PICTET
1805

Asset Allocation…

… in a distorted environment

Andrea Delitala, Maria Luisa Magli
Head of Investment Advisory
Milan, 29 October 2015

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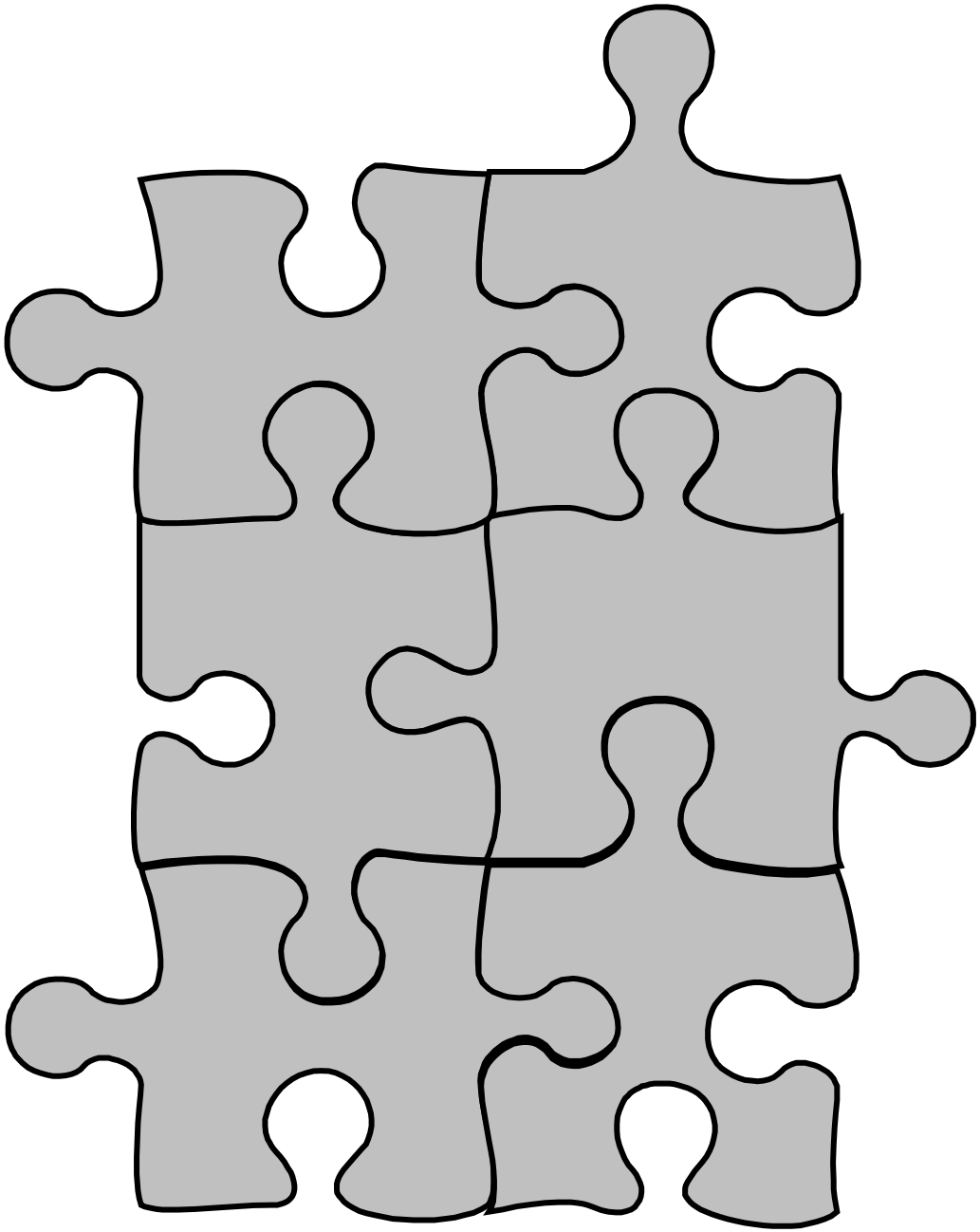

Asset Allocation…

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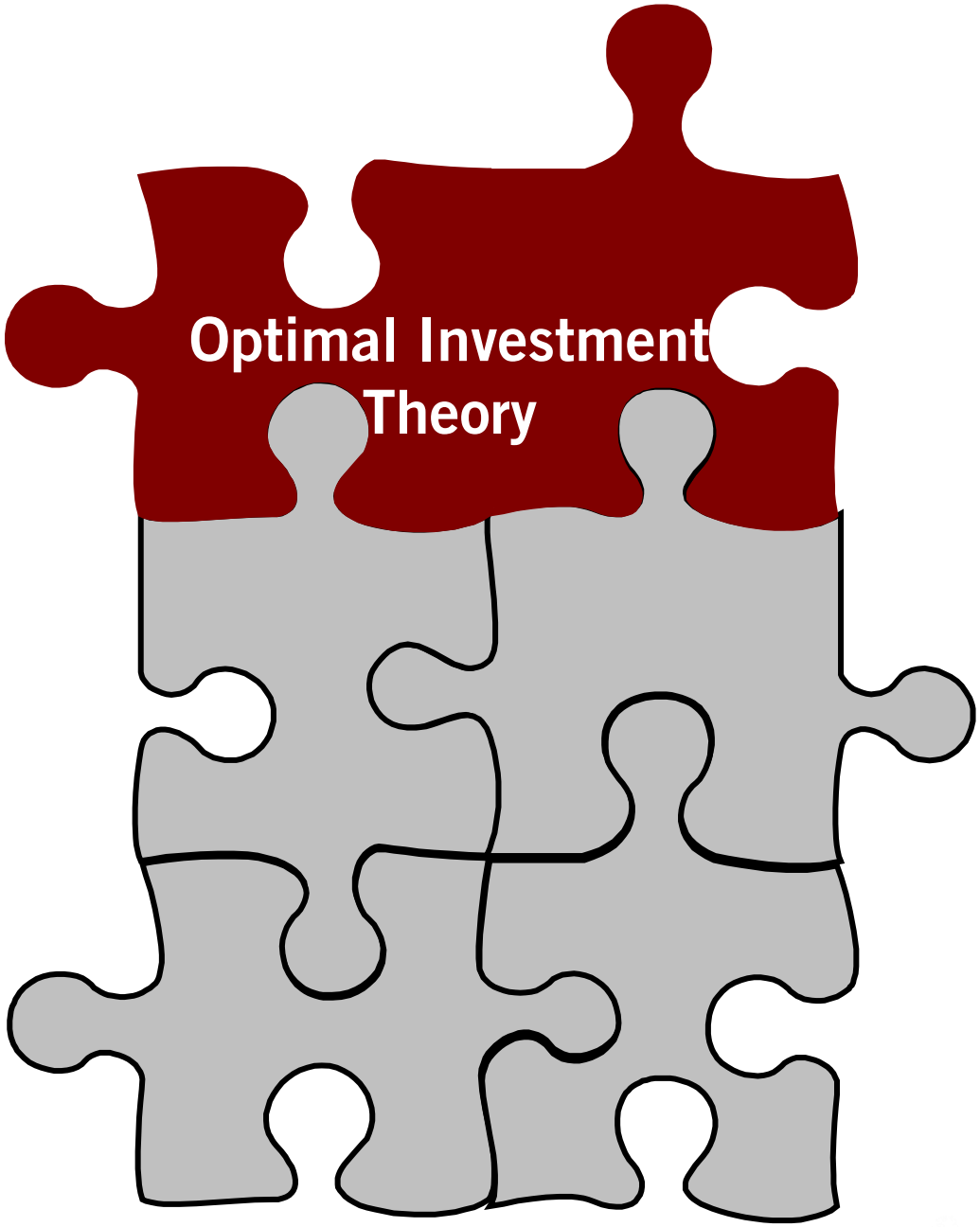
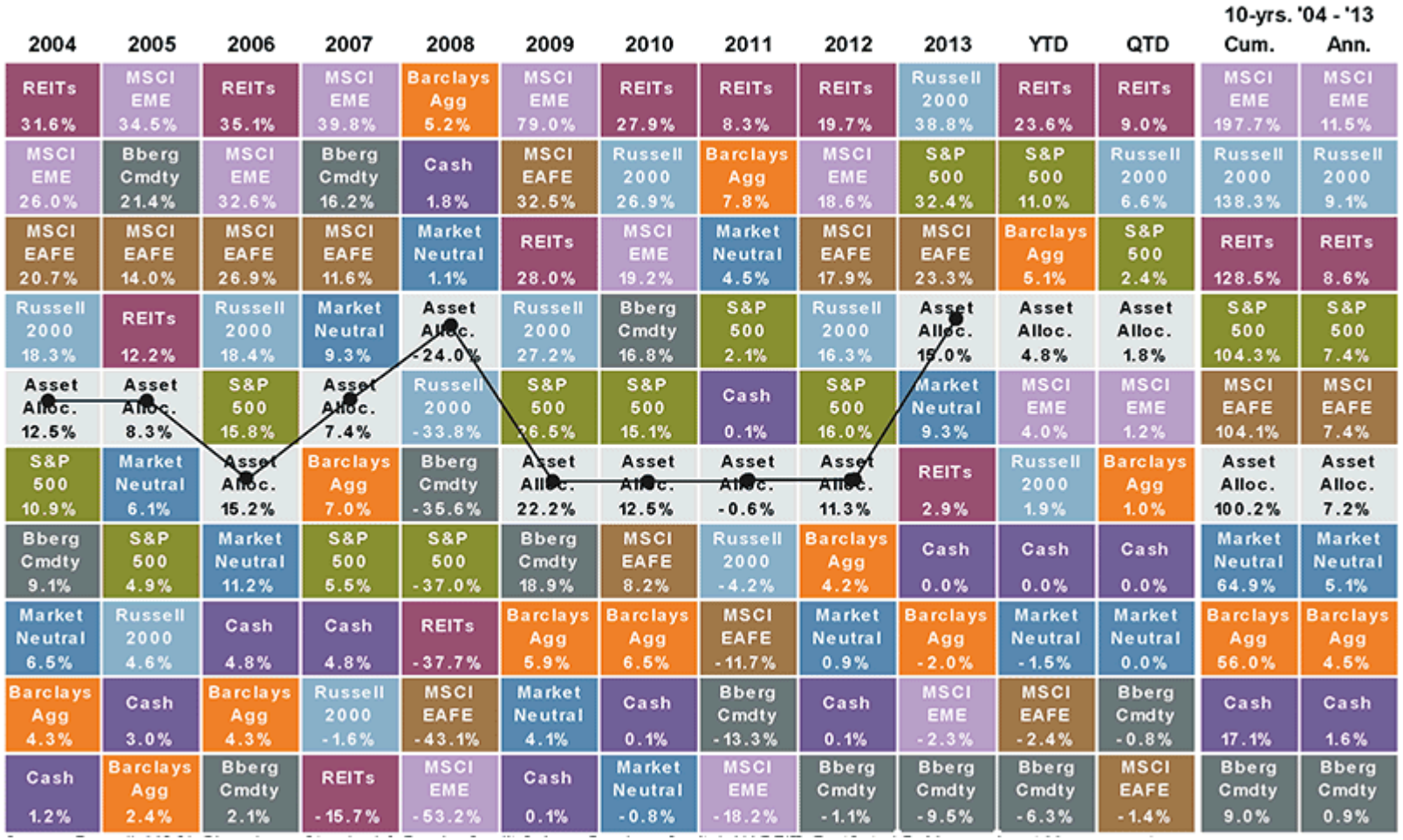


Uncertainty about assets' Total Return higher in the short run

Nearly every year the performance ranking of financial investments differs from that of the previous period.

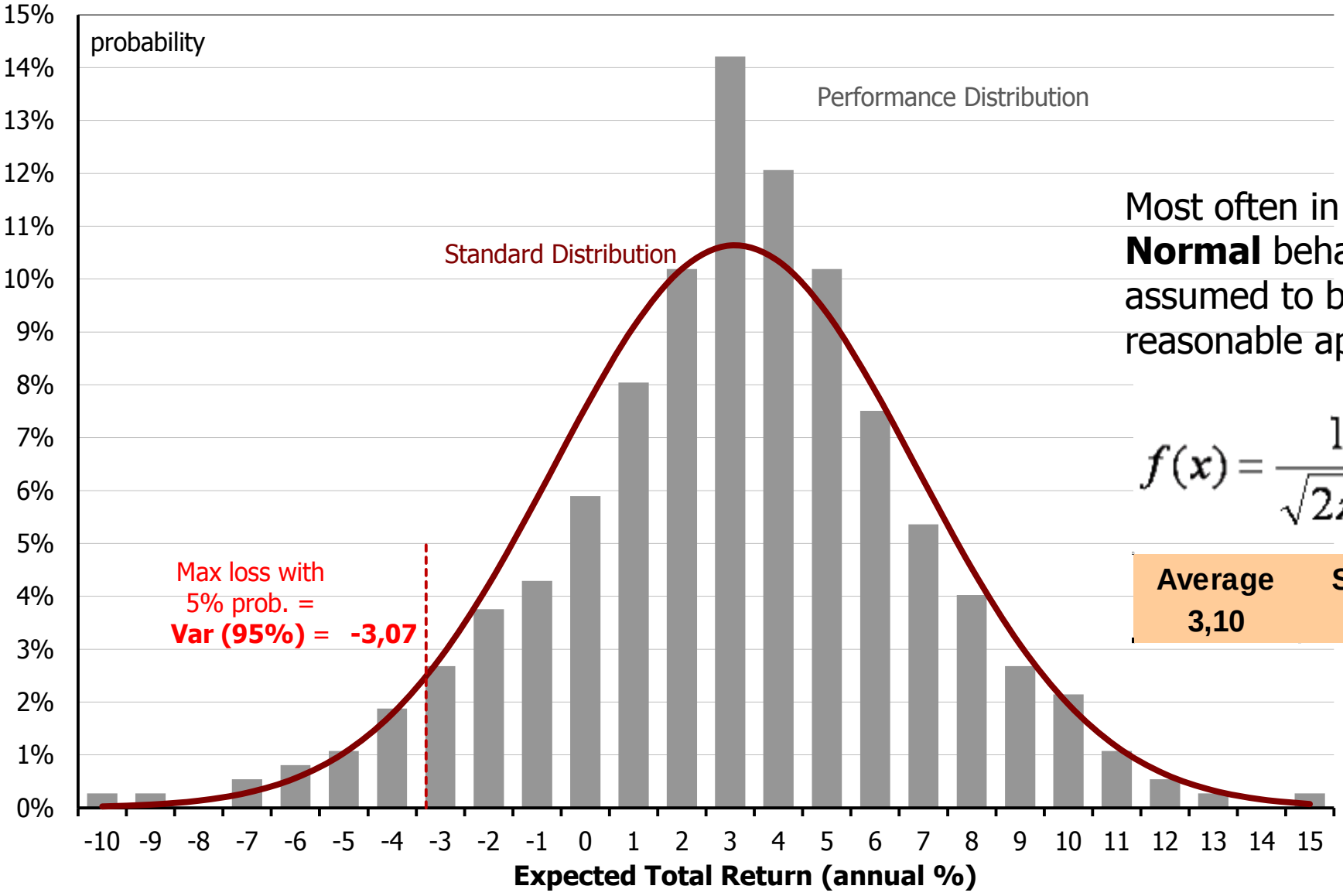


2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	YTD	QTD	10-yrs. '04 - '13 Cum.	10-yrs. '04 - '13 Ann.
REITs 31.6%	MSCI EME 34.5%	REITs 35.1%	MSCI EME 39.8%	Barclays Agg 5.2%	MSCI EME 79.0%	REITs 27.9%	REITs 8.3%	REITs 19.7%	Russell 2000 38.8%	REITs 23.6%	REITs 9.0%	MSCI EME 197.7%	MSCI EME 11.5%
MSCI EME 26.0%	Bberg Cmdty 21.4%	MSCI EME 32.6%	Bberg Cmdty 16.2%	Cash 1.8%	MSCI EAFE 32.5%	Russell 2000 26.9%	Barclays Agg 7.8%	MSCI EME 18.6%	S&P 500 32.4%	S&P 500 11.0%	Russell 2000 6.6%	Russell 2000 138.3%	Russell 2000 9.1%
MSCI EAFE 20.7%	MSCI EAFE 14.0%	MSCI EAFE 26.9%	MSCI EAFE 11.6%	Market Neutral 1.1%	REITs 28.0%	MSCI EME 19.2%	Market Neutral 4.5%	MSCI EAFE 17.9%	MSCI EAFE 23.3%	Barclays Agg 5.1%	S&P 500 2.4%	REITs 128.5%	REITs 8.6%
Russell 2000 18.3%	REITs 12.2%	Russell 2000 18.4%	Market Neutral 9.3%	Asset Alloc. -24.0%	Russell 2000 27.2%	Bberg Cmdty 16.8%	S&P 500 2.1%	Russell 2000 16.3%	Asset Alloc. 15.0%	Asset Alloc. 4.8%	Asset Alloc. 1.8%	S&P 500 104.3%	S&P 500 7.4%
Asset Alloc. 12.5%	Asset Alloc. 8.3%	S&P 500 15.8%	Asset Alloc. 7.4%	Russell 2000 -33.8%	S&P 500 26.5%	S&P 500 15.1%	Cash 0.1%	S&P 500 16.0%	Market Neutral 9.3%	MSCI EME 4.0%	MSCI EME 1.2%	MSCI EAFE 104.1%	MSCI EAFE 7.4%
S&P 500 10.9%	Market Neutral 6.1%	Asset Alloc. 15.2%	Barclays Agg 7.0%	Bberg Cmdty -35.6%	Asset Alloc. 22.2%	Asset Alloc. 12.5%	Asset Alloc. -0.6%	Asset Alloc. 11.3%	REITs 2.9%	Russell 2000 1.9%	Barclays Agg 1.0%	Asset Alloc. 100.2%	Asset Alloc. 7.2%
Bberg Cmdty 9.1%	S&P 500 4.9%	Market Neutral 11.2%	S&P 500 5.5%	S&P 500 -37.0%	Bberg Cmdty 18.9%	MSCI EAFE 8.2%	Russell 2000 -4.2%	Barclays Agg 4.2%	Cash 0.0%	Cash 0.0%	Cash 0.0%	Market Neutral 64.9%	Market Neutral 5.1%
Market Neutral 6.5%	Russell 2000 4.6%	Cash 4.8%	Cash 4.8%	REITs -37.7%	Barclays Agg 5.9%	Barclays Agg 6.5%	MSCI EAFE -11.7%	Market Neutral 0.9%	Barclays Agg -2.0%	Market Neutral -1.5%	Market Neutral 0.0%	Barclays Agg 56.0%	Barclays Agg 4.5%
Barclays Agg 4.3%	Cash 3.0%	Barclays Agg 4.3%	Russell 2000 -1.6%	MSCI EAFE -43.1%	Market Neutral 4.1%	Cash 0.1%	Bberg Cmdty -13.3%	Cash 0.1%	MSCI EME -2.3%	MSCI EAFE -2.4%	Bberg Cmdty -0.8%	Cash 17.1%	Cash 1.6%
Cash 1.2%	Barclays Agg 2.4%	Bberg Cmdty 2.1%	REITs -15.7%	MSCI EME -53.2%	Cash 0.1%	Market Neutral -0.8%	MSCI EME -18.2%	Bberg Cmdty -1.1%	Bberg Cmdty -9.5%	Bberg Cmdty -6.3%	MSCI EAFE -1.4%	Bberg Cmdty 9.0%	Bberg Cmdty 0.9%

Source: Pictet

Basic ingredients of an Asset Allocator: Risky stuff!

Financial assets differ in structure, and their negotiated price vary accordingly



Most often in Finance **Normal** behavior is assumed to be a reasonable approximation

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

Average	Stdev
3,10	3,75

Source: Pictet

Value at Risk

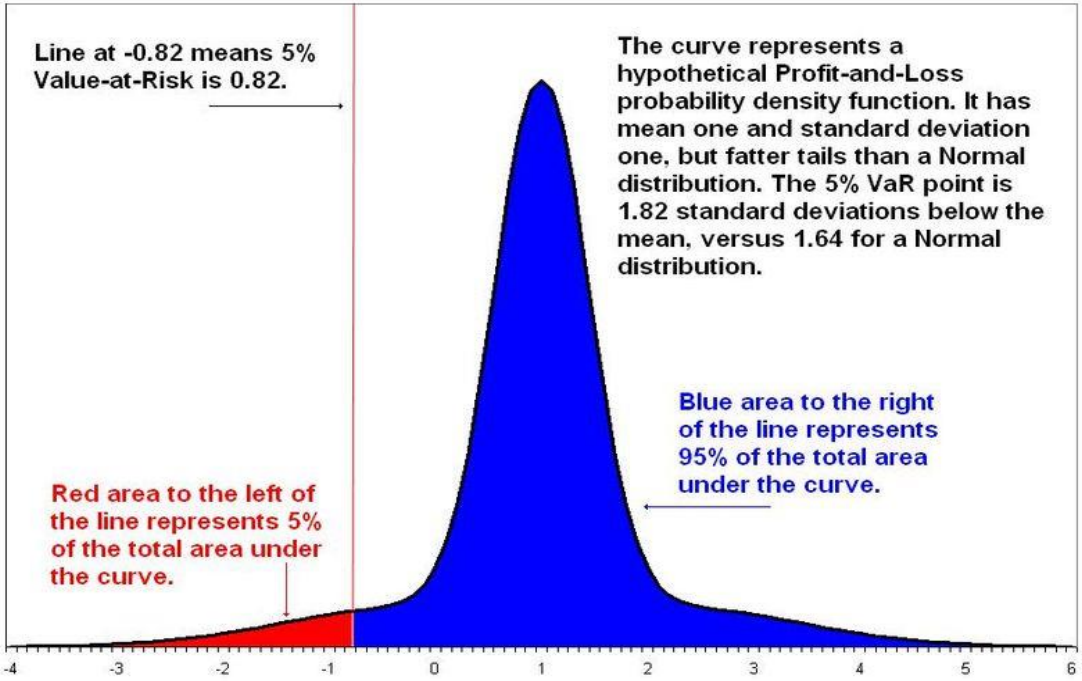
Definition of VAR

Value at Risk (VaR) is a widely used risk measure of the risk loss on a specific portfolio of financial assets. For a given portfolio, probability and time horizon, VaR is defined as a threshold value such that the probability that the mark-to-market loss on the portfolio over the given time horizon exceeds this value (assuming normal markets and no trading in the portfolio) is the given probability level.

$$(VAR_{1-\alpha}): \Pr(x \leq VAR_{1-\alpha}) = 1 - \alpha$$

where α has to be between 0 and 1

- VaR is a predictive (ex-ante) tool used to prevent portfolio managers from exceeding risk tolerances that have been developed in the portfolio policies
- Common parameters for VaR are 1% and 5% probabilities and one day and two week horizons, although other combinations can be used
- If the Return Distribution is assumed to be Normal, then the VAR is 'Parametric'



Source: "Value-at-Risk: An Overview of Analytical VaR", (Romain Berry, JP Morgan Investment Analytics and Consulting); Wikipedia

Total Return of Bonds

The **Net Present Value** of a Bond is represented by the following equation:

$$Pb = \left(\frac{C}{1+i} + \frac{C}{(1+i)^2} + \cdots + \frac{C}{(1+i)^N}\right) + \frac{M}{(1+i)^N} = \left(\sum_{n=1}^{N} \frac{C}{(1+i)^n}\right) + \frac{M}{(1+i)^N}$$

$$= C\left(\frac{1-(1+i)^{-N}}{i}\right) + M(1+i)^{-N}$$

where:

In case there is no maturity the bond becomes 'irredeemable'.
In such case M=0, N=∞, hence **i = C/Pb**

F = face value
i_F = contractual interest rate
C = F * i_F = coupon payment (periodic interest payment)
N = number of payments
i = Yield to Maturity
M = value at maturity, usually equals face value
Pb = market price of the bond

We'll generally refer to **Expected Total Return** of Bonds as to its **Yield to Maturity (YTM).** In reality this is only true at maturity provided there was no default, debt restructuring or other credit events. During its life the price of a bond may of course move away from that consistent with the YTM at issue, e.g. if market interest rates change. Resulting capital gain (or losses) will add to the current yield and add uncertainty to bond prices on a short term horizon.

Source: Pictet

Total Return of Equities

The **dividend discount model** (DDM) is a way of valuing a company based on the theory that a stock is worth the discounted sum of all of its future dividend payments. It is used to value stocks based on the net present value of the future dividends. The equation most widely used is called the **Gordon growth model**

$$Pe = \frac{D_1}{r - g}$$

where P is the current stock price, g is the constant growth rate in perpetuity expected for the dividends, r is the constant cost of equity for that company and D_1 is the value of the next year's dividend.

Derivation of the Equation

$$Pe = \sum_{t=1}^{\infty} D_0 \times \frac{(1+g)^t}{(1+r)^t}$$

$$Pe = D_0 \times \frac{(1+g)}{(1+r)} \times \frac{(1+r)}{(r-g)}$$

$$Pe = \frac{D_1}{r - g}$$

In the following slides we refer to the **Expected Total Return** of an Equity Share as to the **reciprocal** of its **Price Earnings Ratio: E/Pe** i.e. the **Earning Yield.**

So, our simple notion of Equity Return **i_e = E/Pe**

Some properties:

1) When the growth g is zero, then the dividend is capitalized
2) The equation can also be used to estimate the cost of capital, by solving for $r = D_1/Pe + g$

Source: Pictet

Model portfolio theory: some definitions

Modern portfolio theory (**MPT**) is a theory of finance that attempts to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of expected return, by carefully choosing the proportions of various assets.

Efficient frontier (with no risk-free asset): a combination of assets, i.e. a portfolio, is referred to as "efficient" if it has the best possible expected level of return for a given level of risk. Every possible combination of risky assets, without including any holdings of the risk-free rate asset, can be plotted in **risk** & **expected return** space. The efficient frontier is then the portion of the opportunity set that offers the highest expected return for a given level of risk. It is also the boundary for the set of feasible portfolios (slide 12).

Efficient frontier (with risk-free asset): When a risk-free asset is introduced, the half-line shown in the figure is the new efficient frontier. It is tangent to the efficient frontier at the efficient portfolio with the highest Sharpe Ratio. Its intercept represents a portfolio with 100% of holdings in the risk-free asset; the tangency with the efficient frontier represents a portfolio with no risk-free holdings and 100% of risky assets: equities and bonds; intermediate points between these two are portfolios containing positive amounts of both the risky tangency portfolio and the risk-free asset; and points on the half-line beyond the tangency point are leveraged portfolios involving negative holdings of the risk-free asset (slide 14)

Source: Pictet

Different portfolios optimization methodologies

Definition of 'Sharpe Ratio'

A ratio developed by Nobel laureate **William F. Sharpe** to measure **risk-adjusted performance.** The Sharpe ratio is calculated by subtracting the risk-free rate - from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns. The Sharpe ratio formula is:

$$S = \frac{E(R_a - R_b)}{\sigma} = \frac{E(R_a - R_b)}{\sqrt{var(R_a - R_b)}}$$

where R_a is the asset return, R_b is the return on a benchmark asset, such as the risk free rate of return or an index such as the S&P 500. $E[R_a - R_b]$ is the expected value of the excess of the asset return over the benchmark return, and σ is the standard deviation of this expected excess return. This is often confused with the information ratio, in part because the newer definition of the Sharpe ratio matches the definition of information ratio within the field of finance.

Max Sharpe Ratio portfolio

The max Sharpe Ratio portfolio is the portfolio on the efficient frontier that maximizes the Sharpe Ratio (slide 13)

Minimum Variance portfolio

The minimum Variance portfolio is the portfolio on the efficient frontier with the lower level of risk (slide 12)

Constrained portfolio:

With the terms “constrained portfolio”, we will refer to the portfolio on the efficient frontier with a given volatility (e.g. 5% in slide 17)

Source: Investopedia

The Efficient frontier in maths

For a two assets portfolio:

- Expected Return:

$$E(R_p) = w_1 E(R_1) + (1 - w_1)(R_2)$$

- Volatility:

$$\sigma_{P=} = \sqrt{w_1^2\sigma_1^2 + (1 - w_1)^2\sigma_2^2 + 2w_1(1 - w_1)\sigma_1\sigma_2 Corr(x_1; x_2)}$$

Generalizing, for a n-assets portfolio:

- Expected Return:

$$E(R_p) = \sum_{i=1}^{n} w_i E(R_i)$$

- Volatility:

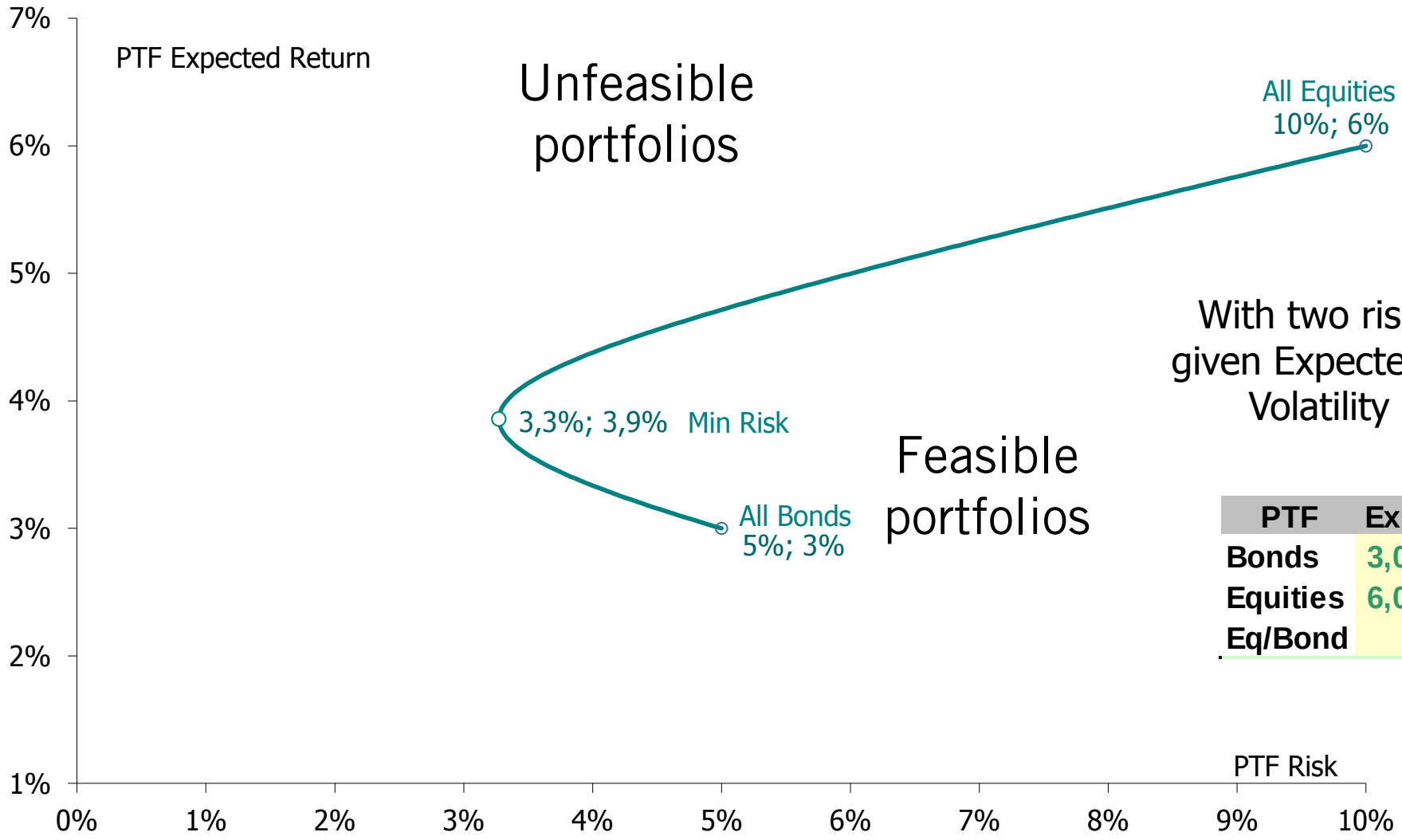
$$\sigma_{P=} = \sqrt{\sum_{i=1}^{n} w_i^2\sigma_i^2 + \sum_{i=1}^{n}\sum_{j\neq i=1}^{n} w_i w_j \sigma_i \sigma_j Corr(x_i; x_j)}$$

where:
R is the asset return
w is asset weight
σ_i^2 is the variance of asset *i*

Source: Pictet

The Efficient Frontier

Best combination of Expected Total Return (TR) and Volatility (Risk) of Portfolios (PTF)



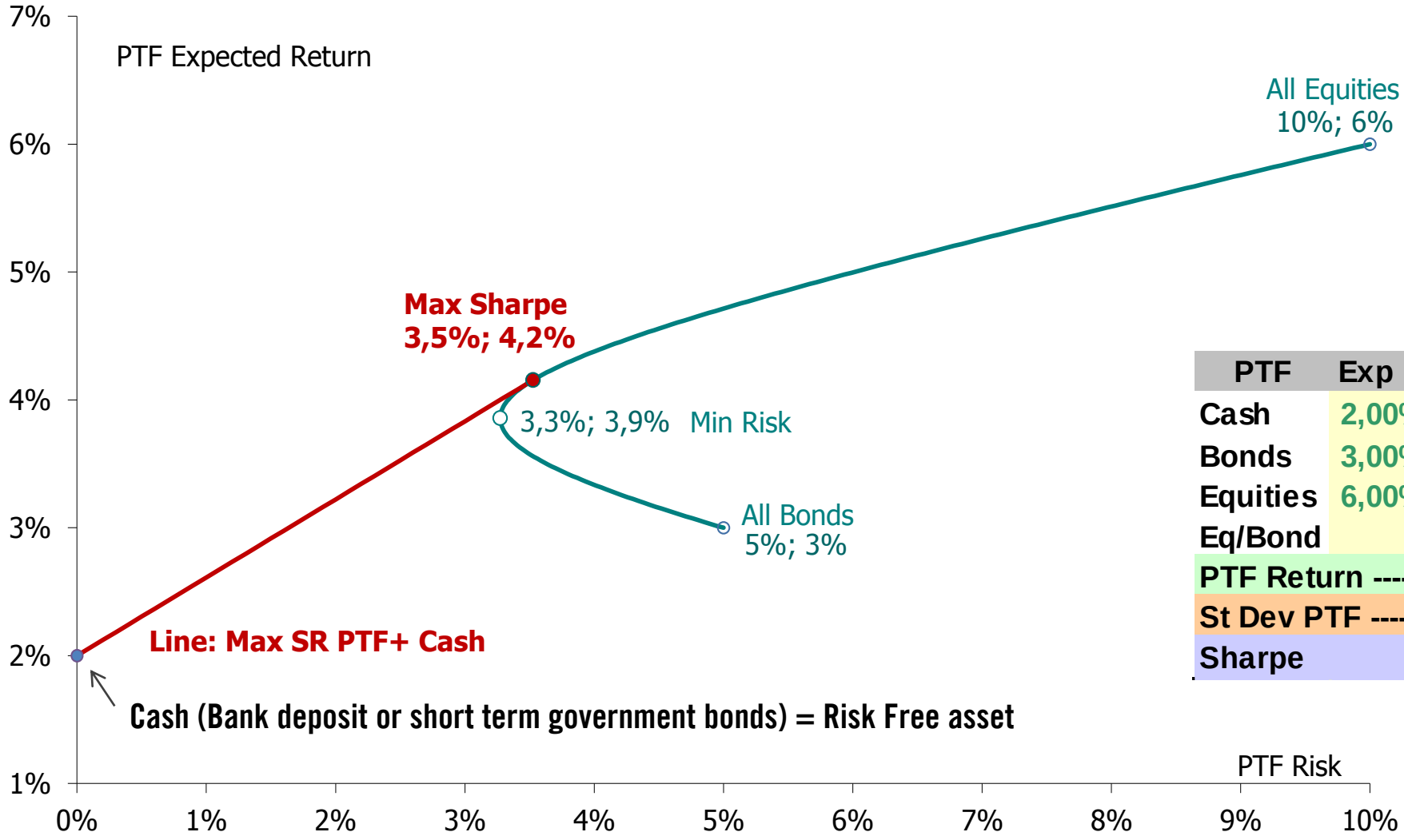
With two risky assets of given Expected Return and Volatility (St.Dev.)

PTF	Exp R	StDev
Bonds	3,00%	5,00%
Equities	6,00%	10,00%
Eq/Bond		-0,50

Source: Pictet

The Efficient Frontier & Max Sharpe Ratio Portfolio

Best combination of Expected Total Return (TR) and Volatility (Risk) of Portfolios (PTF)

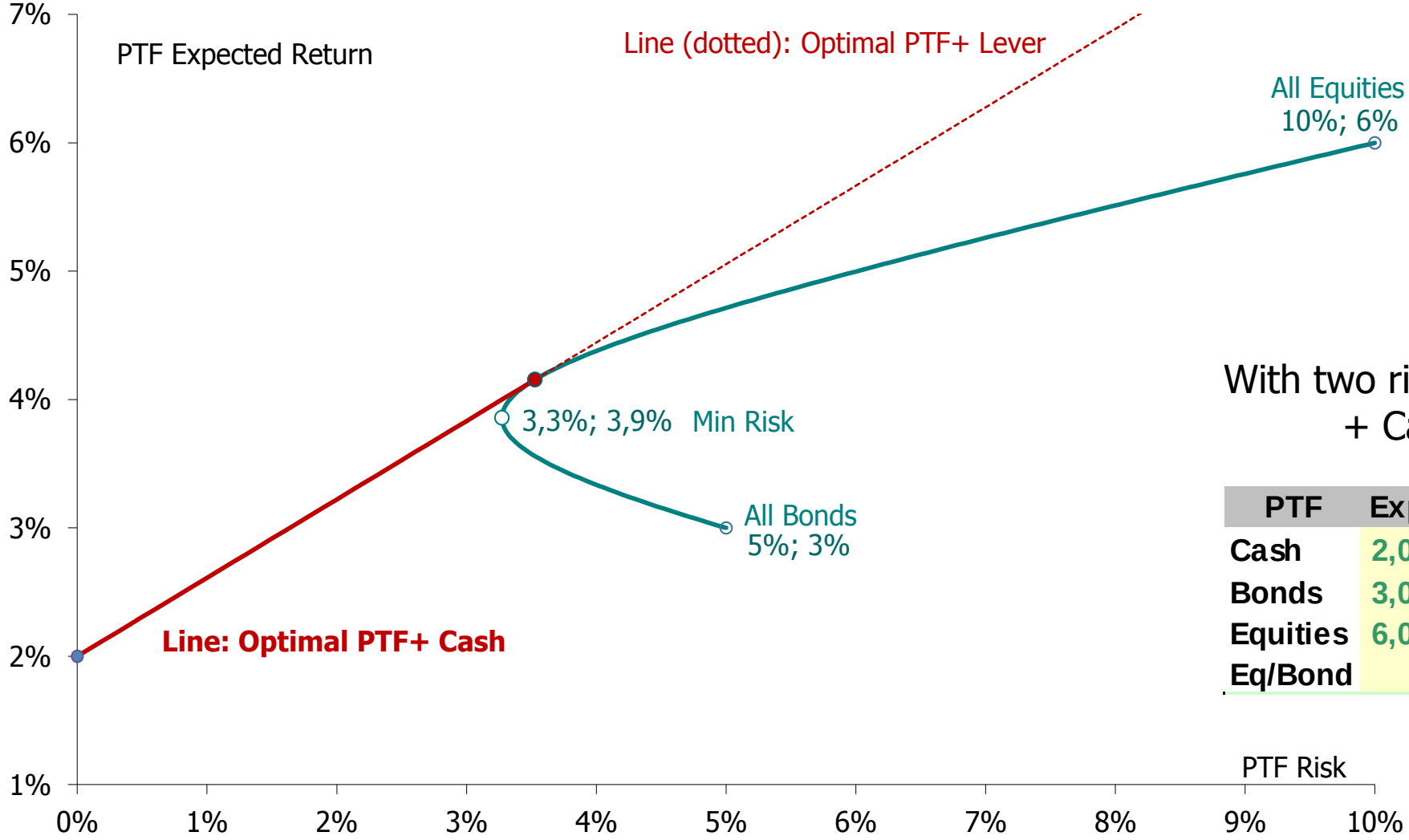


PTF	Exp R	StDev	tang.
Cash	2,00%	0,00%	0,0%
Bonds	3,00%	5,00%	**61,5%**
Equities	6,00%	10,00%	38,5%
Eq/Bond		-0,50	*62,6%*
PTF Return --------->			4,2%
St Dev PTF --------->			3,5%
Sharpe			0,61

Source: Pictet

The Efficient Frontier & Tangent (through Cash)

Best combination of Expected Total Return (TR) and Volatility (Risk) of Portfolios (PTF)



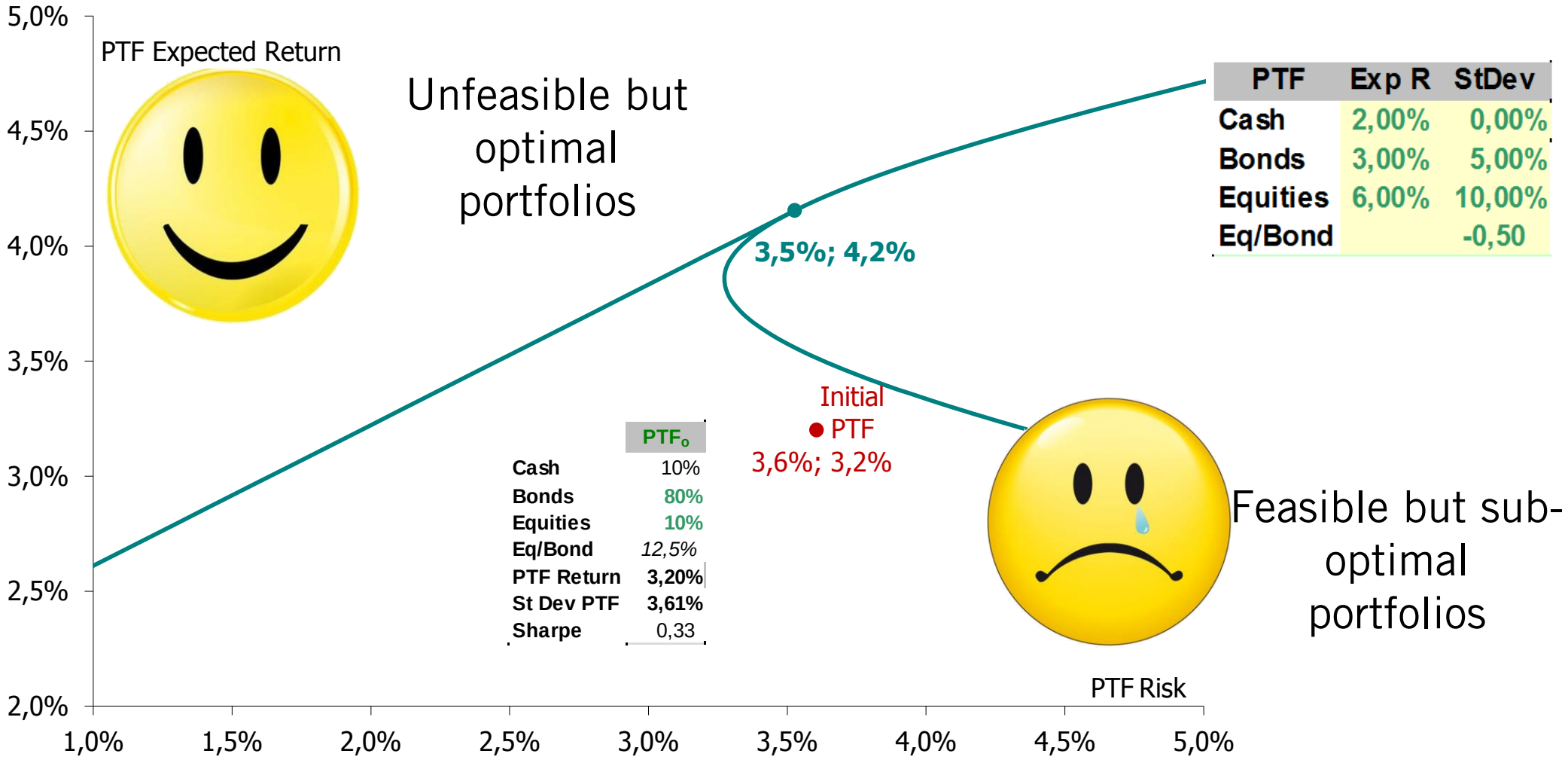
With two risky assets + Cash

PTF	Exp R	StDev
Cash	2,00%	0,00%
Bonds	3,00%	5,00%
Equities	6,00%	10,00%
Eq/Bond		-0,50

Source: Pictet

Why do I choose to stay on the Frontier?

Hierarchy of Portfolios



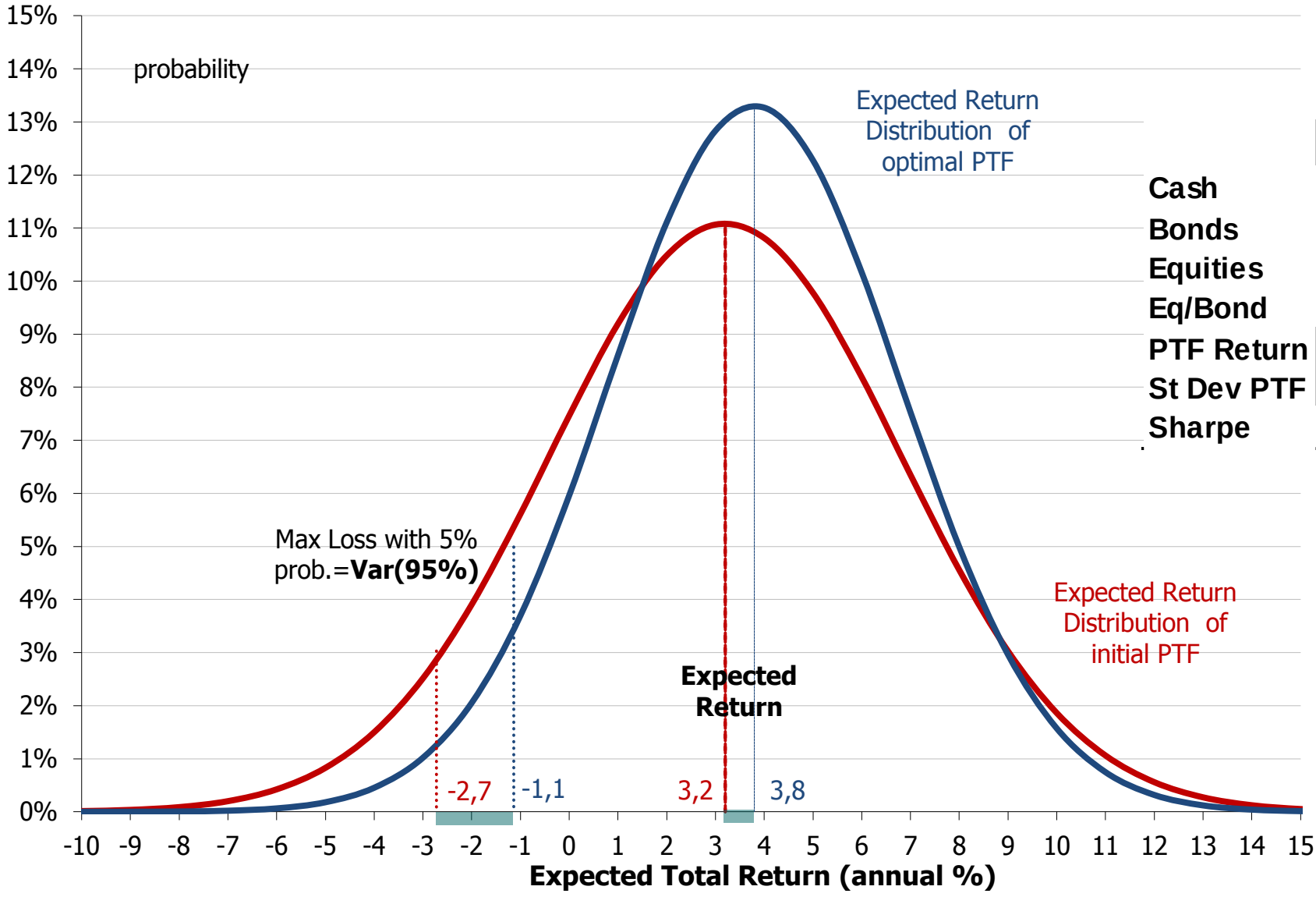
PTF	Exp R	StDev
Cash	2,00%	0,00%
Bonds	3,00%	5,00%
Equities	6,00%	10,00%
Eq/Bond		-0,50

	PTF_0
Cash	10%
Bonds	80%
Equities	10%
Eq/Bond	*12,5%*
PTF Return	**3,20%**
St Dev PTF	**3,61%**
Sharpe	0,33

Source: Pictet

Why do I choose to stay on the Frontier?

Hierarchy of Portfolios

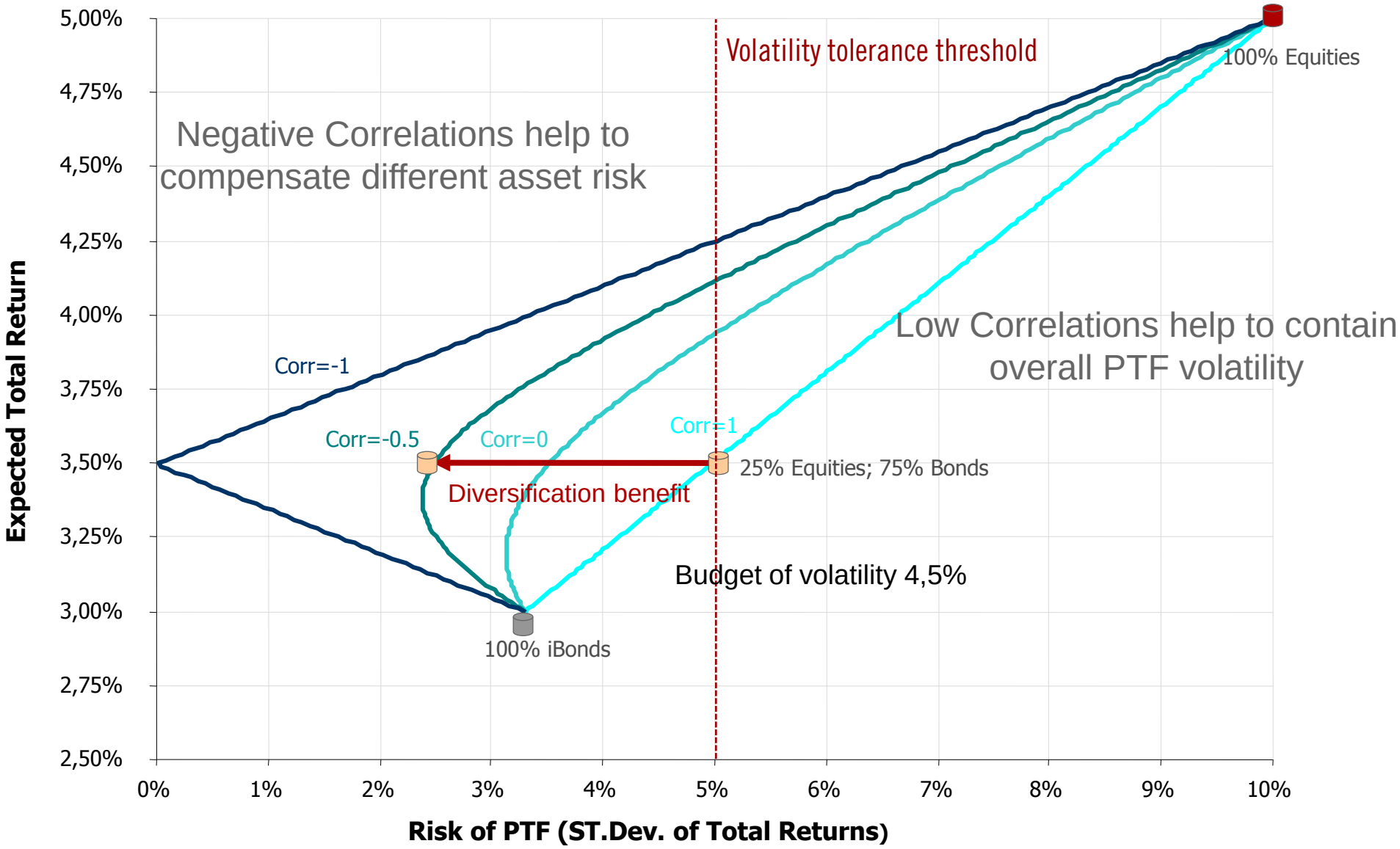


	PTF_0	PTF_1
Cash	10%	15,1%
Bonds	80%	52,2%
Equities	10%	32,7%
Eq/Bond	*12,5%*	*62,6%*
PTF Return	**3,20%**	3,83%
St Dev PTF	**3,61%**	3,00%
Sharpe	0,33	0,61

Source: Pictet

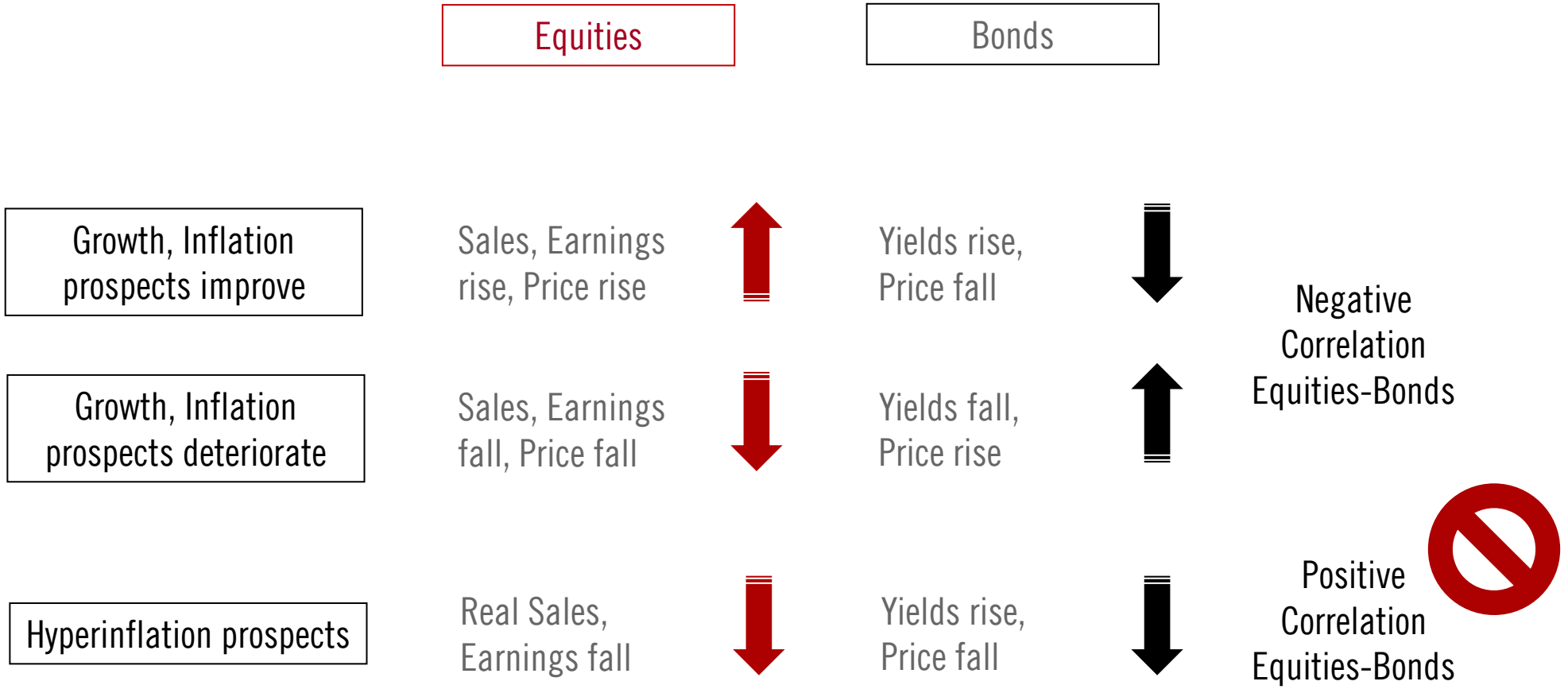
Correlation between asset classes is crucial for AA

The investible Universe ought to be classified by **Risk classes** (moving targets)



Source: Pictet

Normal Correlation regime (short run) Equity - Bonds



Negative correlation (short run) Equity - Bonds: why?

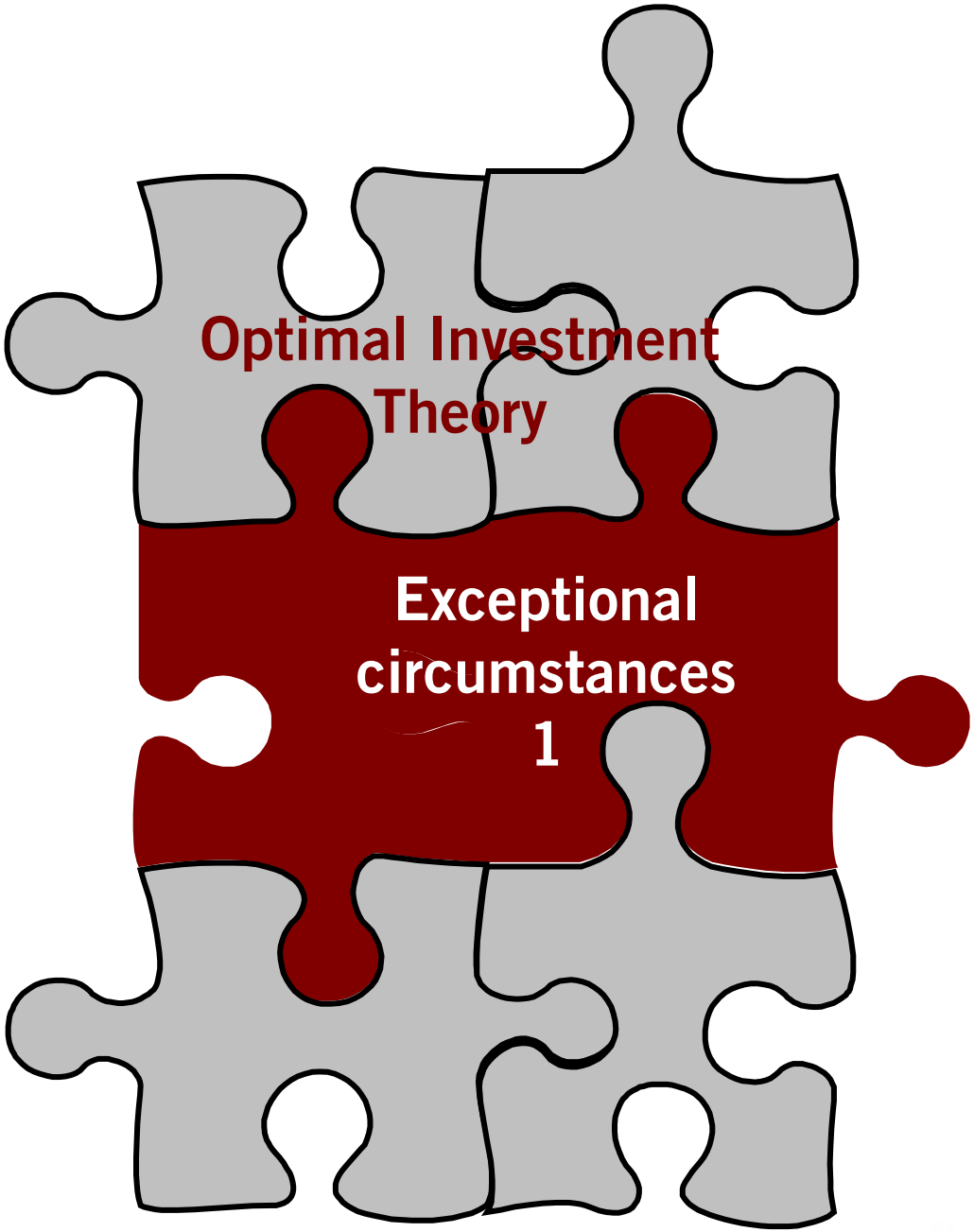
Equities		Bonds	
Earnings Yield		Bond Yield	
Earnings (E)	Price (Pe)	Yield (i)	Price (Pb)
↑	↑	↑	↓

Ceteris paribus Central Banks are expected to raise interest rates in a stronger economy →

Negative correlation holds if risk premiums are not distorted by other factors

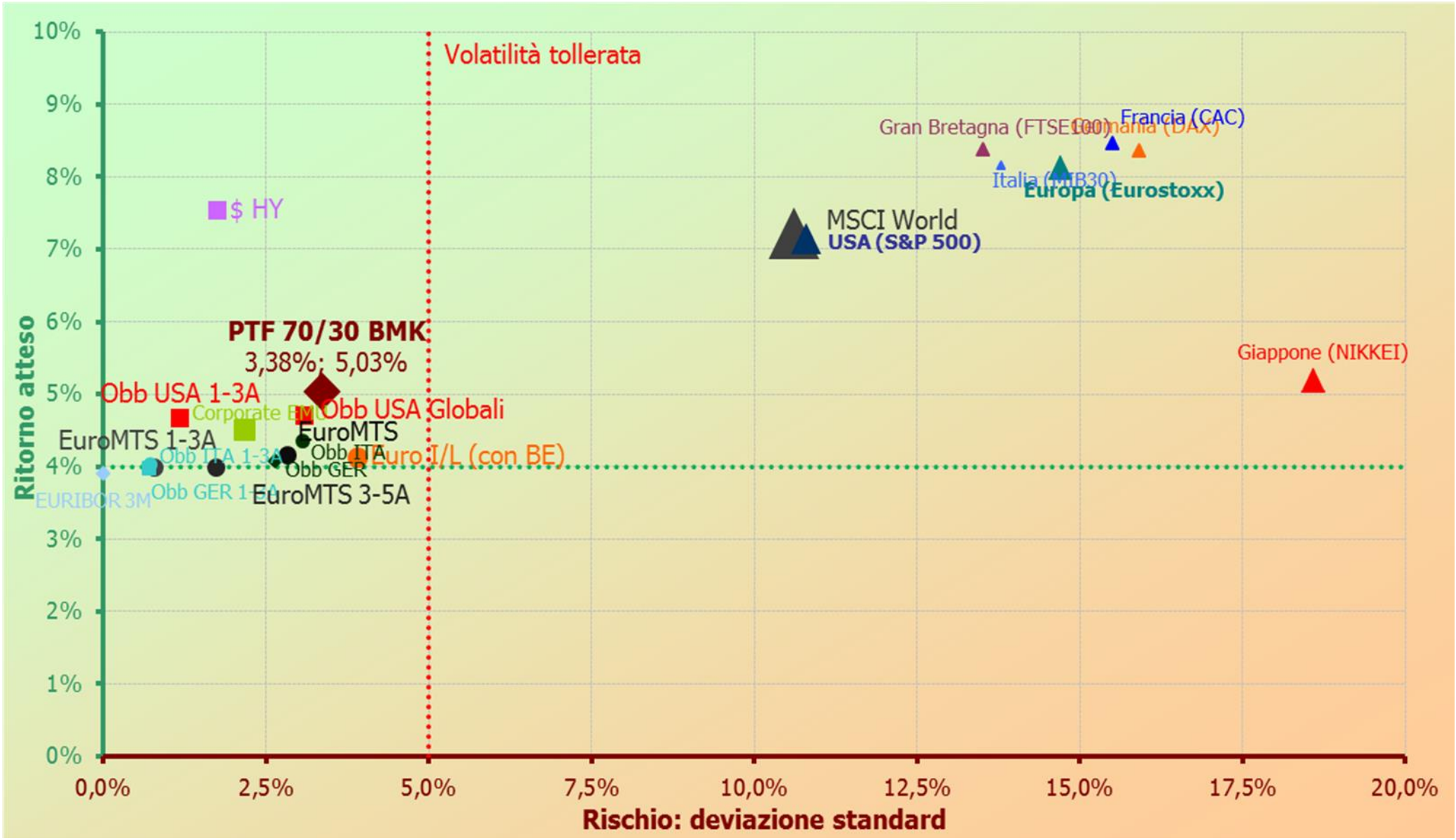
Asset Allocation…

… in a distorted environment



Risk Returns of main Financial Assets in 2007

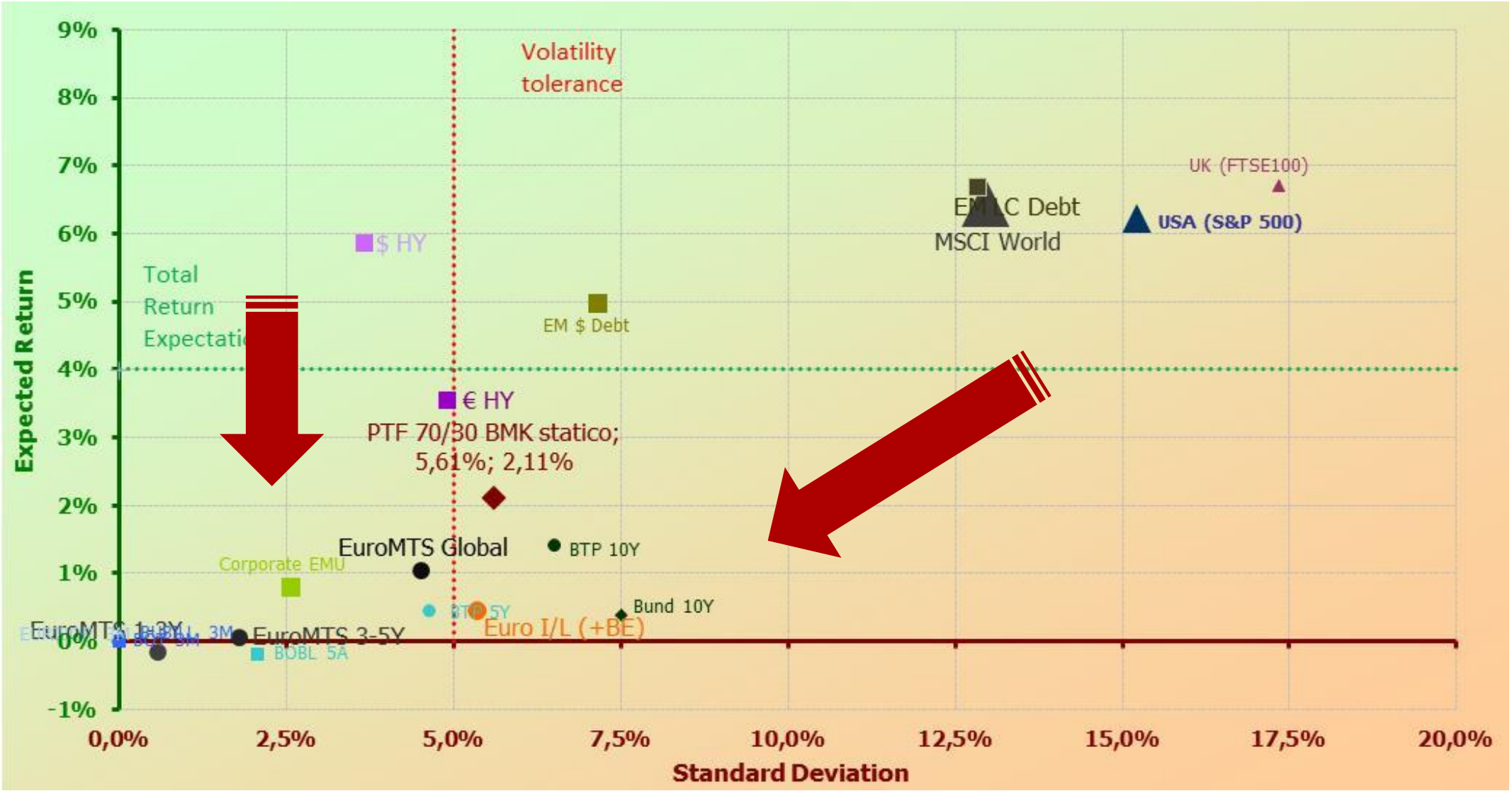
Most Yield to Maturity (YTM) above 4%; Earning Yields around 7%



Source: Pictet, Bloomberg

Risk Returns of main Financial Assets today

Yields compressed by CBs -> '**Financial Repression**'. Very low volatility **-> 'Investors' coercion**'



Source: Pictet, Bloomberg

Concept Map

From 2008 to 2013, Central Banks have been applying unconventional monetary policies, in order to re-establish the monetary transmission mechanism, to provide liquidity to the system and to avoid the contagion to the real economy. The Anglo-Saxon CBs, later followed by the BoJ have endeavored in a large quantitative expansion of their Balance Sheet through purchase of Financial Securities on the Market: Large Securities Asset Purchases or **Quantitative Easing**.

FED

- Liquidity Facilities (2008-2009)
- Operation Twist (Sep 2011)
- QE1/QE2/QE3 (Mar '09, Nov '10 and Sep '12)

ECB

- LTRO (Dec 2011; Feb 2012)
- OMT (Sep 2012)
- QE (Jan 2015)

Effects

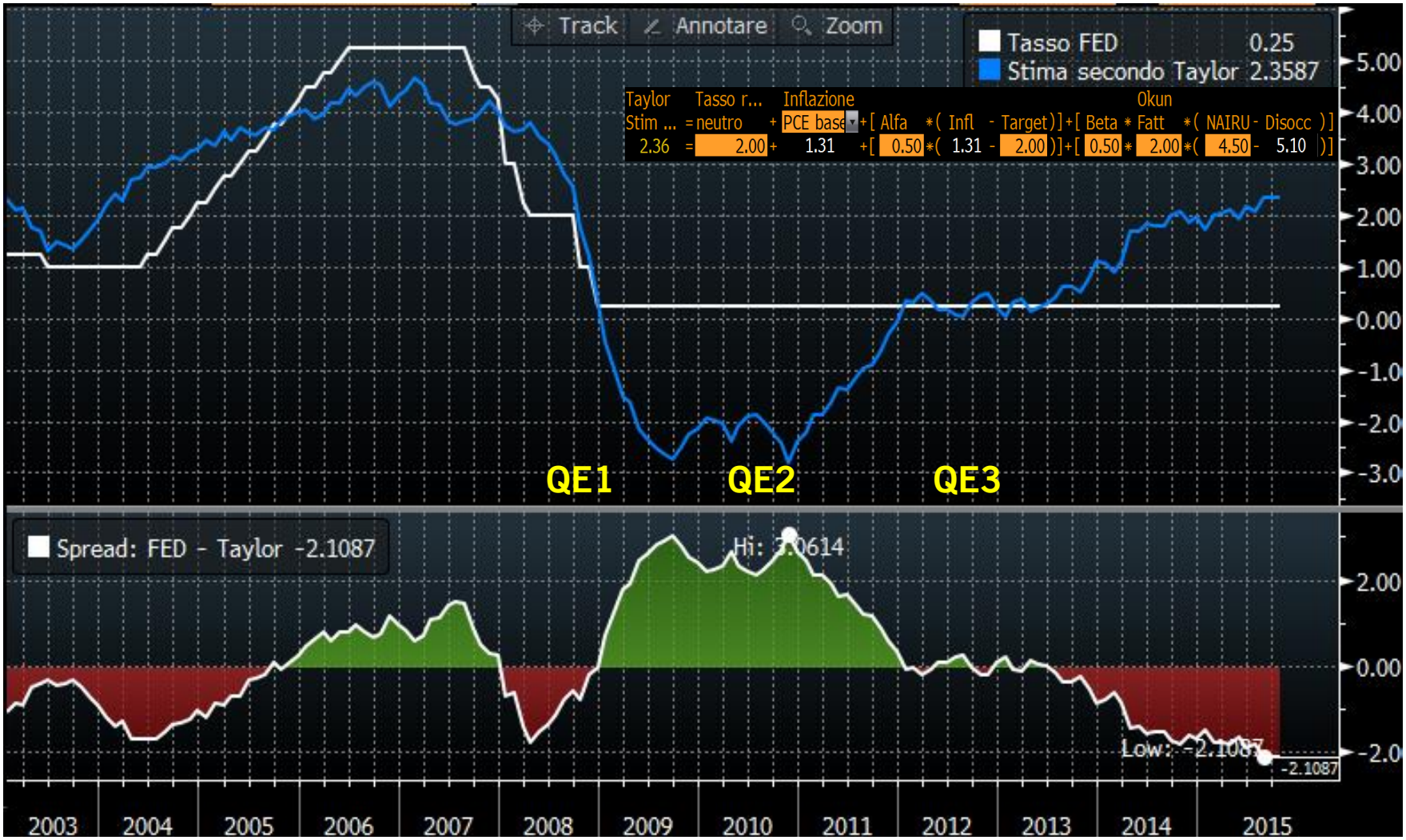
- **CBs balance sheets size**
- **Financial repression** (low interest rates)
- **Herd behavior**
- **Financial coercion**

Source: Pictet, Bloomberg

US interest rates according to fundamentals

Equilibrium interest rates according to the Taylor Rule

Taylor Rule and official rates in USA

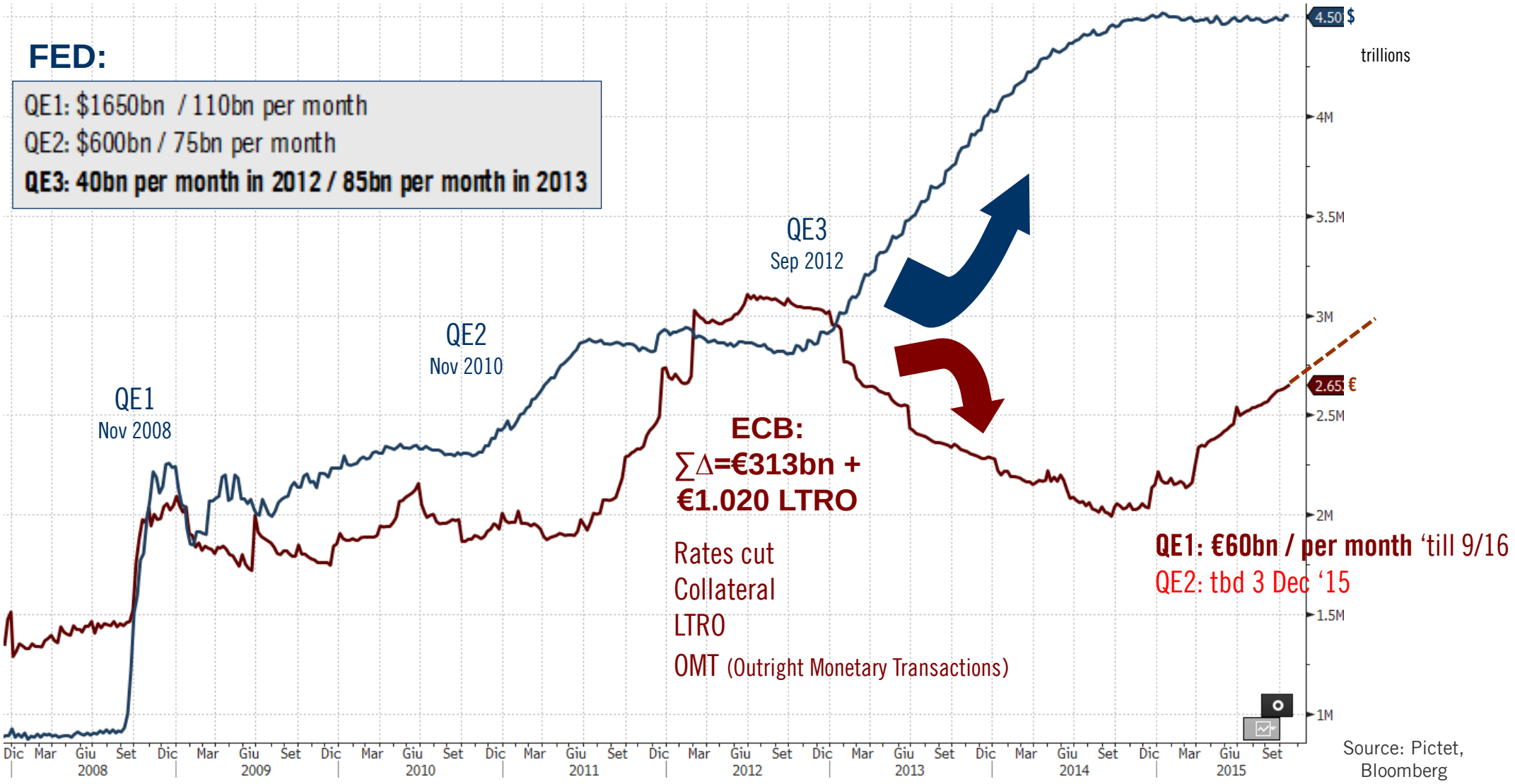


Source: Pictet, Bloomberg

FED still expanding its balance sheet, the ECB's is contracting!

Both the balance sheets reached 3,000 billions of € (and $), then they divorced! Finally ECB QE arrived

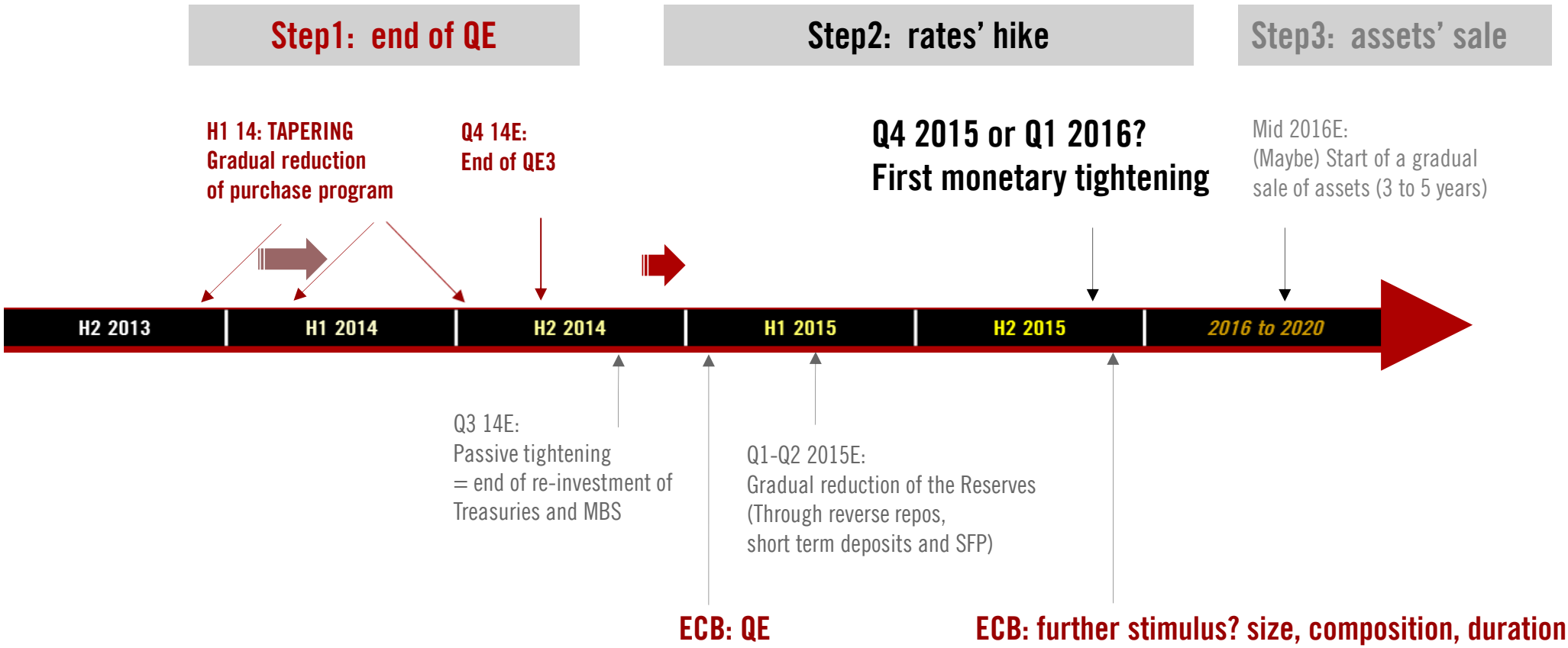
FED and ECB balance sheets size



Source: Pictet, Bloomberg

Timetable for the FED's EXIT Strategy and European QE

First FF rate hike in the December 2015?



Source : Pictet

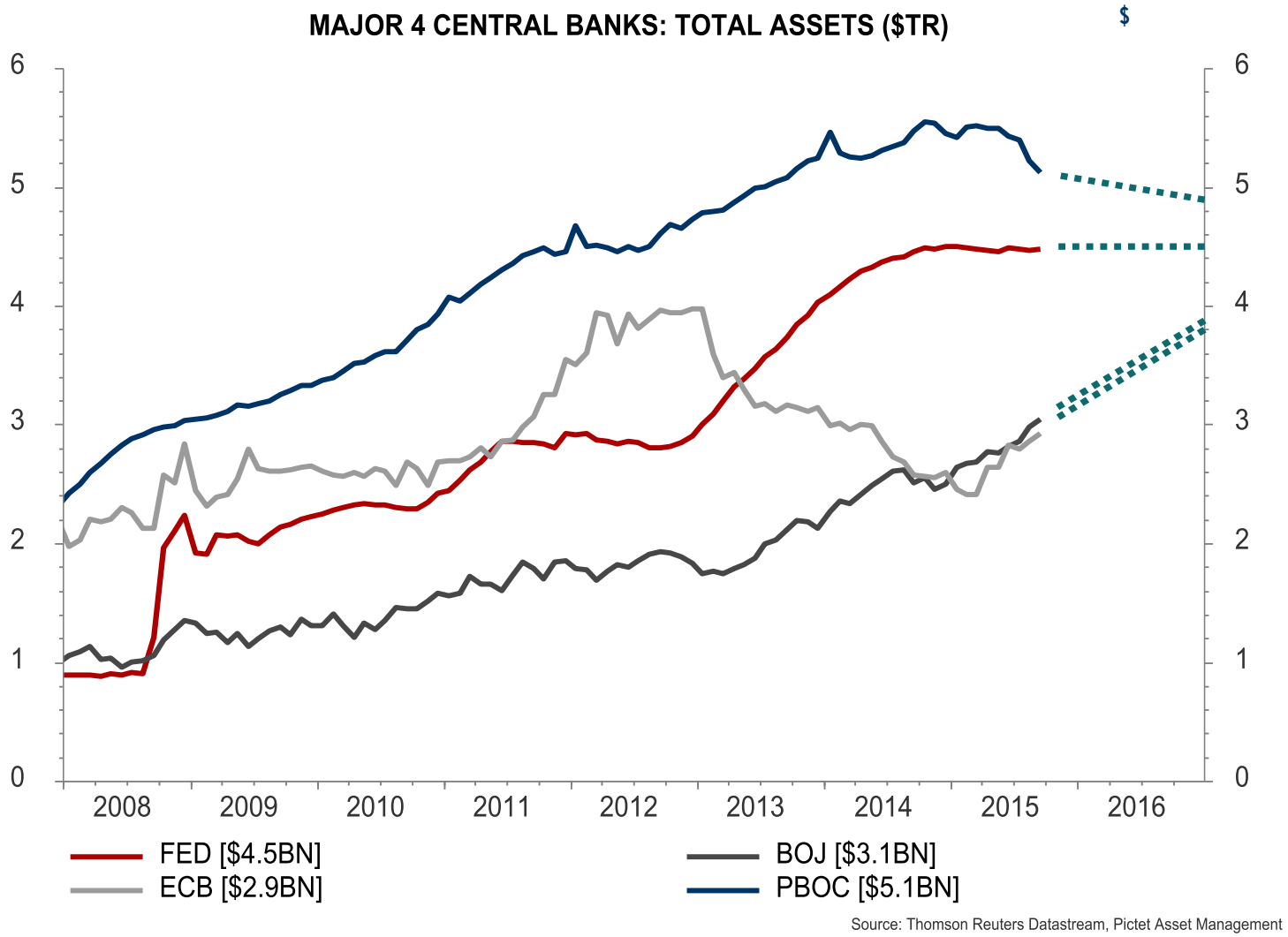
1-Year View: Major 4 Policy Liquidity

The Balance Sheets of the major CBs should converge from now on

Evolution of the Balance sheets size: FED, ECB, BOJ, PBoC

Policy Liquidity, Major 4

$1tr addition in 2016.



Source: Thomson Reuters Datastream, Pictet Asset Management

Bund e Treasuries: distortion due to *flight to quality* and QE

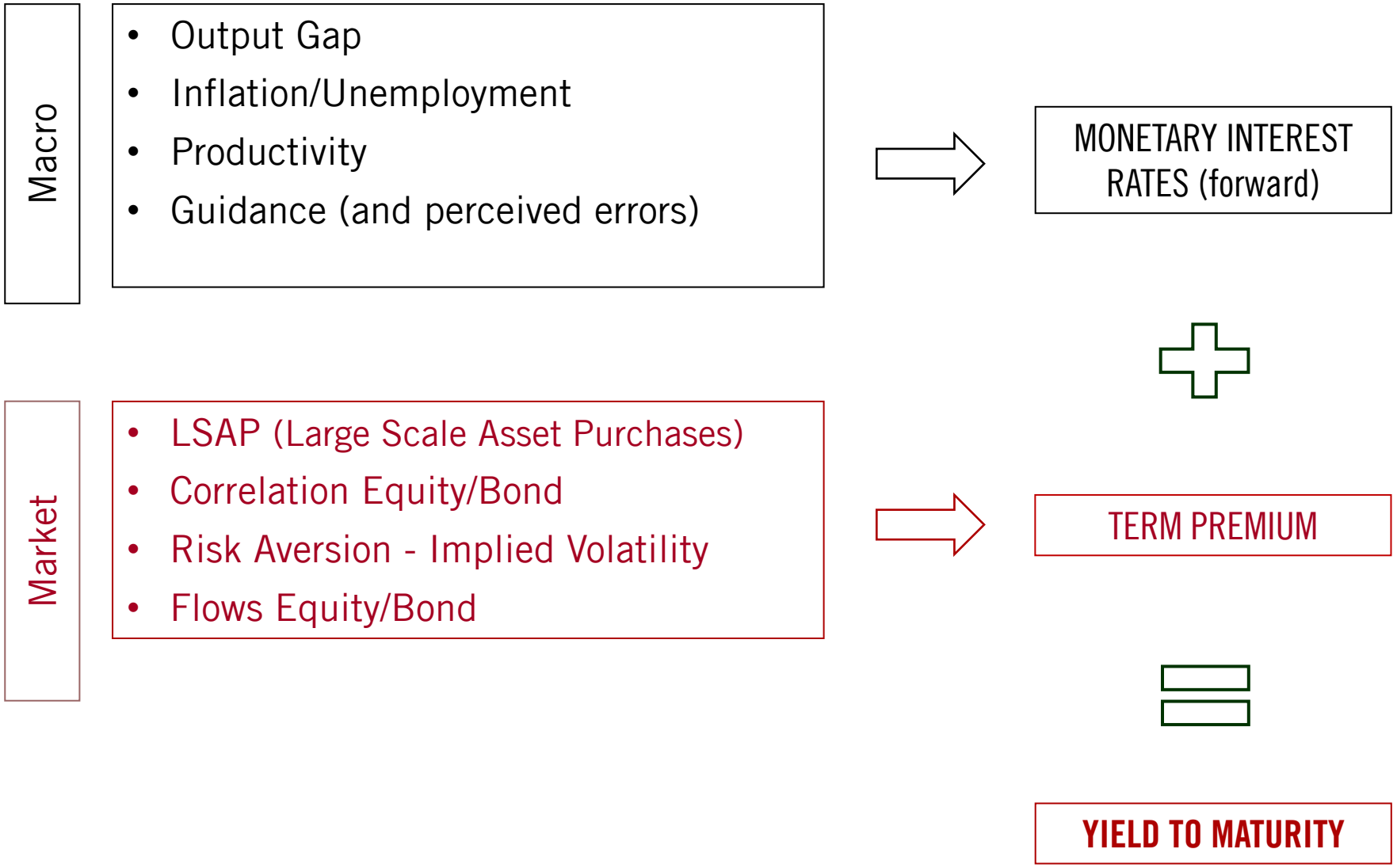
10-year T-Note and Bund compared to the estimated fair value

Estimates based on key variables and market indices, foreign exchange, commodities, 2Y swap yields

Source: Pictet, Bloomberg

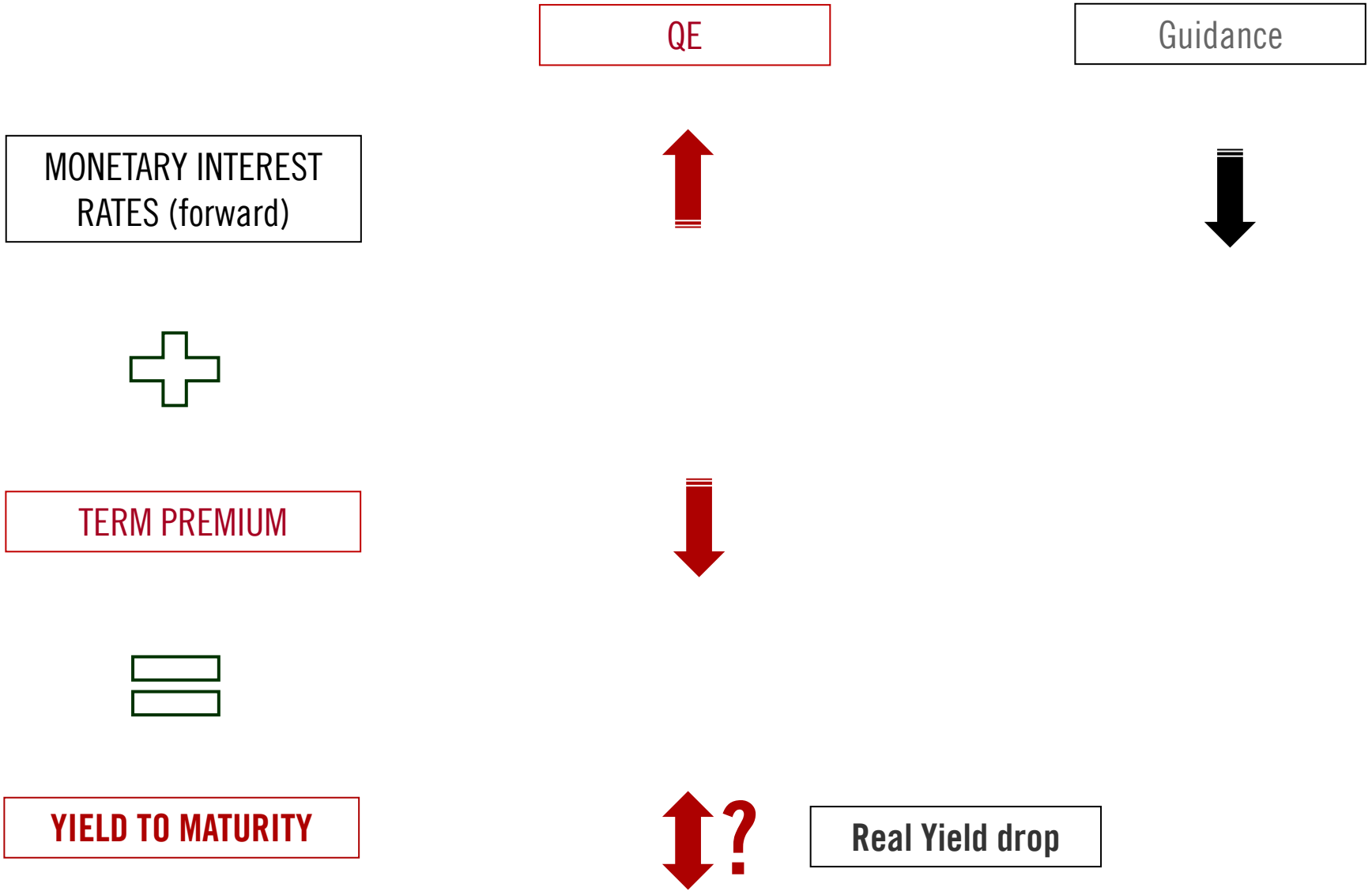
The determinants of the Yield to Maturity

Factors affecting the various components of bond yields



Does QE reduce yields?

Impact on Nominal Yields not obvious, clearer on real yields



The QE has effects particularly on real rates and other activities ...

QE lowers real returns. Its unwinding since May 2013 reversed the trend (with BE dropping)

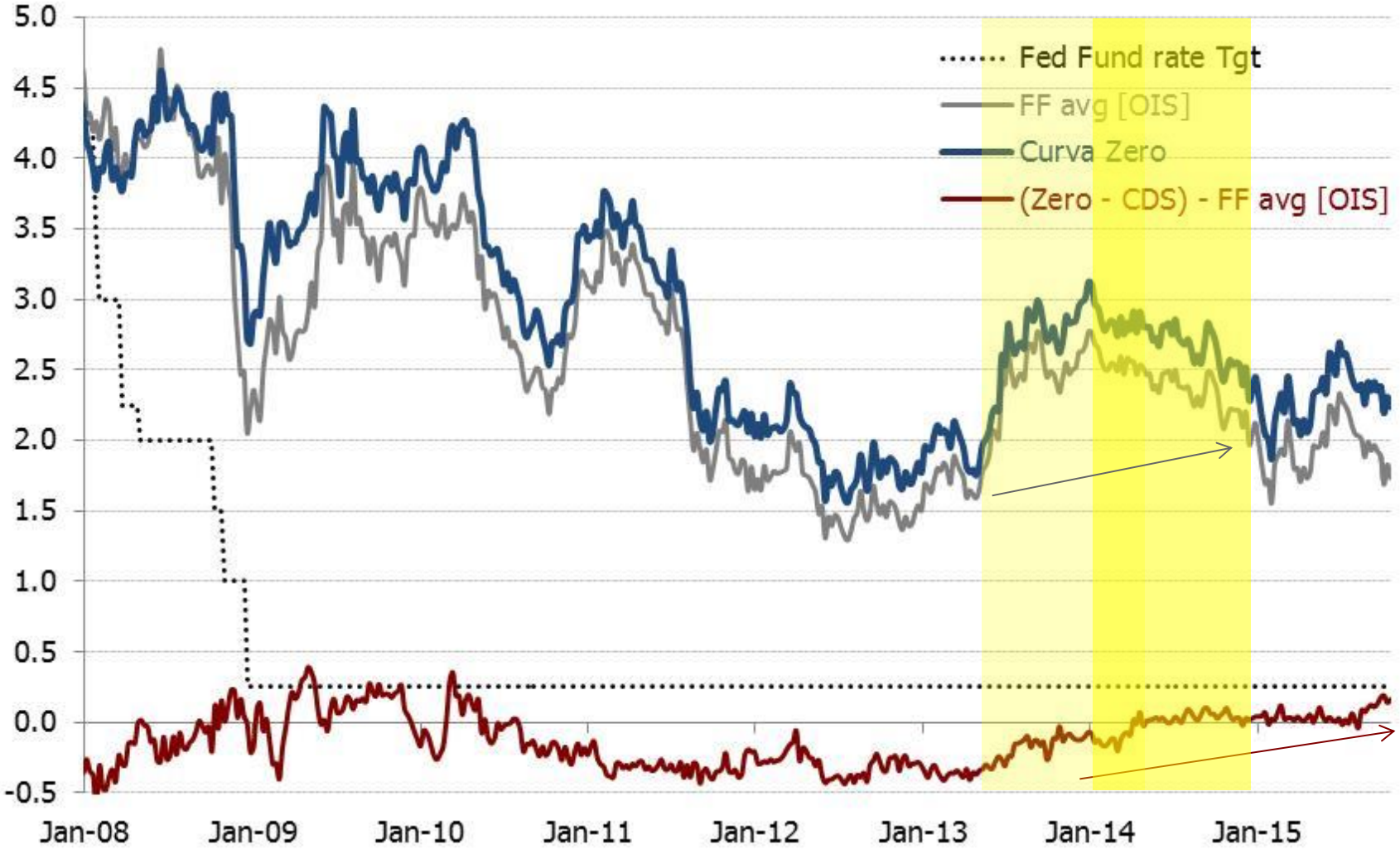
Nominal interest rates, real (TIPS) and Break-even inflation in the market for U.S. Treasuries

Source : Pictet, Bloomberg

Mkt based Term Premium stable, while expectations on FF volatile!

Inferring the term premium from the market, it is positive unless we consider also the CDS…

Term premium on T-Notes: yield to maturity - CDS - average interest rate on Fed funds for the next 10 years



T-Note: 2,24%

Expected FF: 1,74%
(Estimated w FF Futures etc.)

CDS_{10} on T-Note: 34bp

Term Premium: 16bp
(by difference)

Source: Pictet, Bloomberg
Data as of 16/10/2015

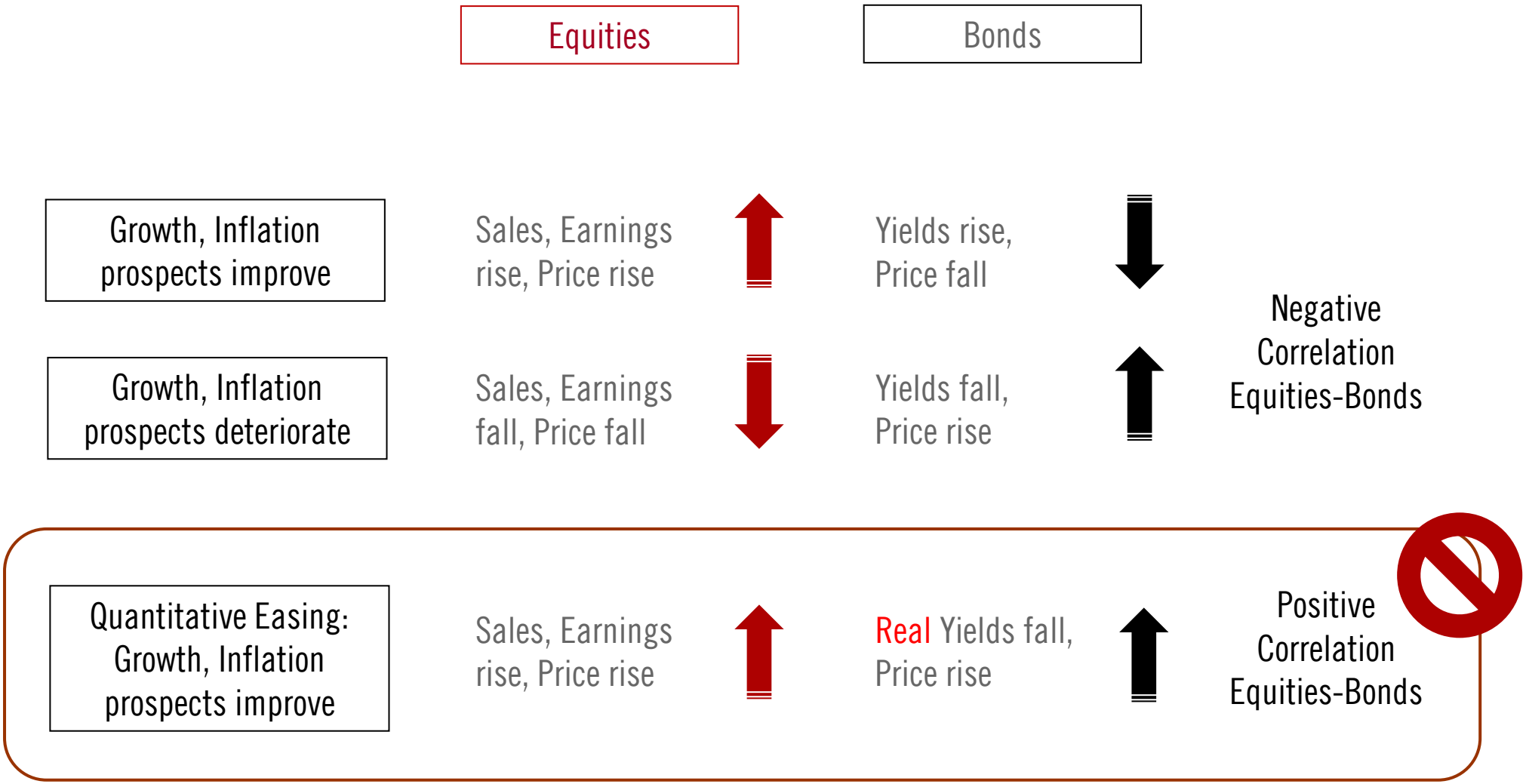
Only now, after QE is over ½ of the move due to the Term Premium!

The Fed has contributed to the confusion with ambiguous interventions, the market has misunderstood

	19 April 2013	16 October 2015	change		
MONETARY INTEREST RATES (forward)	1,62%	1,74%	**12bp**	↑	Guidance*
+					
TERM PREMIUM	-0,36%	0,16%	**52bp**	↑	QE
=					
YIELD TO MATURITY Net of Credit Risk	1,26%	1,90%	**64bp**	↑	TOTAL

* In December 2012 became quantitative: rate hikes were conditional upon macro-economic objectives (Unemployment < 6,5%; inflation > 2,5%); since March 2014 Fed's guidance is again qualitative.

Ab-Normal Correlation regime (short run) Equity - Bonds



The guidance becomes endogenous

Implications of communicating a ‘reaction function’ instead of levels or timing of intervention

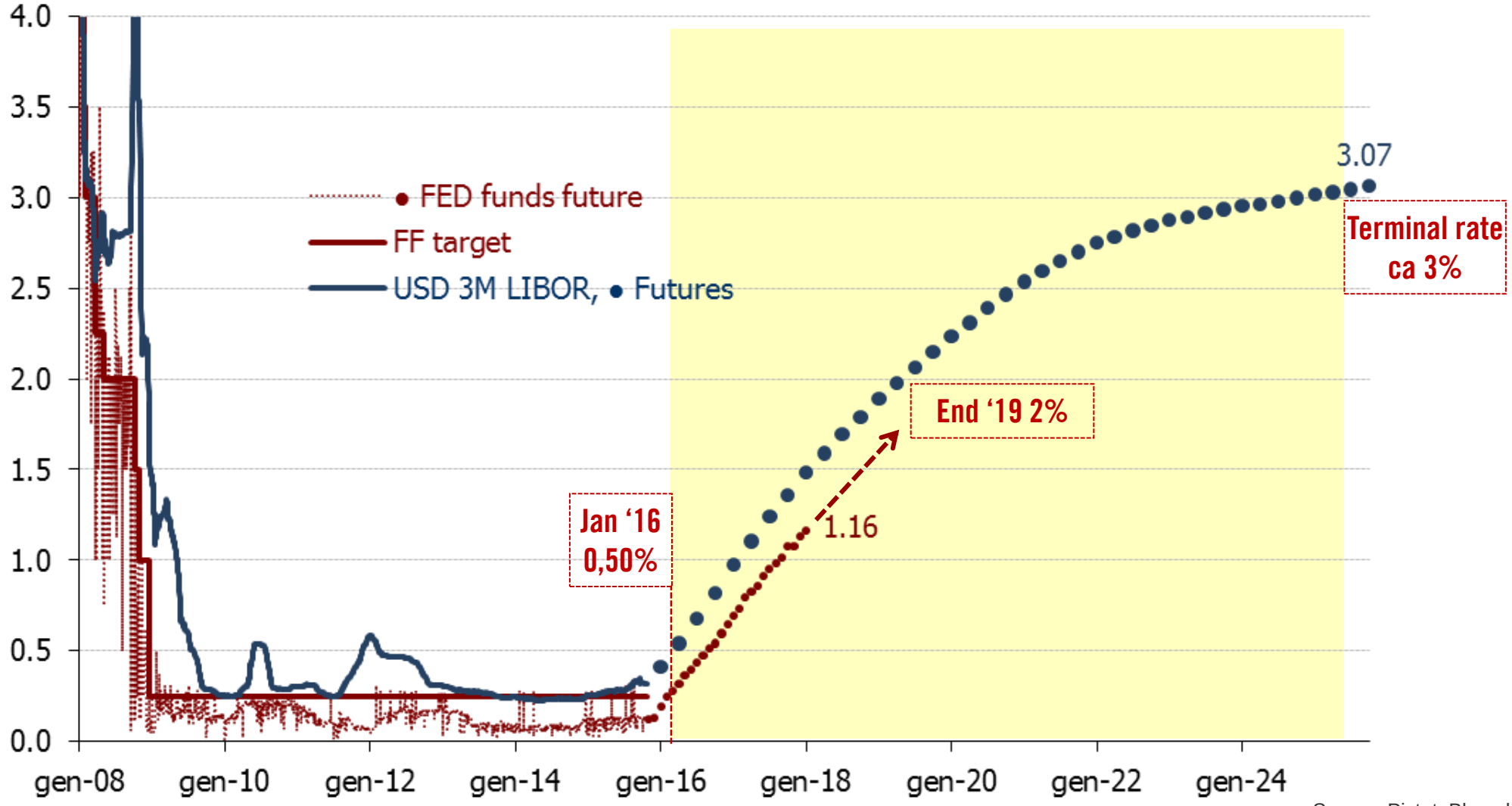
Proposing conditional interventions, the Fed should induce the market to incorporate its ‘reaction function’, which should internalize any new information concerning the macroeconomic scenario..
Other things being equal, this should:

- ⇩ Policy uncertainty
- ⇩ Economic cycle uncertainty
- ⇩ Equity volatility
- ⇧ Expected Policy rates volatility (forward)
- ⇧ Volatility of Yield to maturity (YTM)

Fed fund rates according to market's expectations

FF Futures fully price the first rate hike in Q1 2016

Fed fund target, effective FF rates, 3M $ Libor: historical and forward levels implied by the respective Futures



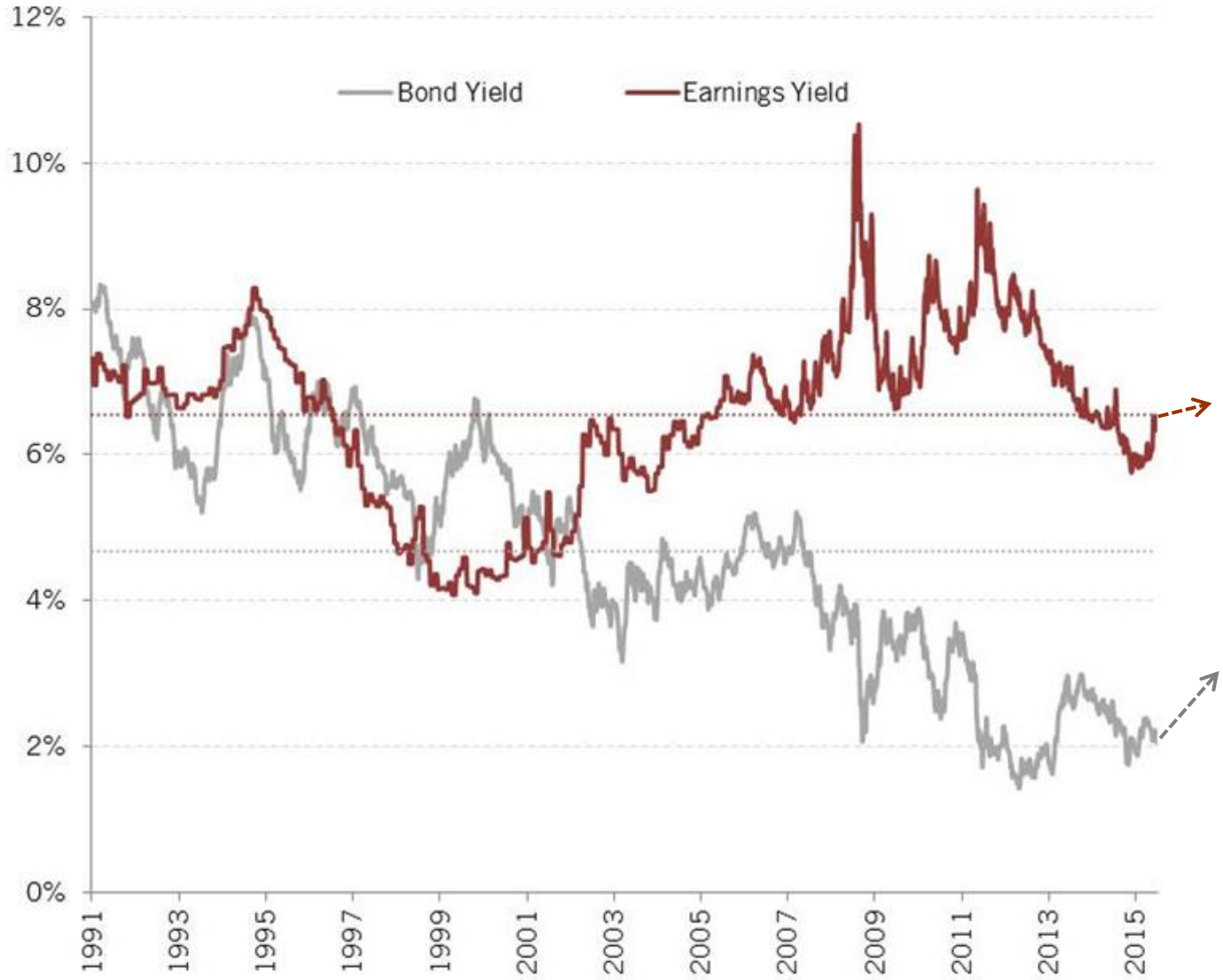
Source: Pictet, Bloomberg

Normalization of Risk Premiums

Equities' Earning Yields already at historical average. Bond Yields need to adjust

Yields to Maturity (BY) of 10 US year government bonds are around 2%, a low level compared with the last 30 years of history

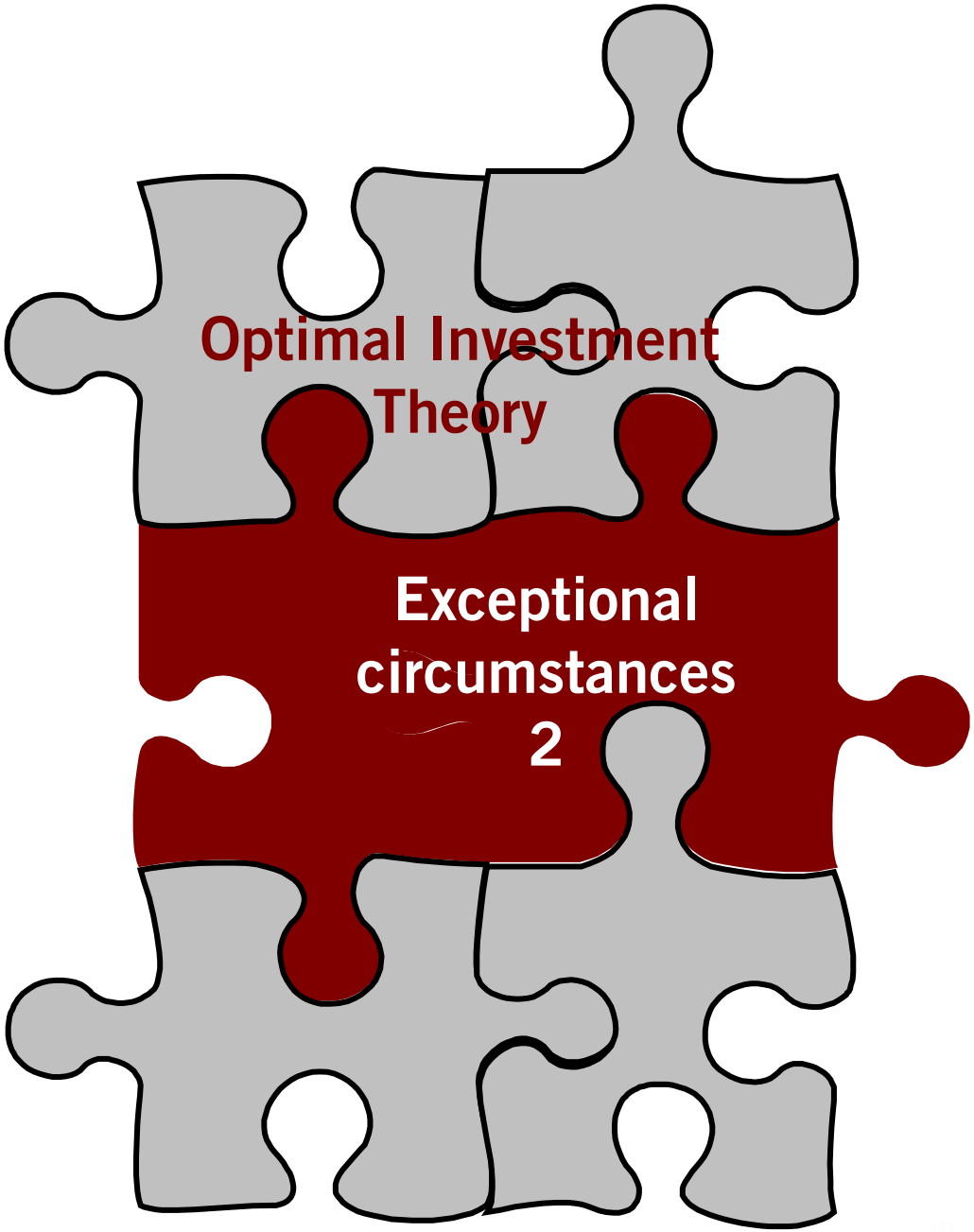
On the contrary, Equity valuations, i.e. Earnings' Yields (EY) are close to historical average



Source: Pictet Asset Management, IBES

Asset Allocation…

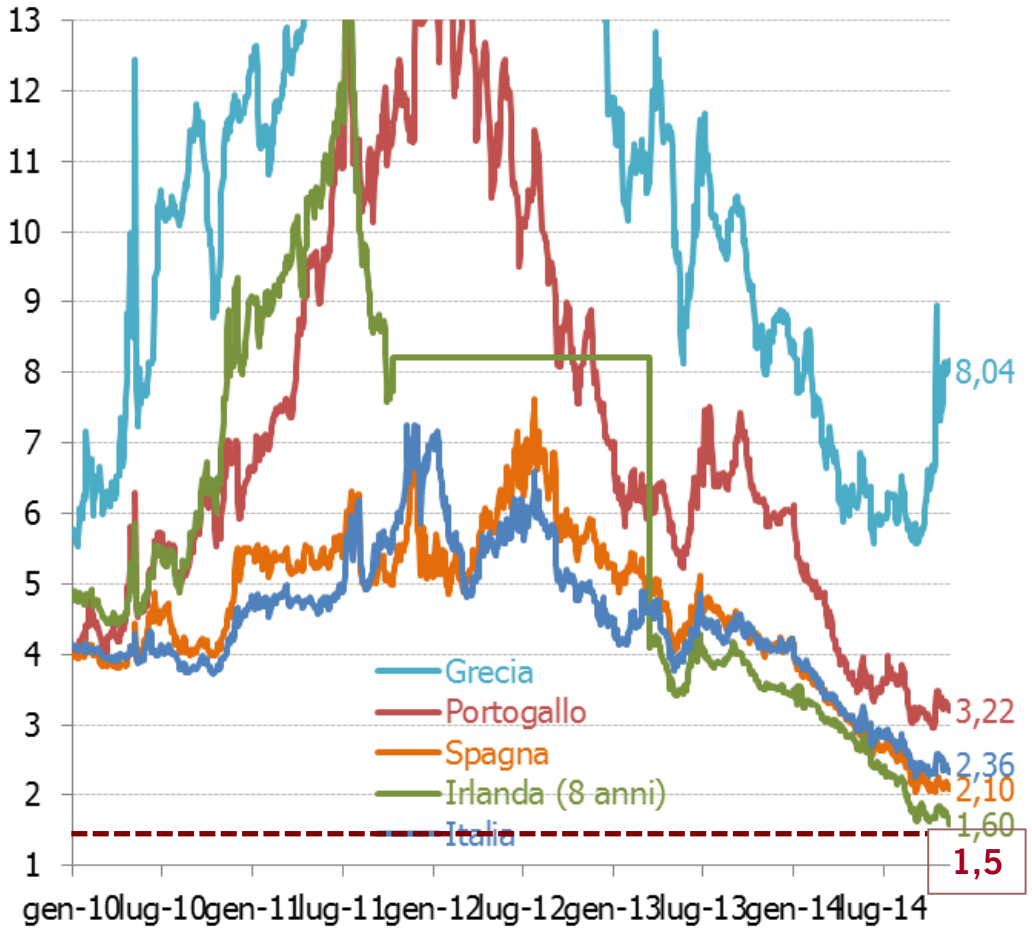
… in a distorted environment

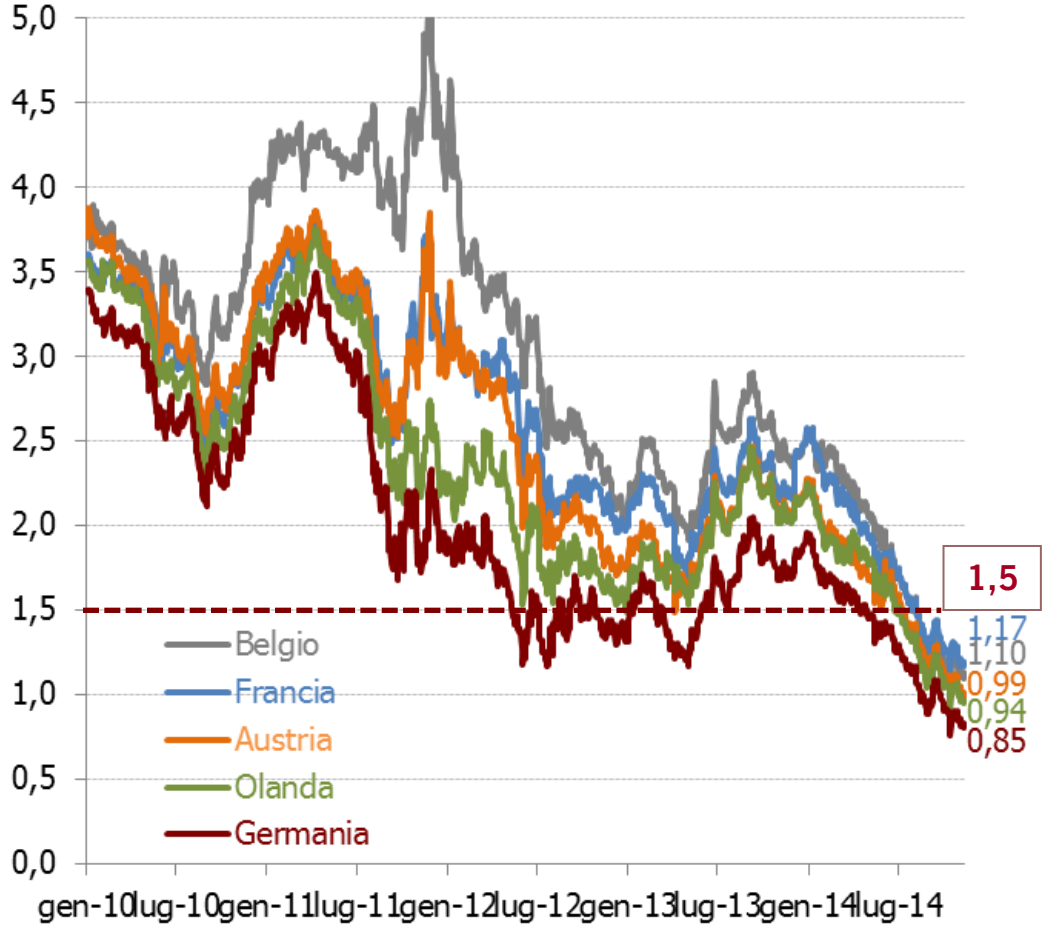


EMU transformed into a marriage of dis-interest!

Fx flexibility and seigniorage lost; yields at pre-EMU levels: € costs outweigh the advantages ?

10Y YTM of main EMU Countries: combination of Systemic and Country-specific patterns (for Programme Countries: Greece, Portugal, Ireland)



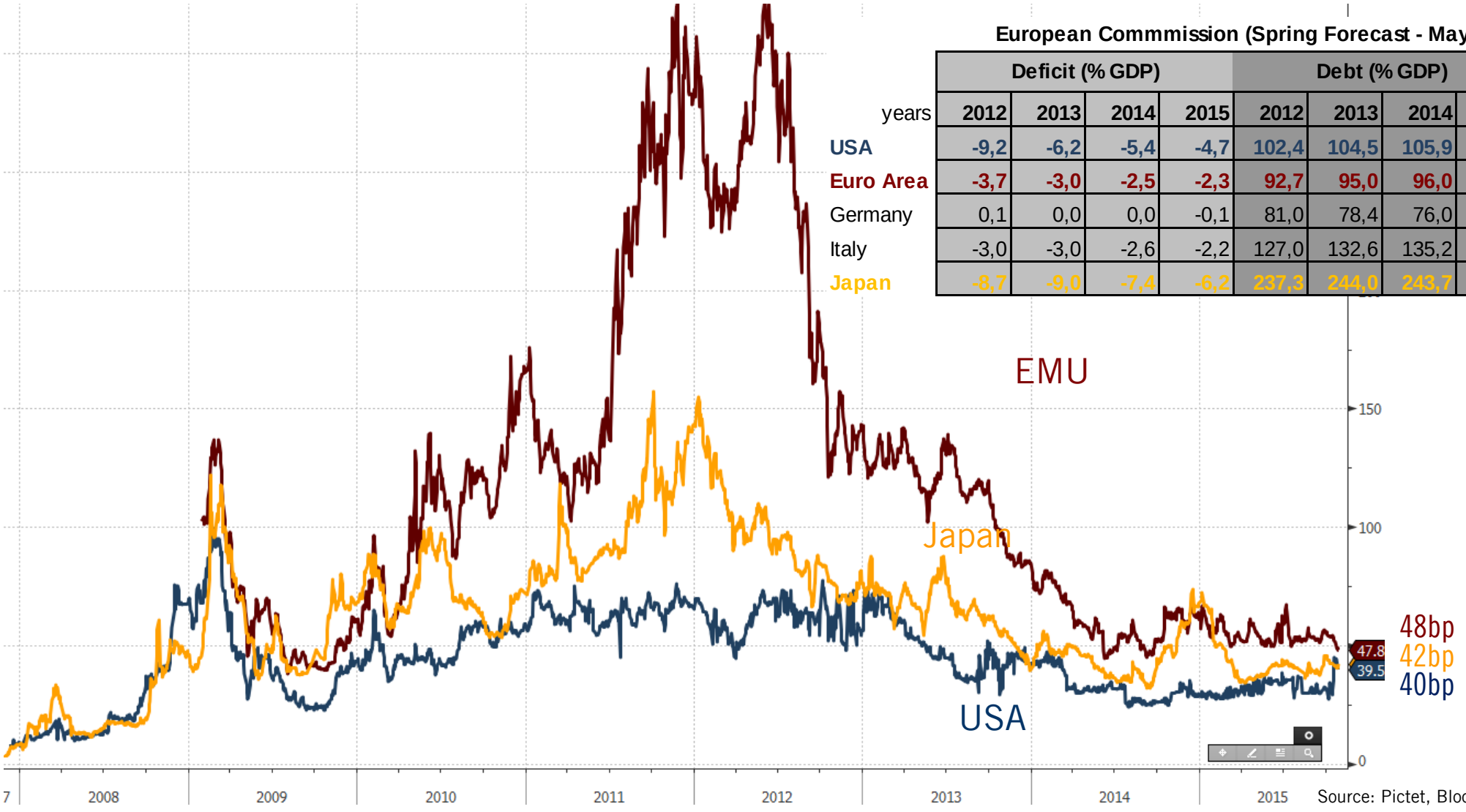


Source: Pictet, Bloomberg

Perception on G3 Solvability

EMU paid an unwarranted premium relative to its pubic finance fundamentals

5Y CDS of the US, JAPAN and GDP weighted average od 5Y CDS of EMU (ex-Greece) Countries



European Commmission (Spring Forecast - May 2014)

	Deficit (% GDP)				Debt (% GDP)			
years	2012	2013	2014	2015	2012	2013	2014	2015
USA	-9,2	-6,2	-5,4	-4,7	102,4	104,5	105,9	105,4
Euro Area	-3,7	-3,0	-2,5	-2,3	92,7	95,0	96,0	95,4
Germany	0,1	0,0	0,0	-0,1	81,0	78,4	76,0	73,6
Italy	-3,0	-3,0	-2,6	-2,2	127,0	132,6	135,2	133,9
Japan	-8,7	-9,0	-7,4	-6,2	237,3	244,0	243,7	244,1

Source: Pictet, Bloomberg

Reasons behind EMU pain

The uncomfortable EMU apartment block

Congenital deficiencies? Mostly **market circularity** and many mistakes (PSI, EBA…)

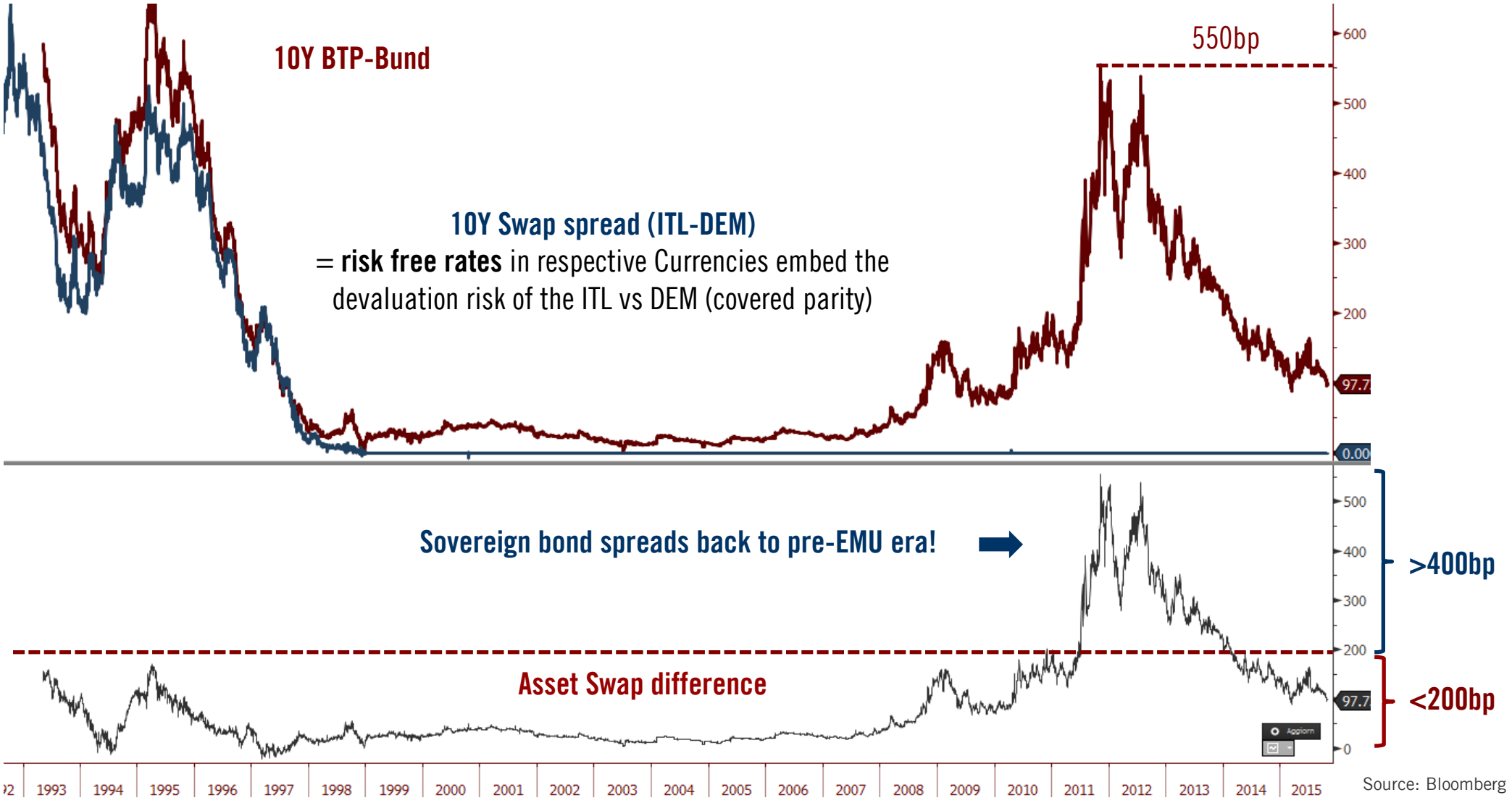
In the EMU house the Greek fire started 3 years ago. The lack of windows (floating currencies) makes suffocation more likely, but does not explain why the fire spread so rapidly…

Economists (e.g. De Grauwe) pointed out **poor Governance.** Yet I believe **market forces** and **poor decision making** have been underestimated

Distrust with €: game changer for Sovereign Solvency

Asset swaps used to measure the relative Credit Premiums: Italian case

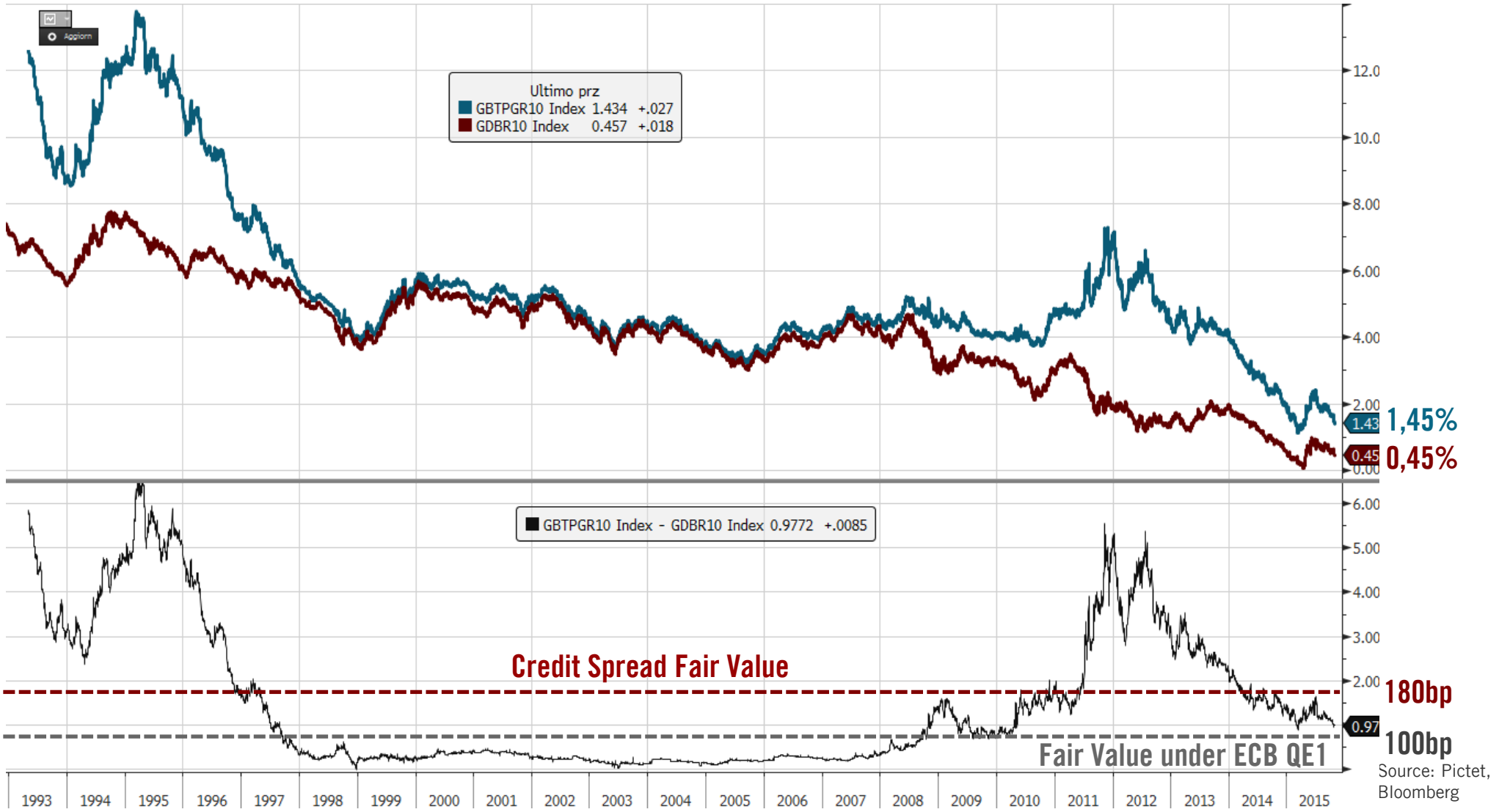
10Y Asset Swap spread (BTP-Bund): Credit premium of BTP vs Bund = (YTM BTP 10Y – ITL Swap 10Y) – (YTM Bund – DEM Swap 10Y)



Source: Bloomberg

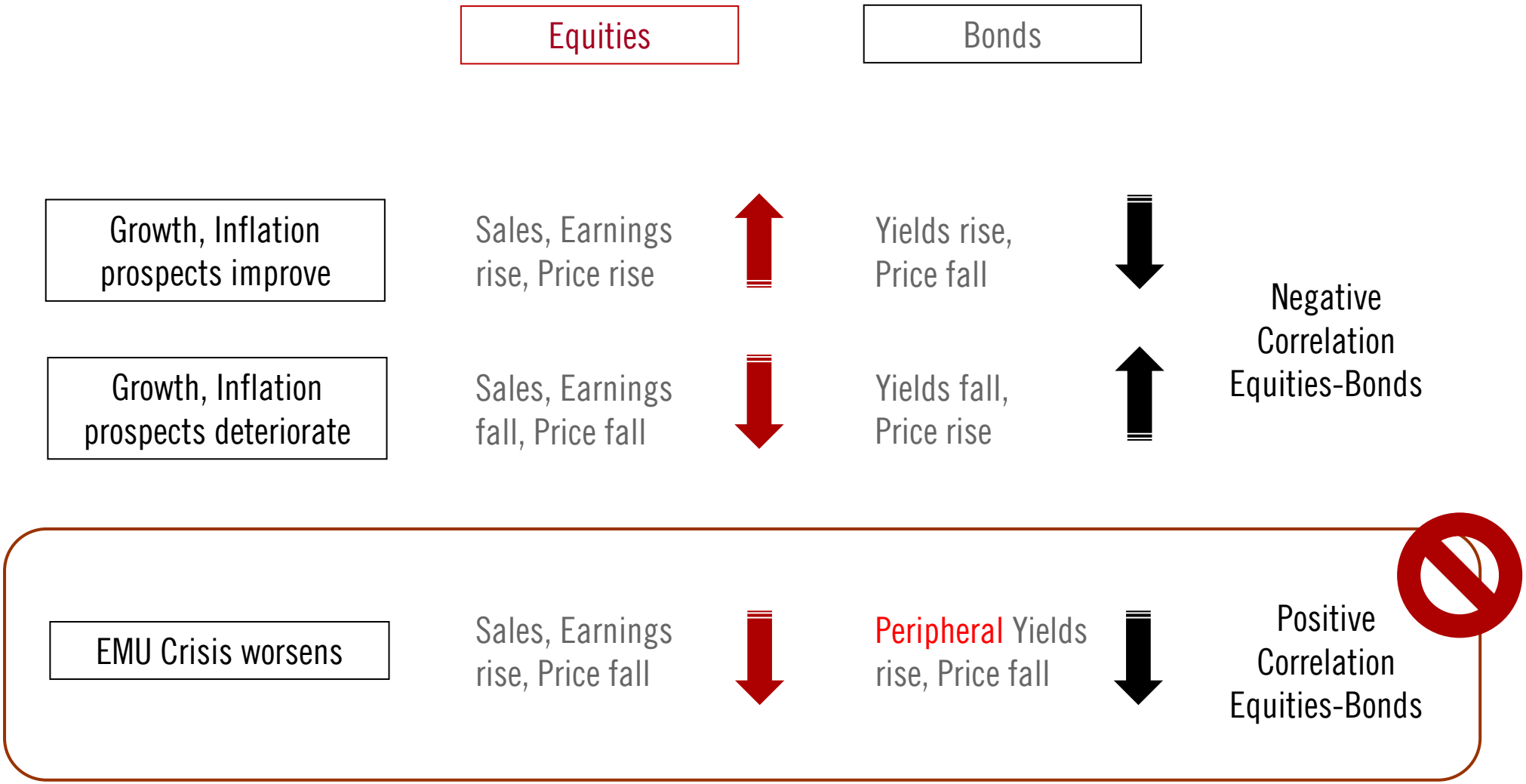
BTP-Bund definitely includes EMU Reversibility Risk

10Y BTP-Bund Spread = Credit Premium + Expected Realignment x Probability of Fluctuation



Source: Pictet, Bloomberg

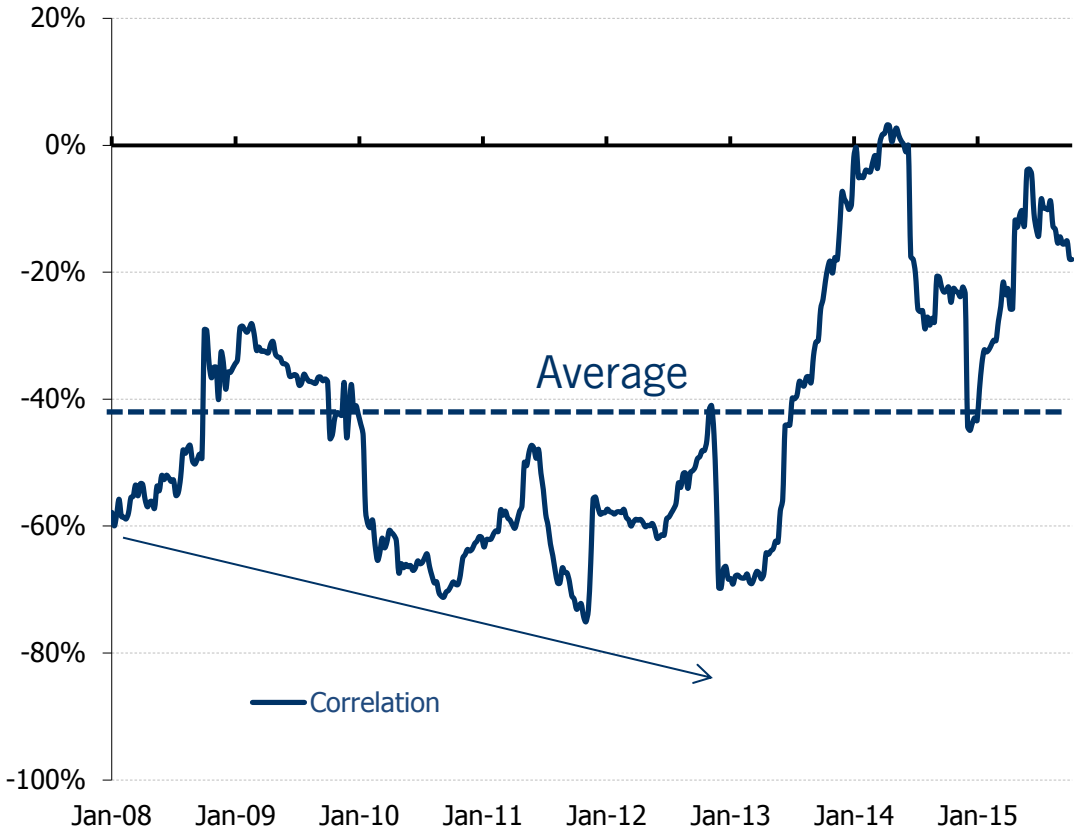
Ab-Normal Correlation regime (short run) Equity - Bonds



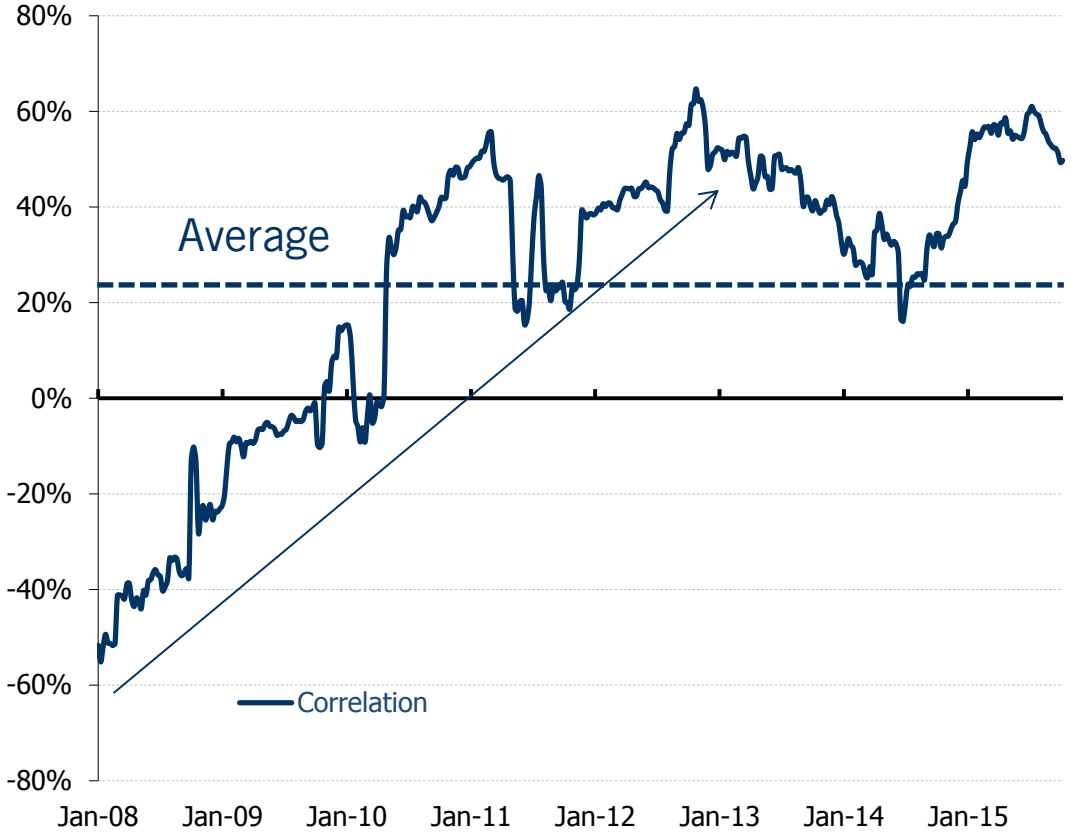
Correlations between bonds and equities (Germany, Italy)

The ‘core’ bonds (Germany) negatively correlated with equities. This DOES NOT apply to Italy!

CORRELATION between GERMAN BUNDS and MSCI EMU



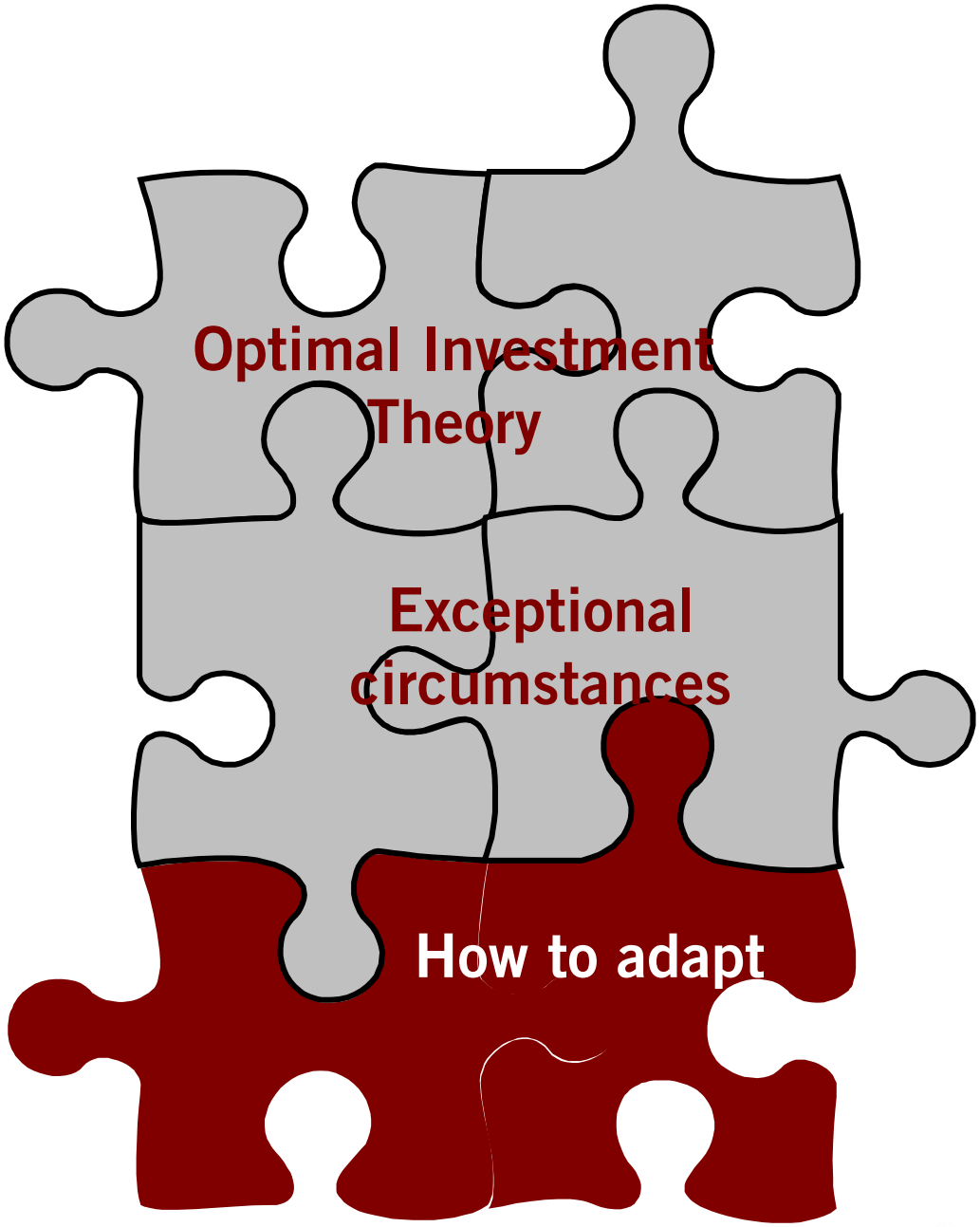
CORRELATION between ITALIAN BTP and MSCI EMU



Source: Pictet, Bloomberg

Asset Allocation…

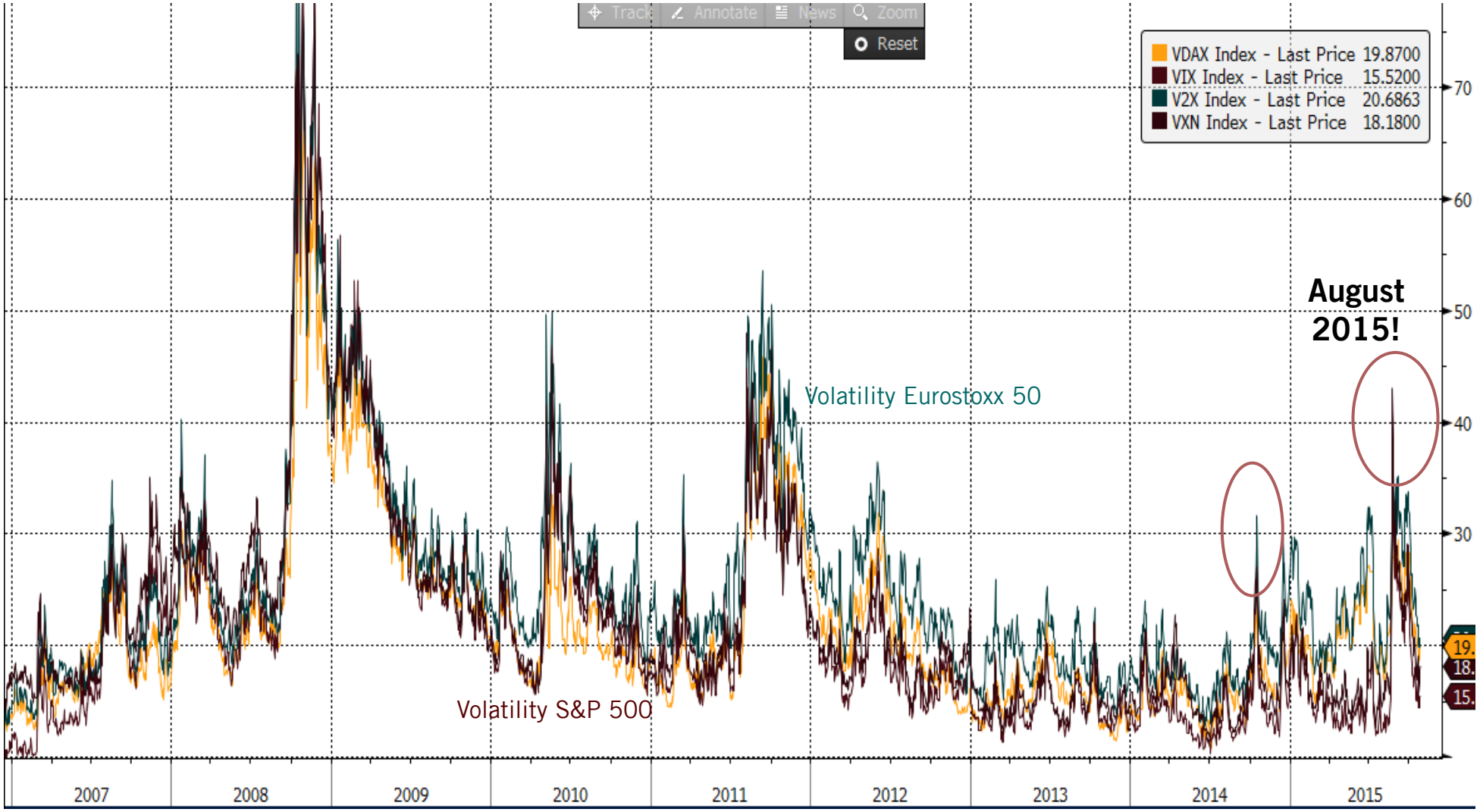
… in a distorted environment



Expected volatility

Uncertainty reduced by 'endogenous' Fed (unemployment doesn't decrease, QE↑) and BCE's OMT/QE

Implied Volatility (Index Options)



Source: Pictet, Bloomberg

Correlation among different Asset Classes: 2003-2008

European Bonds: negative correlation with MSCI World and Euro

01/01/2003 - 01/01/2008

<Filter>

	Security	MSCIW↑	MSCI U	MSCI E
11)	MSCIW	1.000	0.954	0.908
12)	MSCI U	0.954	1.000	0.799
13)	MSCI E	0.908	0.799	1.000
14)	MSCIEM	0.733	0.646	0.632
15)	CORPEH	0.292	0.278	0.223
16)	BONDEM	0.251	0.275	0.142
17)	GOLD	0.037	0.025	-0.047
18)	FXEUR	0.025	0.088	-0.152
19)	FXUSD	-0.011	-0.085	0.144
20)	FXJPY	-0.172	-0.116	-0.154
21)	CORPUI	-0.221	-0.181	-0.253
22)	CORPEI	-0.242	-0.185	-0.297
23)	BONDIT	-0.311	-0.252	-0.346
24)	BONDEI	-0.328	-0.291	-0.352
25)	BOND E	-0.337	-0.276	-0.374
26)	BOND U	-0.348	-0.306	-0.353

01/01/2003 - 01/01/2008

<Filter>

	Security	MSCIW	MSCI U	MSCI E↑
11)	MSCI E	0.908	0.799	1.000
12)	MSCIW	1.000	0.954	0.908
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25)	BOND U	-0.348	-0.306	-0.353
26)	BOND E	-0.337	-0.276	-0.374

Source: Bloomberg

Correlation among different Asset Classes: 2010-2012

European Bonds: positive correlation with MSCI World and Euro

12/31/2009 - 12/31/2012

<Filter>

	Security	MSCIW↑	MSCI U	MSCI E
11)	MSCIW	1.000	0.978	0.934
12)	MSCI U	0.978	1.000	0.877
13)	MSCI E	0.934	0.877	1.000
14)	MSCIEM	0.825	0.767	0.757
15)	CORPEH	0.550	0.485	0.529
16)	BONDEM	0.440	0.418	0.389
17)	BONDIT	0.367	0.333	0.440
18)	FXEUR	0.359	0.363	0.375
19)	GOLD	0.241	0.249	0.157
20)	BOND E	0.056	0.022	0.098
21)	CORPEI	0.049	0.024	-0.002
22)	BONDEI	-0.256	-0.257	-0.289
23)	CORPUI	-0.330	-0.343	-0.358
24)	FXUSD	-0.446	-0.460	-0.436
25)	FXJPY	-0.482	-0.435	-0.471
26)	BOND U	-0.658	-0.642	-0.659

12/31/2009 - 12/31/2012

<Filter>

	Security	MSCIW	MSCI U	MSCI E↑
11)	MSCI E	0.934	0.877	1.000
12)	MSCIW	1.000	0.978	0.934
13)	MSCI U	0.978	1.000	0.877
14)	MSCIEM	0.825	0.767	0.757
15)	CORPEH	0.550	0.485	0.529
16)	BONDIT	0.367	0.333	0.440
17)	BONDEM	0.440	0.418	0.389
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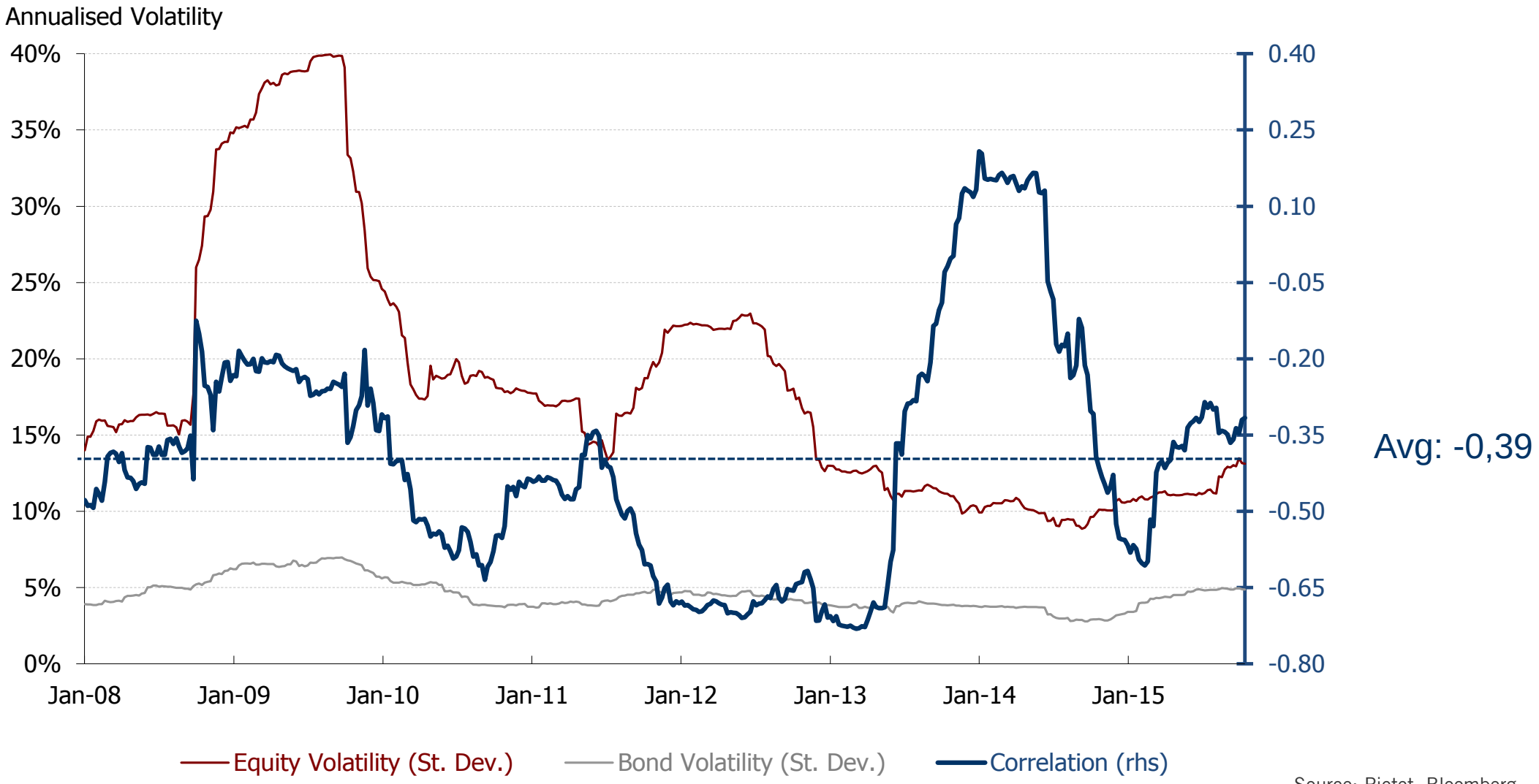
Source: Bloomberg

Correlation Analysis

If correlation falls (better if <0) when volatility rises, then the diversification benefit intensifies

Volatility and Correlation (weekly; 12M rolling); US Treasuries, MSCI W



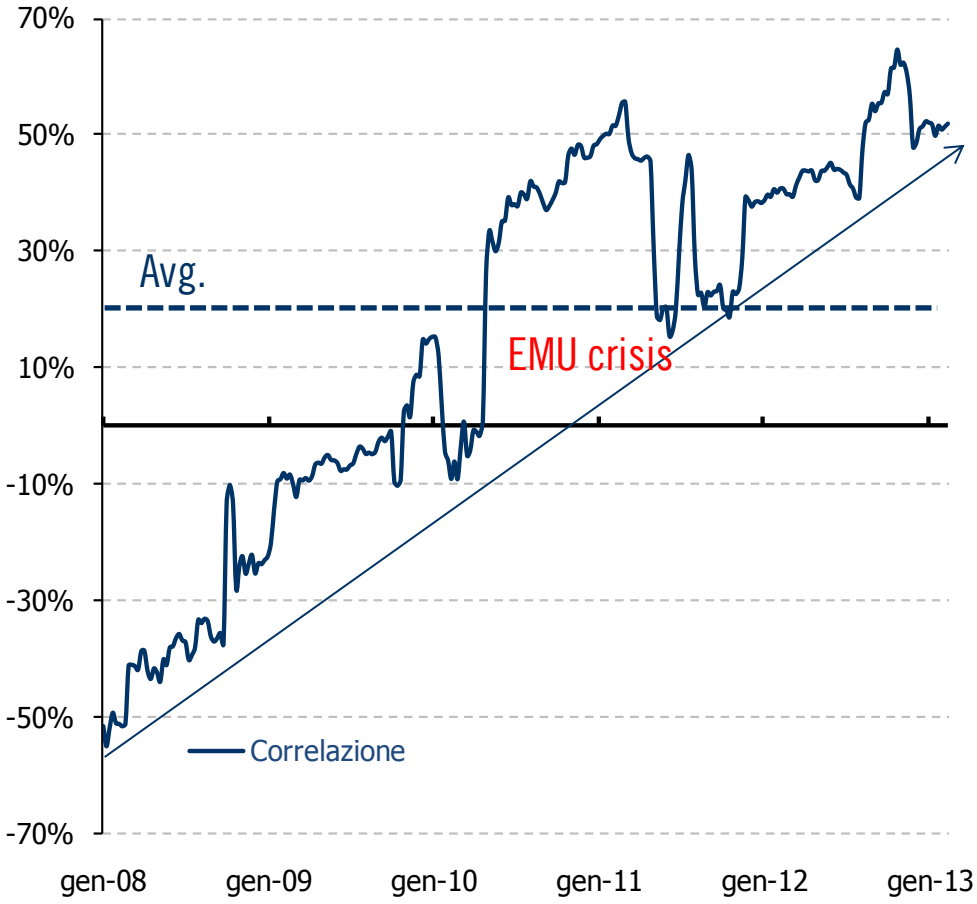
Source: Pictet, Bloomberg

Correlations between bonds and equities, USA & Italy (Jan '13)

The 'core' bonds (USA) negatively correlated with equities. This DOES NOT apply to Italy!

CORRELATION BETWEEN US TREASURIES and MSCI W ($)

CORRELATION BETWEEN ITALIAN BTP and MSCI EMU

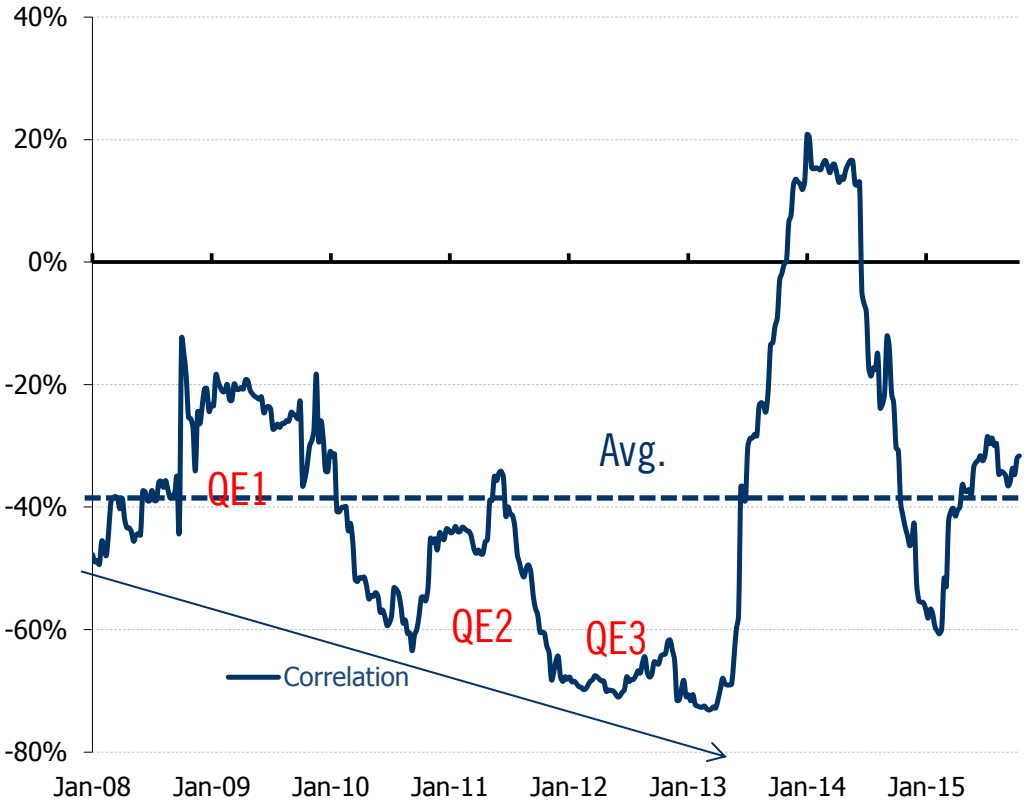


Source: Pictet, Bloomberg

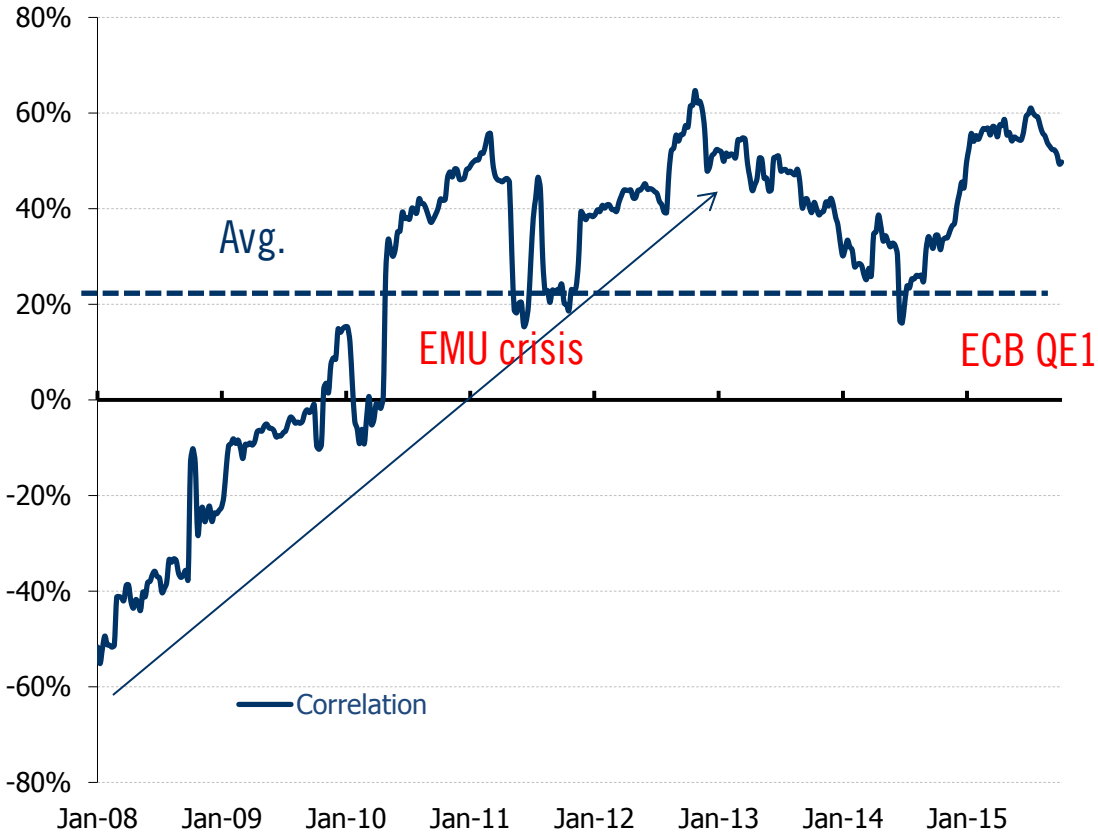
Correlations between bonds and equities, USA & Italy (now)

The ‘core’ bonds (USA) negatively correlated with equities. This DOES NOT apply to Italy!

CORRELATION BETWEEN US TREASURIES and MSCI W ($)



CORRELATION BETWEEN ITALIAN BTP and MSCI EMU

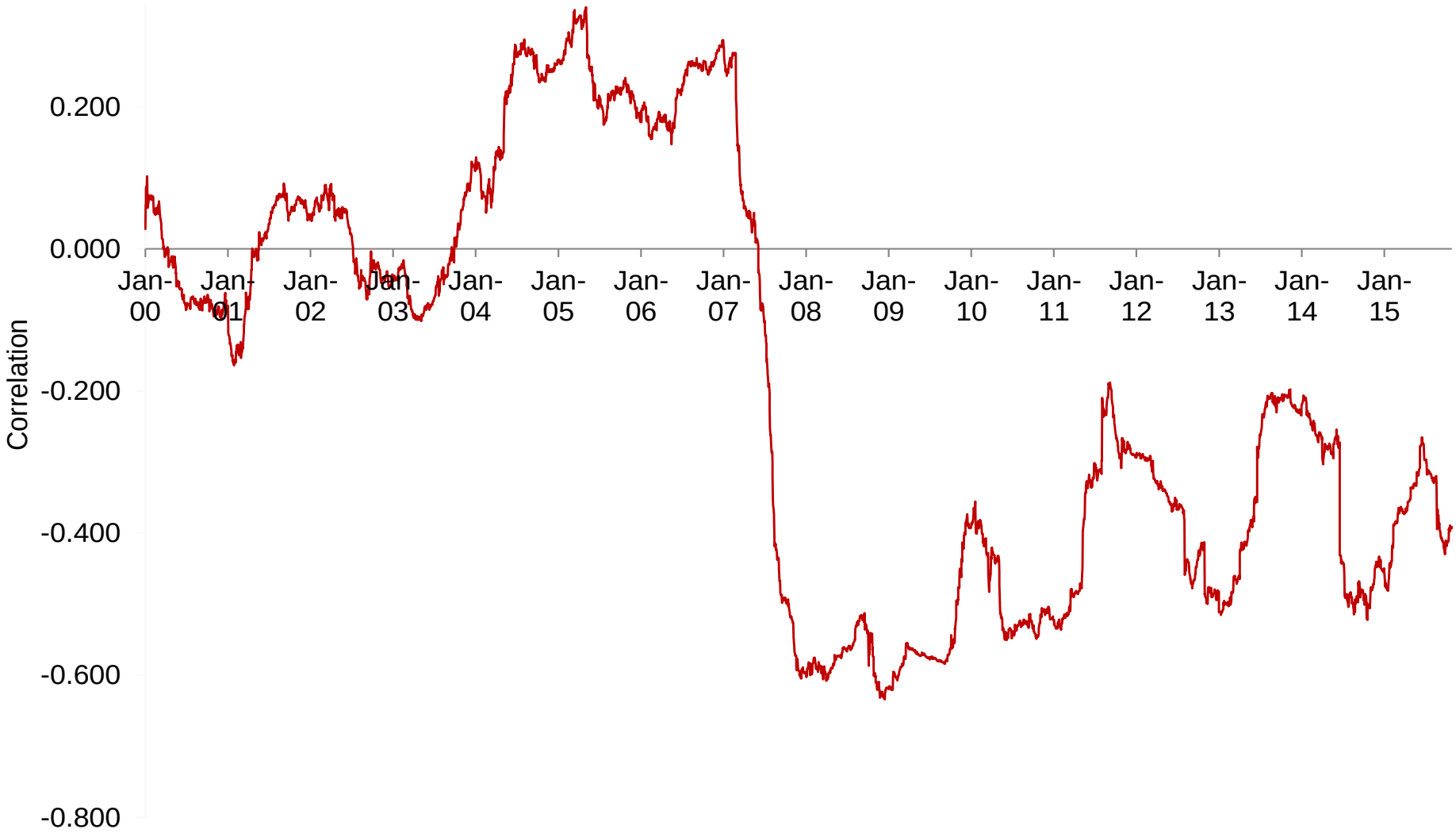


Source: Pictet, Bloomberg

Carry Trades

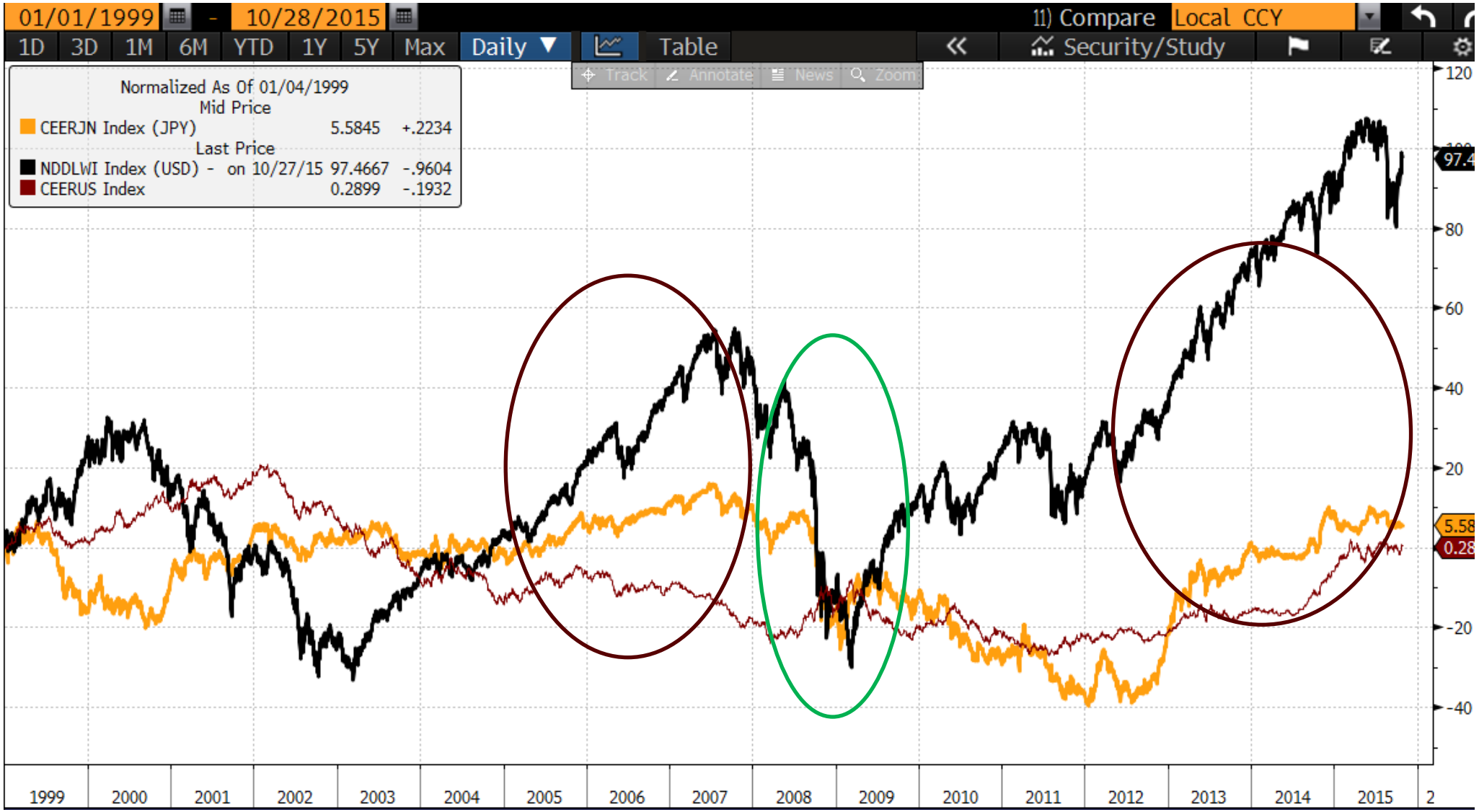
Correlation between Funding Currencies and Risky Assets is negative

Volatility and Correlation (weekly; 12M rolling); JPY Effective Exchange Rates, MSCI W



Source: Pictet, Bloomberg

Yen Effective Exchange Rates vs MSCI World



Risk on: Yen depreciates

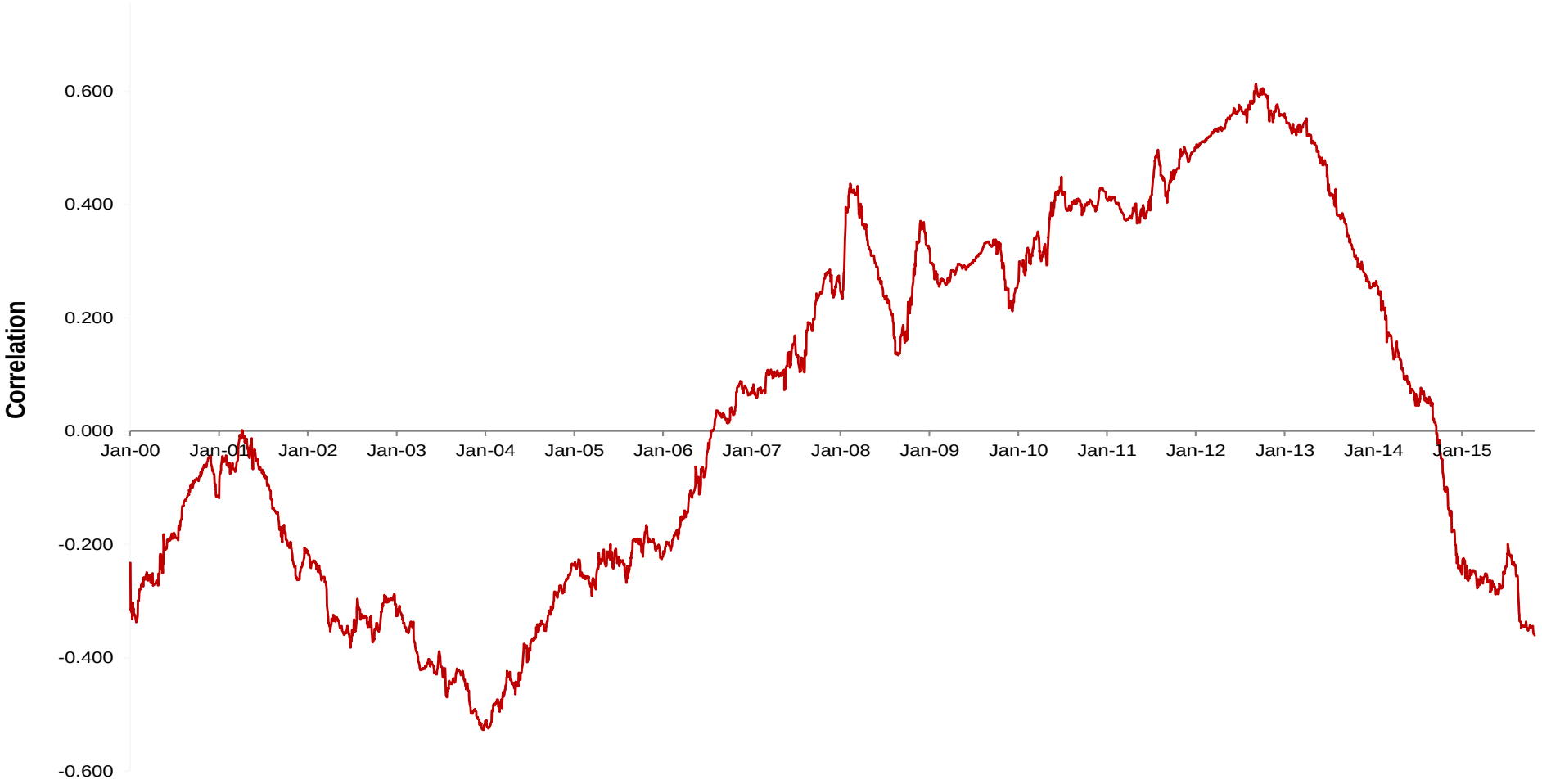
Risk off: Yen appreciates

Source: Pictet, Bloomberg

Euro shifting to Funding Currency Regime

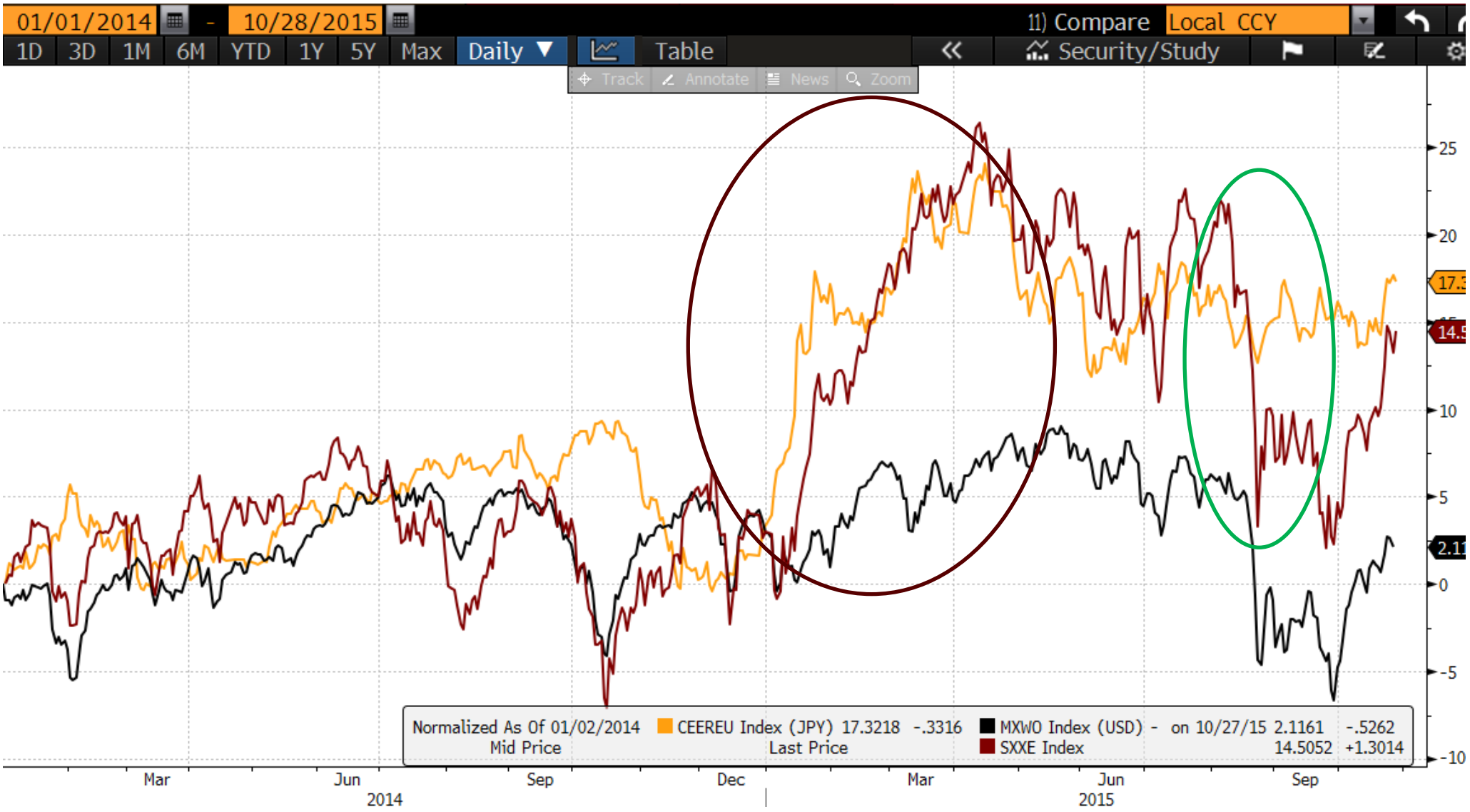
Correlation between Funding Currencies and Risky Assets is negative

Volatility and Correlation (weekly; 12M rolling); EUR Effective Exchange Rates, Eurostoxx



Source: Pictet, Bloomberg

Euro Effective Exchange Rates vs Eurostoxx



Risk on: Euro depreciates

Risk off: Euro appreciates

Source: Pictet, Bloomberg

Different portfolios optimization methodologies (continued)

We introduce now two different kind of portfolio optimizations, the Maximum Diversification and the Risk Parity approaches, which focus on risk allocation, usually defined as volatility, rather than allocation of capital or returns (they are also known as risk-based approached).

Maximum Diversification Portfolio

The Maximum Diversification portfolio maximizes the ratio of weighted-average asset volatilities to portfolio volatility

$$\max \frac{\boldsymbol{w}' \boldsymbol{\sigma}}{\sqrt{\boldsymbol{w}' \boldsymbol{\Omega} \boldsymbol{w}}}$$

where $\boldsymbol{w}$ is the vector of the weights and $\boldsymbol{\Omega}$ is the var-cov matrix

Risk Parity Portfolio

In the Risk Parity Portfolio the weights must be chosen such that the contribution of each asset to the portfolio risk is equal. This requirement can be approximated by the constraint

$$w_i \frac{\delta \sigma_P^2}{\delta w_i} = w_j \frac{\delta \sigma_P^2}{\delta w_j} \quad \forall\, i, j \in \{1, .., n\}$$

where σ^2 is the portfolio variance, w_i the asset i weight and n is the number of assets in the portfolio

Source: Clarke, De Silva, Thorley (2012); Daly, Rossi and Herzog (2012)

Portfolio exercise: max diversification

Repeated crises challenged Markowitz, Relative Value strategies (HF) due to sick correlations

WHICH PORTFOLIO?

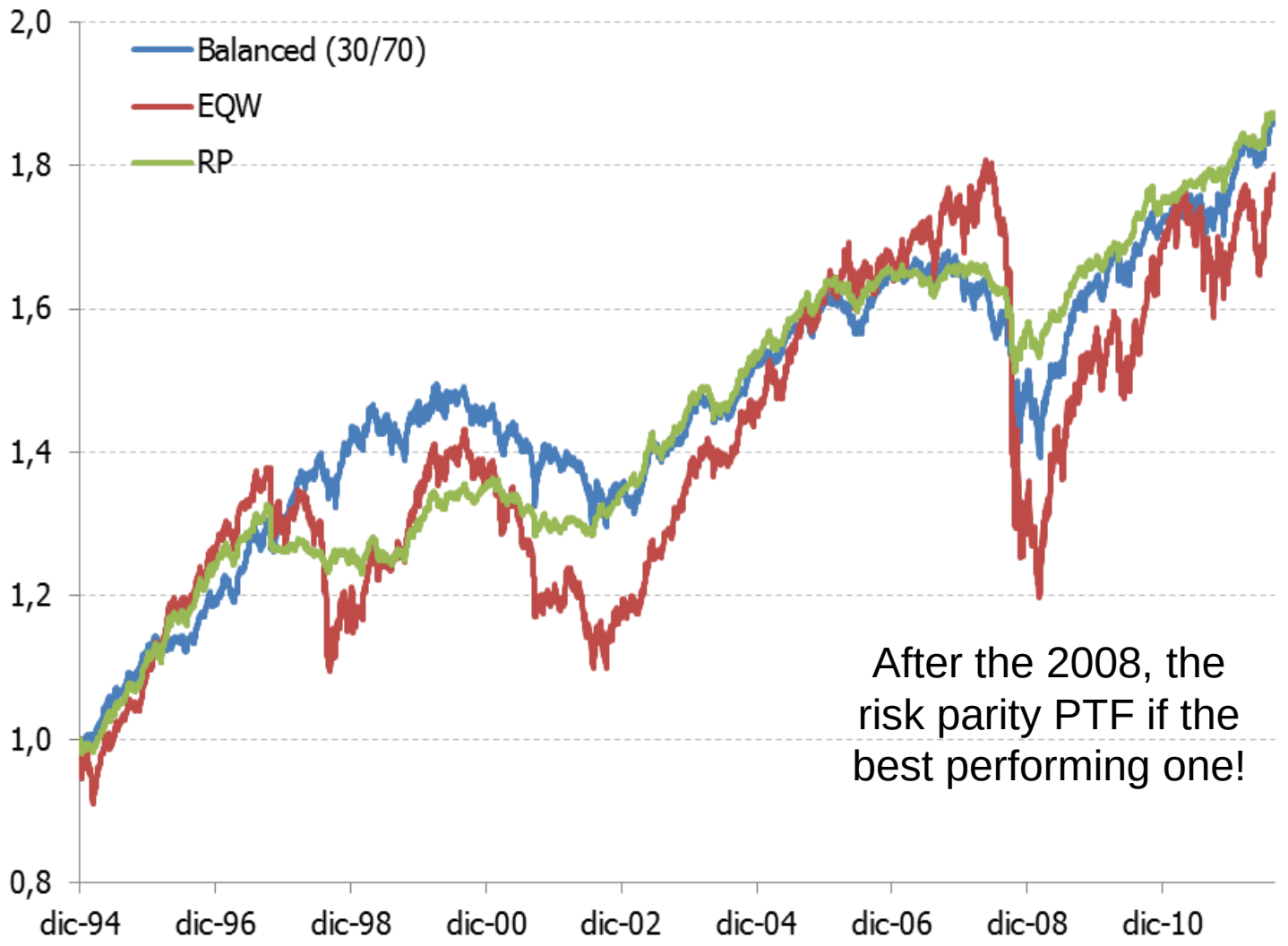
In normal times: Markowitz and optimal PTF (max Sharpe Ratio)

With volatility but stable negative correlation: balanced PTF

With volatility and uncertain correlations: equally weighted PTF (max diversification)

With volatility and changing correlations: risk parity based PTF (close to minimum risk)

Equally weighted portfolio, balanced portfolio and risk parity portfolio performances



Source: Pictet, Bloomberg

Conclusions

- The benefits coming from diversification are directly proportional to the degree of decorrelation among the investment portfolio's assets.

- Since the subprime crisis of 2008, correlations remained relatively high (typical during financial turmoil). On the contrary, the volatilities have experienced a normalization.

- One of the causes of the correlations behavior is the standardization of the investors' behavior, affecting in particular intra-assets correlations. The correlation between equities and bonds has been affected by the European Debt Crisis and by the behavior of the Fed in the USA, and later many other Central Banks adopting Quantitative Easing, that favor (at least a temporary) inversion of the correlation sign from negative to positive.

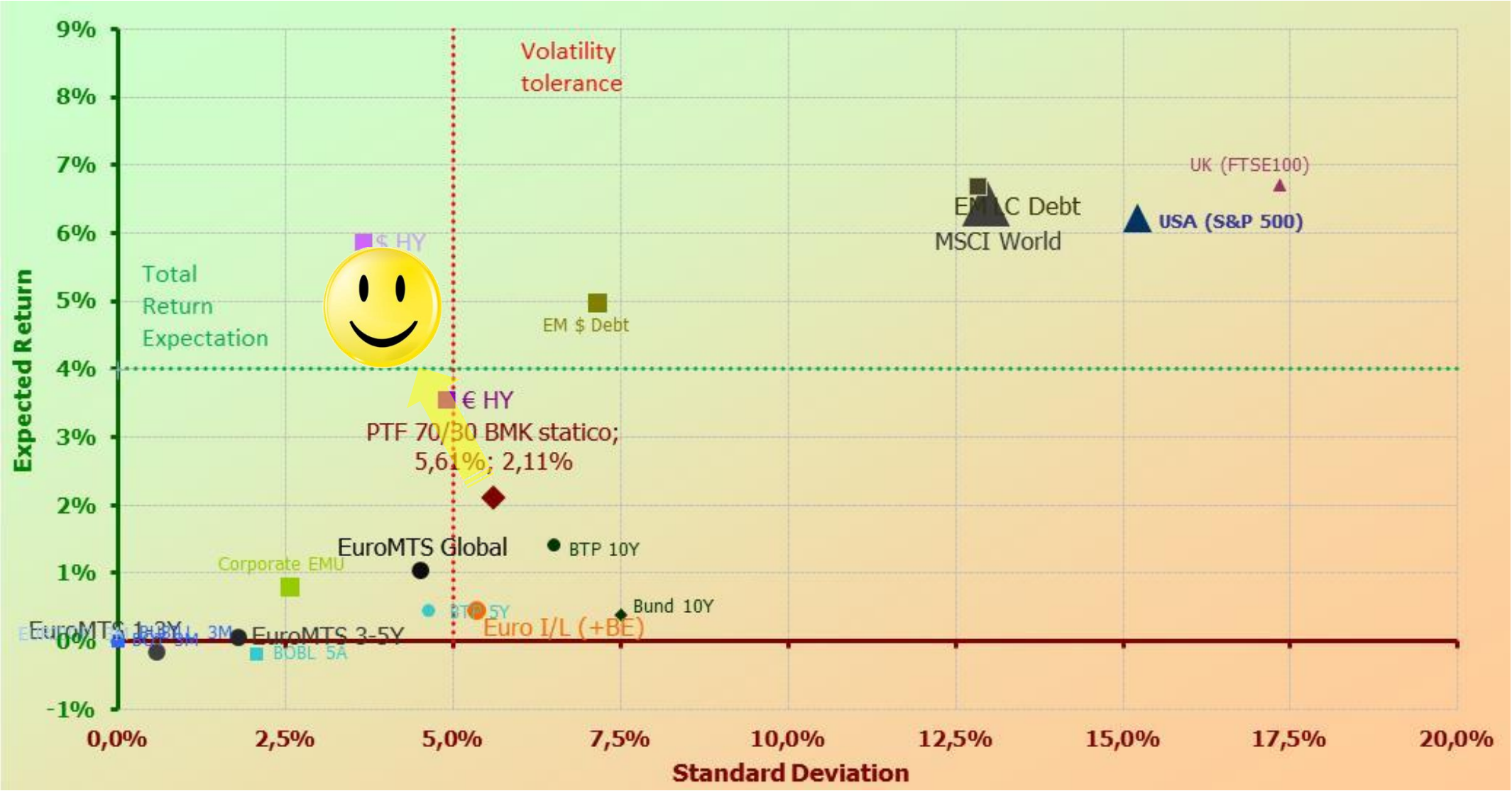
- When there is uncertainty on the economic growth, the correlation between equities and bonds should be 'normal' (negative): this could encourage holding a longer duration.

- Because of the paucity of decorrelations, there are now less opportunities than before. How to face this new world? Two solutions: i) Reduce your Total Return objectives; ii) become more «aggressive» in order to reach 'sub-optimal' but higher gains. Either way, we are induced to diversify through additional presence of risky assets (equities).

In this last case, using a **max Diversification** portfolio (or based on **Risk Parity**), instead of a **max Sharpe** one, may hold better in the face of uncertain/unstable correlations.

Flexible approach to compensate for lower ex-ante Returns

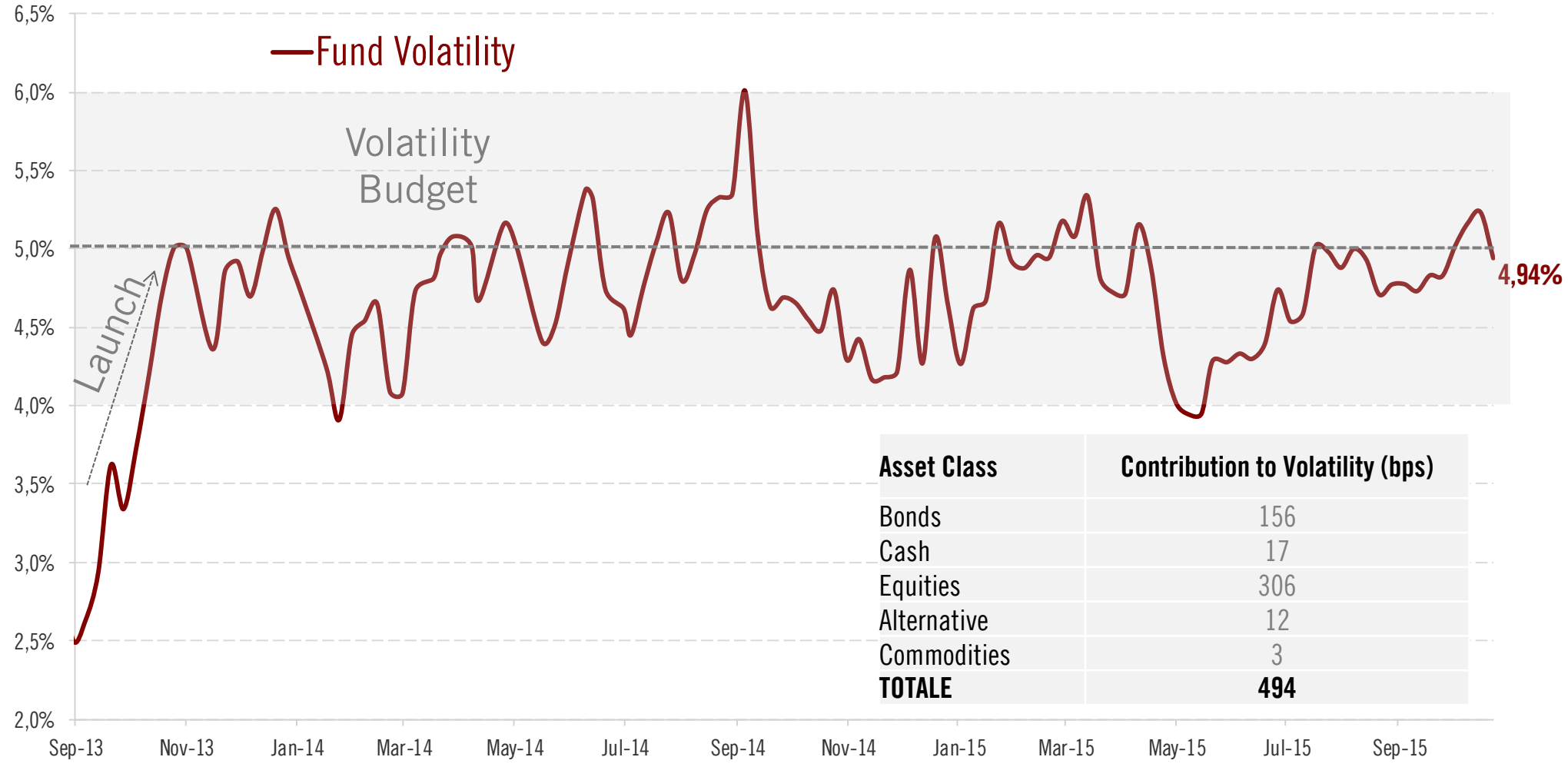
Components of the 70/30 Portfolio: EMU Bonds and MSCI World



Source: Pictet, Bloomberg

Ex-Ante Volatility of Pictet Multi Asset Global Opportunities (MAGO)

Risk Management in Portfolio Construction

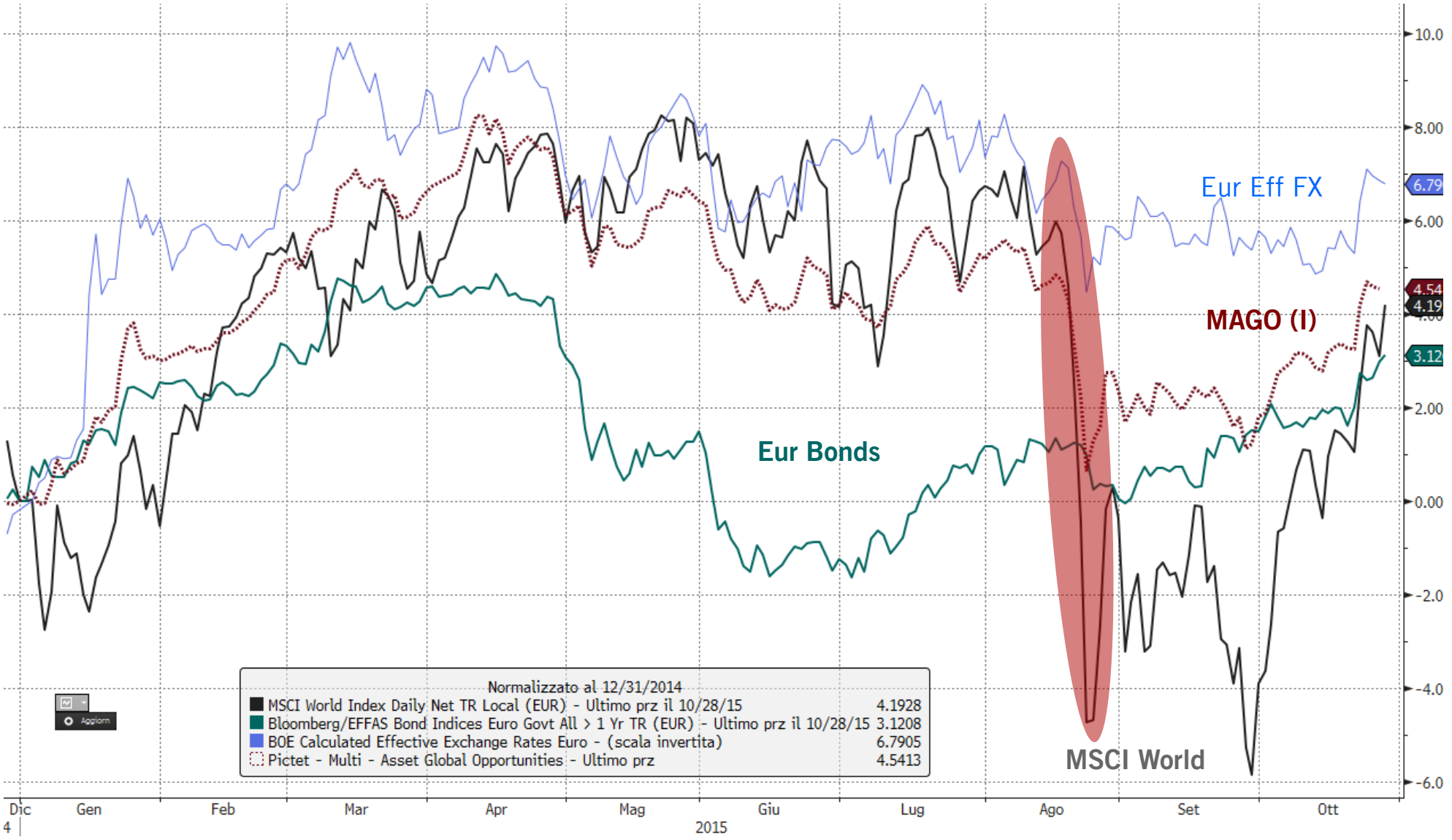


Asset Class	Contribution to Volatility (bps)
Bonds	156
Cash	17
Equities	306
Alternative	12
Commodities	3
TOTALE	**494**

Source: Pictet, Bloomberg

Performance of Pictet Multi Asset Global Opportunities

Performance and Volatility of MAGO and its reference



Source: Pictet, Bloomberg

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Hope you received some hints…

… good luck for your financial DIY!

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Daly D., Rossi S. and Herzog F. (2012). Methodology for the Construction and Enhancement of Risk-Parity Portfolios. *SwissQuant Group AG, Zurich, Switzerland:* 416 – 419.

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Top Advisor is a digital contest designed to disseminate the principles of financial education: put yourself in the shoes of a money manager, build your portfolio and play with markets.

Get your friends, colleagues and customers involved in a challenge that will teach you how to manage your emotions and learn the principles of successful investing.

The challenger has to invest a virtual 100.000€ wealth, building a portfolio with Pictet funds using a web trading platform.

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- Digital contest on portfolio simulation measured on the Sharpe ratio
- Each category has its competition and league table
- Interaction between categories
- Training programs

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Every session the first three in each category receive a prize!

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- Meeting with the Bank's analysts
- Training sessions on optimal portfolio construction

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- The Absolute Top Advisor within all the categories wins a **Renault Twizy Life**
- Second and third placed win two wonderful electrical bicycles

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