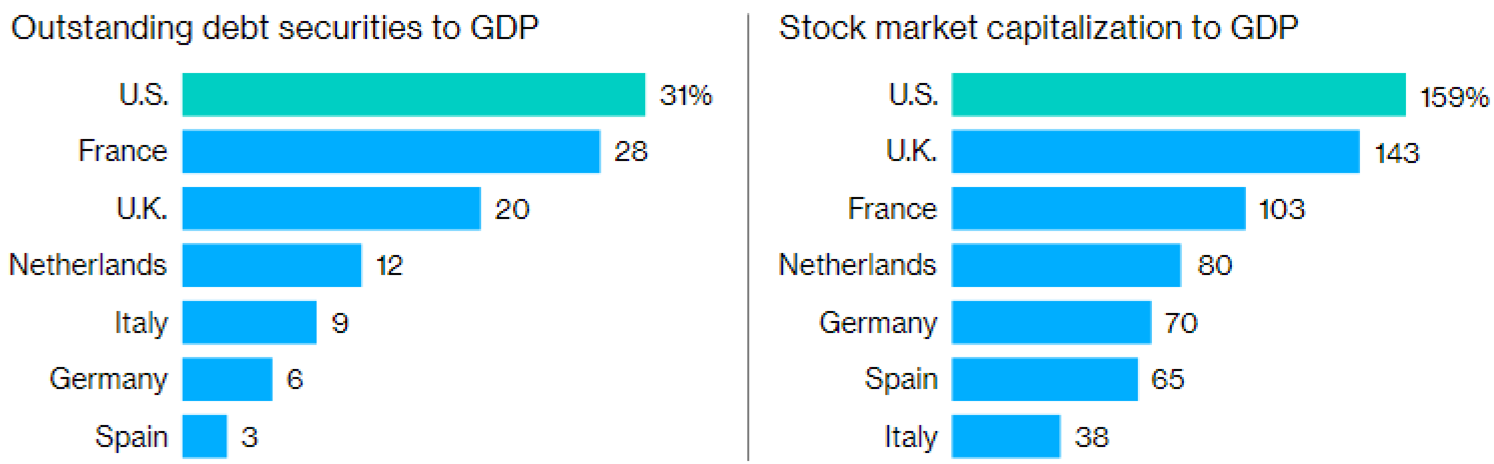


Sources: Eurostat, Federal Reserve

Capital Markets Size

"The lack of market-based financing in Europe is also evident in the size of national stock markets. The U.S. economy has a much larger pool of capital available that can be tapped by companies, while the EU's stock markets as a whole are smaller relative to the economy and vary greatly between countries. Corporate bonds also play varying roles within the bloc, and are dwarfed by the U.S. market."

©Bloomberg

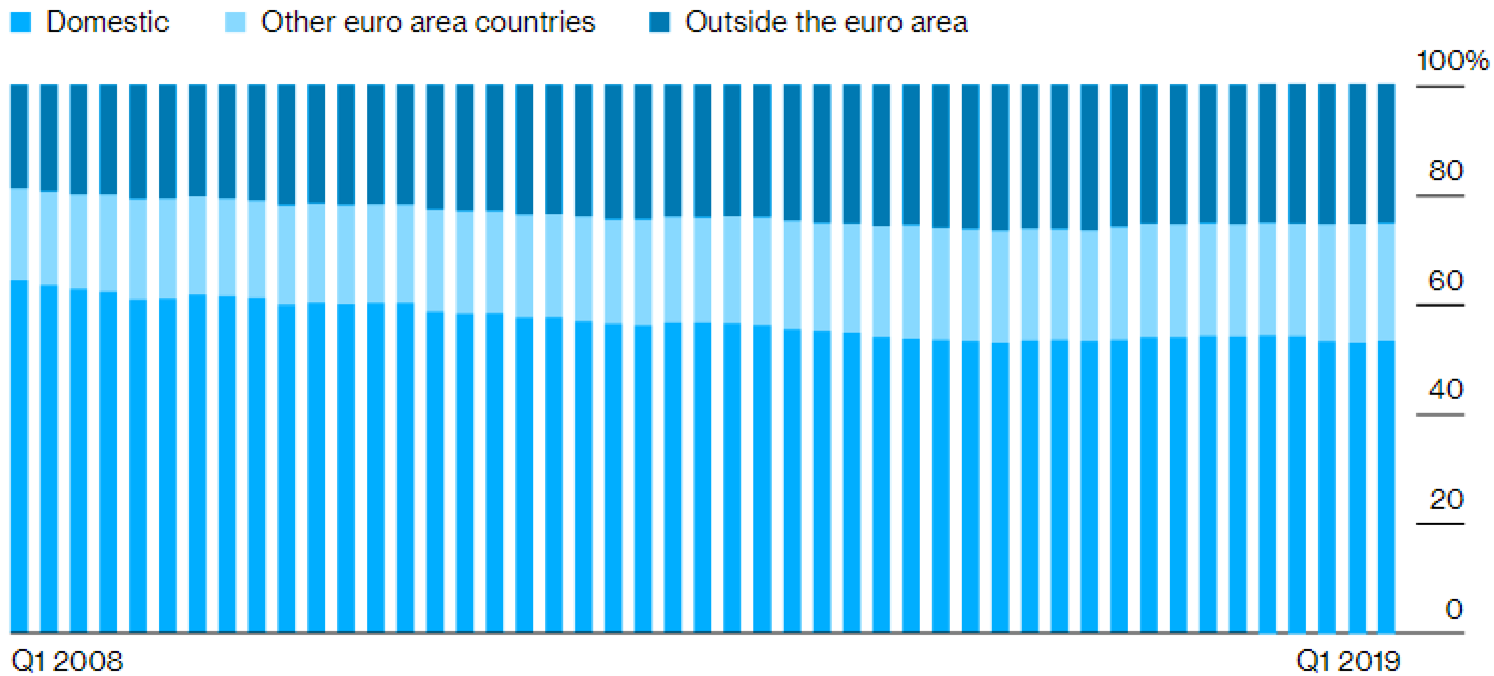


Sources: Bloomberg, BIS, World Bank

Home Bias

Fragmented capital markets remain in Europe

Euro area holdings of equity by geographical issuer counterparty



1.Source: ECB, Bloomberg

Bloated Balance Sheets

Because Europe's companies depend more on loans than market funding, bank balance sheets are larger than in the U.S., where lenders have the added advantage that they can offload mortgages to Fannie Mae and Freddie Mac, government-sponsored enterprises that repackage and sell them to investors. The returns European lenders earn on those assets are dwarfed by their U.S. competitors.

Economic Area	Total assets	Return on assets
European Economic Area	$33.6T	0.44
U.S.	17.9	1.33

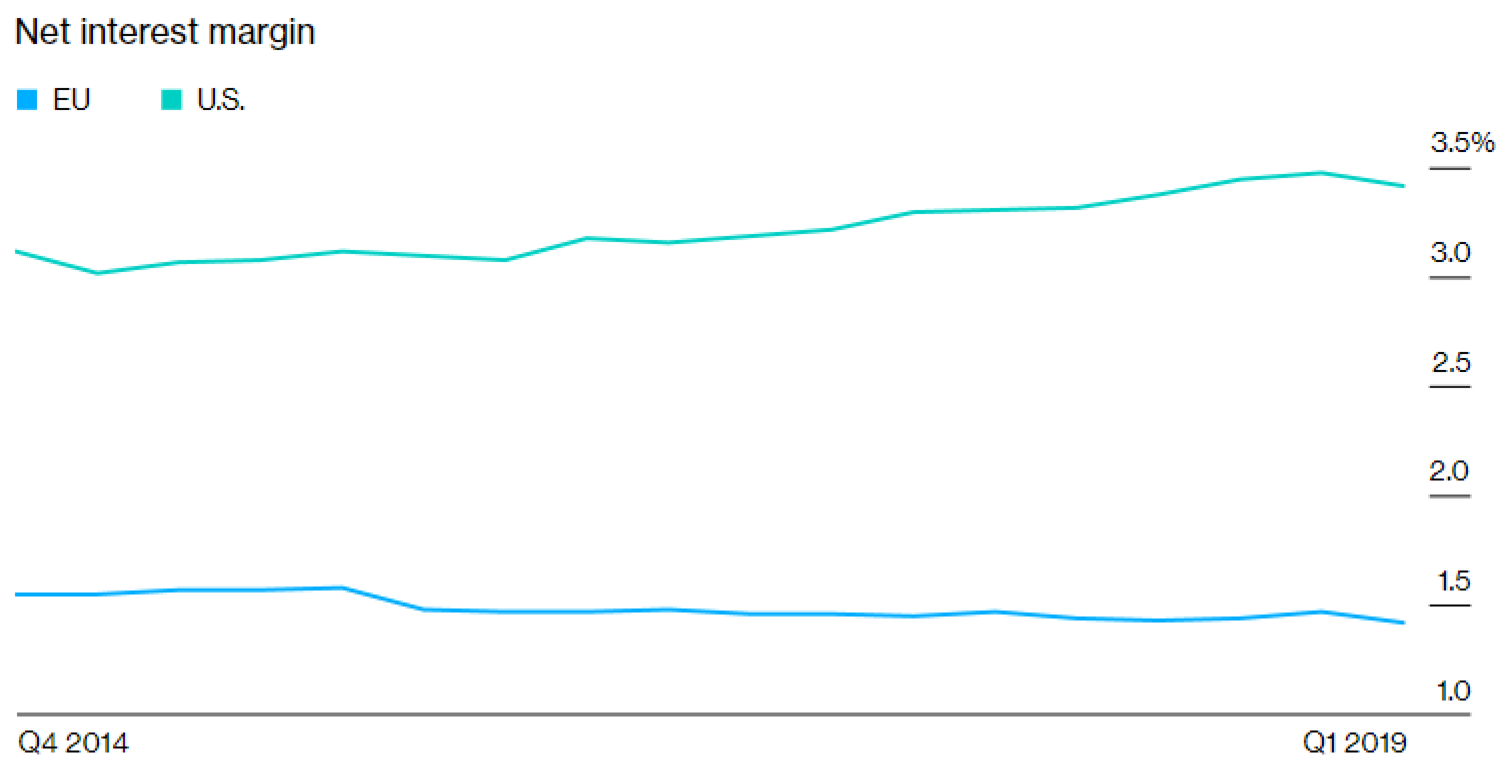
Note: Data for 4Q 2018
Sources: EBA Risk Dashboard, FDIC Quarterly Bank Data

1.Source: Bloomberg

Bank Income

The EU's beleaguered banking industry needs to diversify their income sources through fees.

Negative interest rates have put a strain on income from lending in the past years, and with the economy weakening again, that's not likely to change any time soon.



1.Source: FDIC, EBA

Digital Innovation in Lending

Can it be done at an
institutional level scale?

... Or is it just noise?

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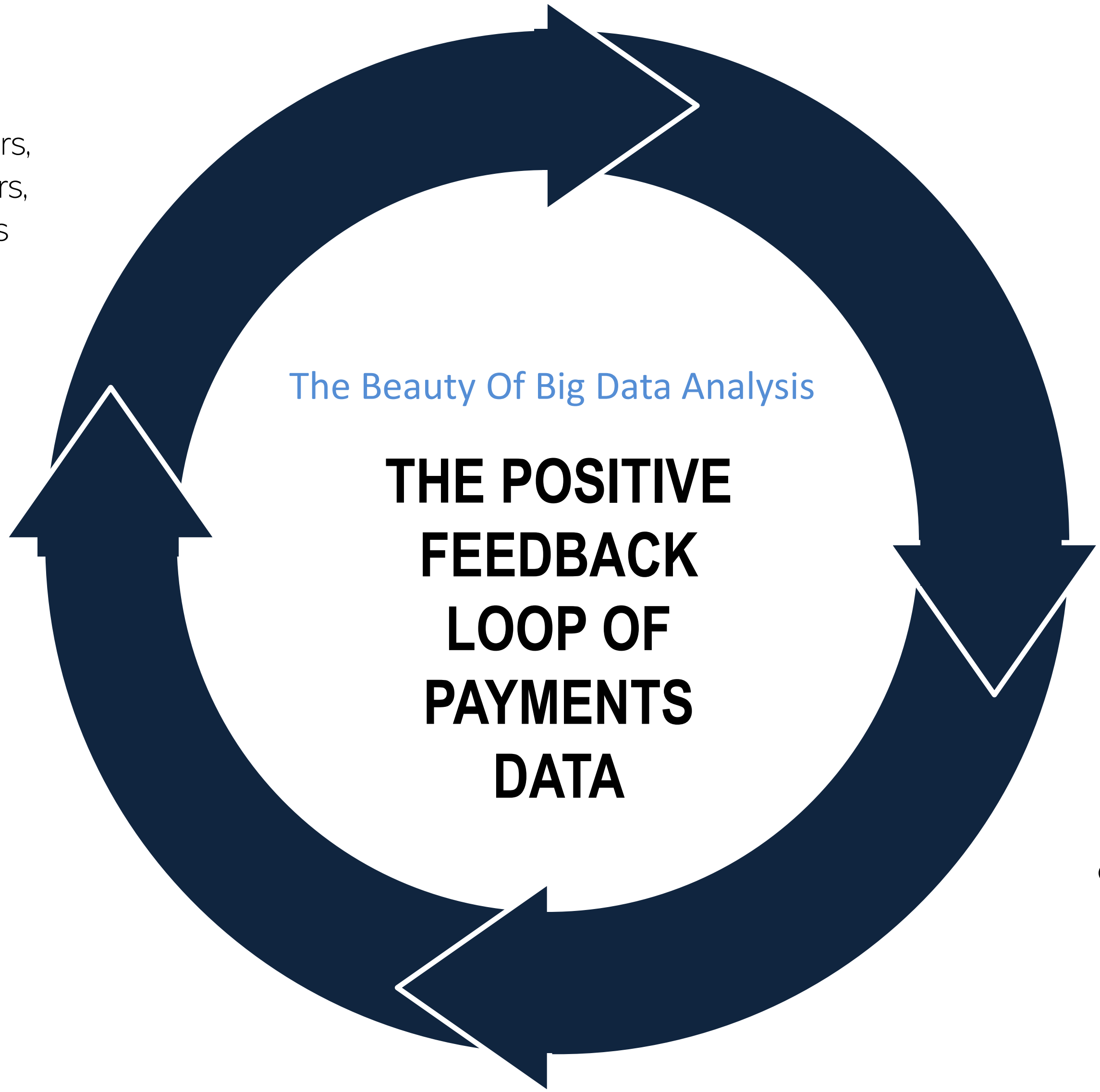
Adjustment Based On Payments History

More Volumes
as we trade over the years, across debtors and sellers, across countries, across business models

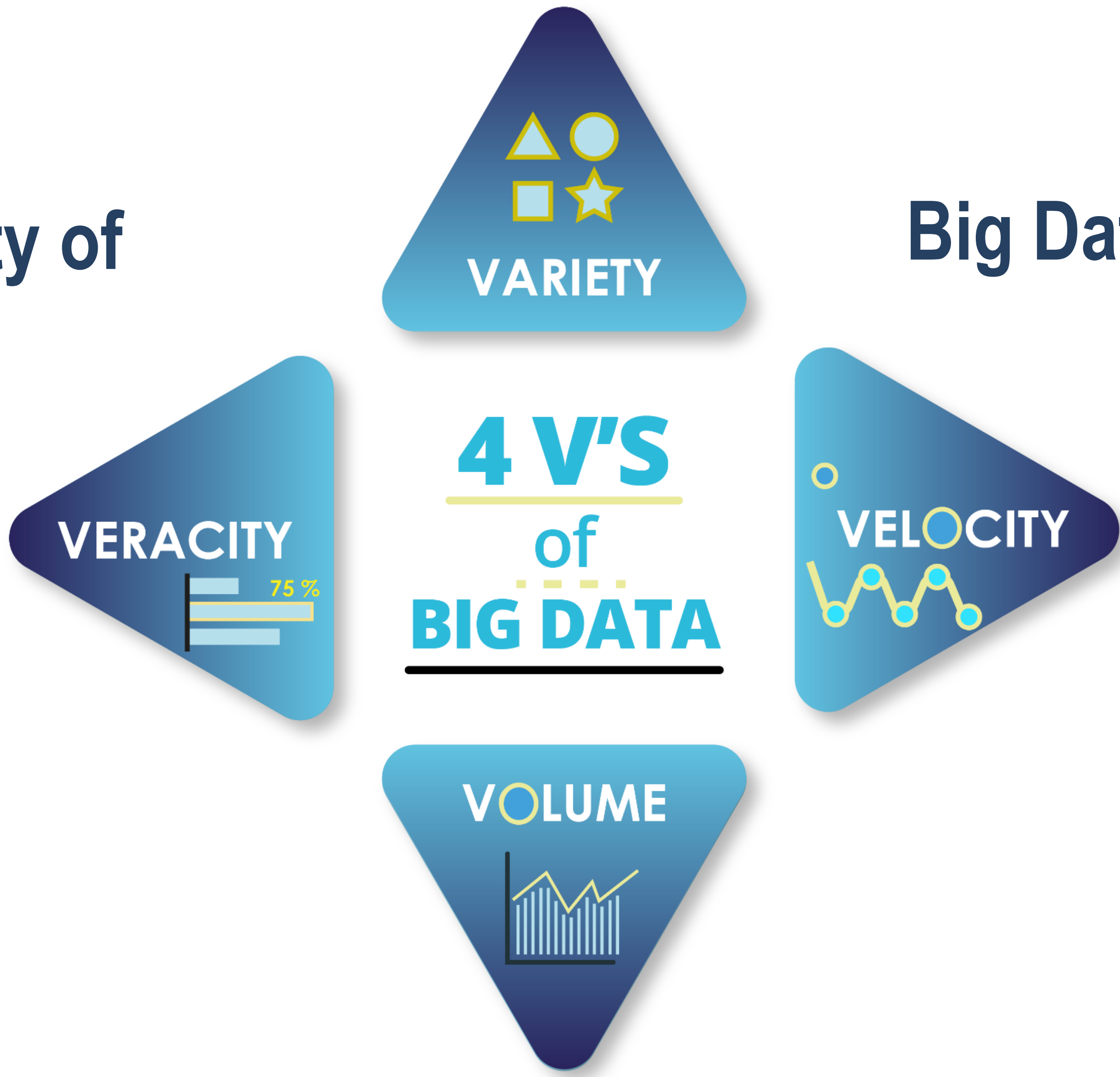
More Data
that we can train our Machine Learning credit models on, through Data Science



Better Decisions
as we can optimise our decision-making with better information

More Visibility
as we have better assessment of credit quality and how it evolves over time

The Beauty of Big Data Analysis



Source: University of Cambridge – Judge Business School

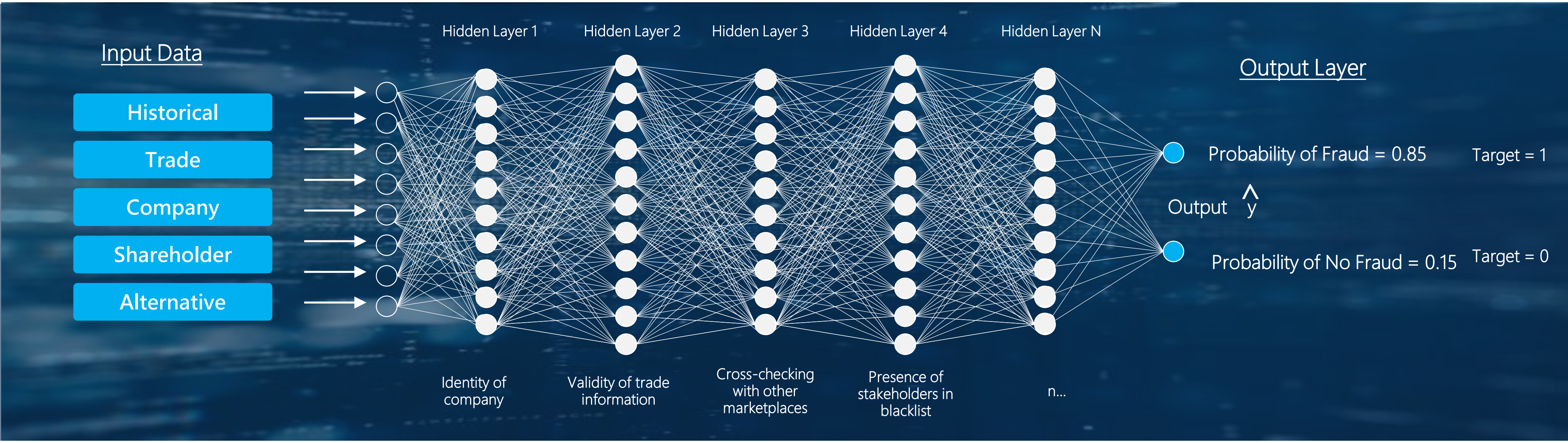
Fraud Detection, Credit Risk Models And Portfolio Optimization Algorithms

We source structured, unstructured and semi-structured data to feed our AI and Machine Learning algorithms in order to develop.

1. Fraud Detection
2. Credit Risk
3. Portfolio Optimization

Fasanara data science – Fraud Risk

Identify fraud risk and mitigate suspicious investments coming from companies and their network, using neural networks



Fasanara data science – Credit Risk

Assessment of credit risk on a standardized process across originators, geographies, and asset classes

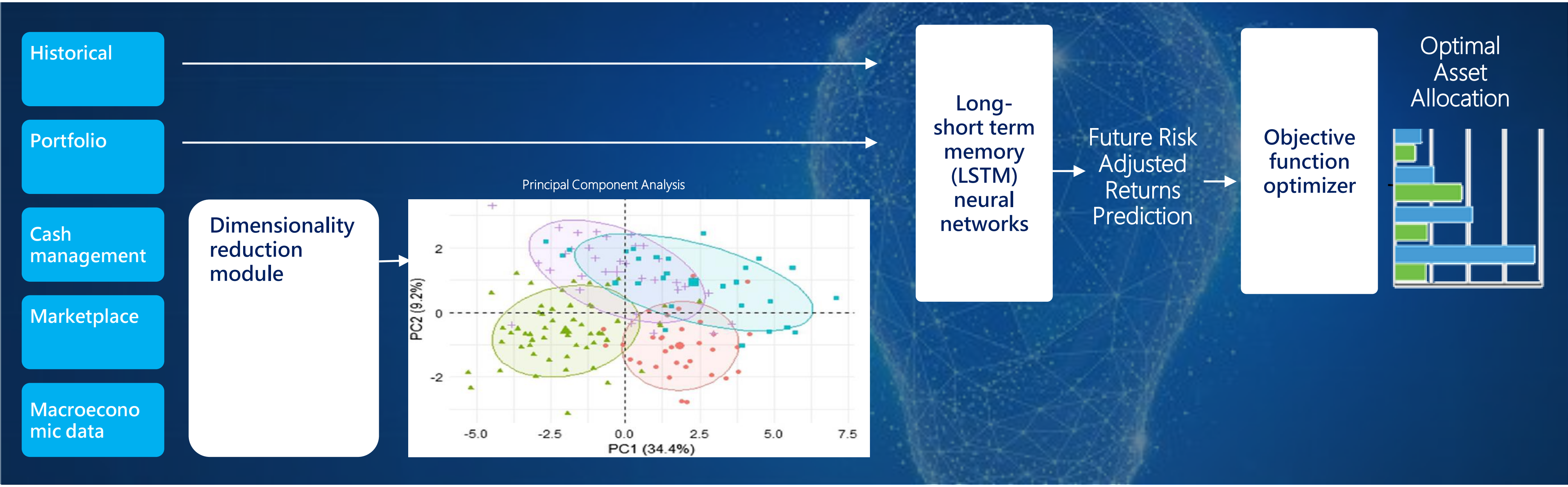
Network structure for all institutions

Only Connected Borrowers

The estimated factor network structure of all borrowers (15045 companies, default rate = 4.2%)

The estimated factor network structure for the connected borrowers (4305 companies, default rate = 11.22%)

Definition of the best set of actions given certain constrains on a given portfolio and in case of new allocations



The 2020s will bring huge uncertainties for public assets, after a decade of unprecedented monetary printing created the largest bubble in modern financial markets.
Despite that fragile environment, Fasanara sees large opportunities in select, uncorrelated, niche private markets.

A FEW SECULAR TRENDS WILL AFFECT MARKETS IN THE NEXT DECADE:

1 European banks keep withdrawing from the market, depriving debt availability from SMEs, opening the opportunity up to private lenders.

2 Institutional Investors will increasingly seek to replace yield in a dramatic low interest rates environments, driving the demand side for private credit.

3 New technologies have reshaped the future of credit, ranging from AI/Machine Learning to Big Data and Fintech, thus allowing to build highly diversified granular portfolios, with an ultra-short duration, at high single-digits yield, despite a strong public long-term credit rating (currently at AA, with a stable outlook).

4 The family of Fasanara Capital's private debt strategies aims at tackling macro uncertainties and tail risks in public assets, by proving an alternative place for capital, away and uncorrelated from twin bubbles in public equities and bonds worldwide.

FASANARA CAPITAL

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